REMAINS OF KHMER ROUGE VIOLENCE: THE MATERIALITY OF BONES AS SCIENTIFIC EVIDENCE AND AFFECTIVE AGENTS OF MEMORY

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ABSTRACT

REMAINS OF KHMER ROUGE VIOLENCE: THE MATERIALITY OF BONES AS SCIENTIFIC EVIDENCE AND AFFECTIVE AGENTS OF MEMORY

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The Khmer Rouge regime, led by the infamous Pol Pot, governed Cambodia from 1975 to 1979. Living conditions were severe, and it is estimated that approximately one quarter of the Cambodian population of nearly eight million died from mistreatment, overwork, malnutrition, and violence. Using a biocultural anthropological approach, this research addressed questions concerning individuals executed by the Khmer Rouge regime and the agency (the effect on living individuals) of the resulting skeletal remains.

An osteological analysis of more than 500 crania was conducted at the Choeung Ek Genocidal Center (Choeung Ek) in Phnom Penh. More than 100 original Khmer Rouge execution lists from the detention and torture facility known as S-21—today called the Tuol Sleng Genocide Museum—were assessed to gather known demographic data for those who were executed and buried at Choeung Ek between 1977 and 1979. To comprehend the incorporation of human skeletal remains from the Khmer Rouge period into the socio-religious framework of modern Cambodia, 13 memorial *stupa* containing human remains were visited and the caretakers of these memorials were interviewed.

The 508 crania at Choeung Ek were assessed for demographic characteristics and traumatic injuries. Results indicate that the majority of crania were estimated to be male (82.9%) and nearly all were of Asian ancestry (86%). The majority of the individuals were young adults (68.3%) between the ages of 20 and 35 years old, although subadults and older adults were represented. Perimortem trauma was present on 311 crania (61%), with 179 (58%) having

discernable impact locations. Blunt force injuries (87%) were the most common mechanism of trauma and the basicranium (53%) was the most frequently impacted region. When the mechanism and location of traumatic injuries were evaluated by sex and age-at-death categories, no statistically significant differences were found indicating that all victims with perimortem trauma were subjected to similar execution methods regardless of their age or sex.

At the Tuol Sleng Genocide Museum, 97 definitive Khmer Rouge execution lists were evaluated documenting the murders of 6,285 individuals. The majority (82.1%) were male, the minimum age was 11, the maximum age was 77, and the average age was 29.1 years. When these archival demographic data were compared to these osteologial data, however, there were statistically significant differences between the samples.

Observational data from all 13 memorials, and interview data from 10 memorials indicated that the human remains were not formally preserved to prevent decay and there was never a clear indication of how many individuals were represented by the remains with the *stupa*. The informant's responses addressed issues such as the identification of the human remains within the memorial, current religious practices conducted at the memorials often in conjunction with caring for the remains, how the remains are displayed for knowledge and/or teaching purposes—although often with a political undertone—and that the memory of the Khmer Rouge period, as well as that of the victims, is crucial for modern Cambodians.

This research embraced a holistic approach to move beyond the confines of traditional osteological laboratory research by addressing the social impact of the remains. While the Khmer Rouge period was devastating, the human remains of the victims have not been forgotten; the remains continue to remind all who visit that immeasurable violence occurred in Cambodia but also that Cambodians are resilient and they will continue to memorialize those they lost.

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KEY TO ABBREVIATIONS

BFT:	Blunt force trauma
CIA:	Central Intelligence Agency; foreign intelligence service of the United States' government
CGDK:	Coalition Government of Democratic Kampuchea; formed in 1982 in opposition to the PRK government
CPK:	Communist Party of Kampuchea; the party of Democratic Kampuchea that oversaw the communist revolution in Cambodia between 1975 and 1979
CPP:	Cambodian People's Party; ruling governmental party in Cambodia since 1991, formerly the KPRK, with Hun Sen as its Prime Minister since 1998
DC-Cam:	Documentation Center of Cambodia; non-governmental organization with the largest archive of Khmer Rouge documents, photographs, etc.
DK:	Democratic Kampuchea; the state established by the CPK that governed Cambodia between 1976 and 1979
EAAF:	Equipo Argentino de Antropología Forense (Argentine Forensic Anthropology Team); founded in Buenos Aires by Dr. Clyde Snow in 1986
ECCC:	Extraordinary Chambers in the Courts of Cambodia; United Nations-supported court established in 2004 to prosecute top leaders of Democratic Kampuchea
FAFG:	Fundacion De Antropología Forense De Guatemala (Guatemalan Forensic Anthropology Foundation); founded in Guatemala City by Dr. Clyde Snow in 1991
GSW:	Gunshot wound; one form of high-velocity projectile trauma
ICC:	International Criminal Court; located in The Hague, the Netherlands
ICTR:	International Criminal Tribunal for Rwanda; branches located in The Hague and Arusha, Tanzania
ICTY:	International Criminal Tribunal for the former Yugoslavia; located in The Hague, the Netherlands
ICP:	Indochinese Communist Party; founded by Ho Chi Minh in 1930

KGB: Committee for State Security; intelligence and security service of the Soviet Union's government between 1954 and 1991

KPRP: Khmer People's Revolutionary Party; developed under the supervision of the Vietnamese Communists with the ICP in 1951

KR: Khmer Rouge, or the Red Khmer; the members of the regime of DK that controlled Cambodia between 1975 and 1979

mCA: Multiple Correspondence Analysis; statistical method used to graphically display contingency table data to evaluate patterns and variance

NUFK: National United Front of Kampuchea; government of Norodom Sihanouk after the Lon Nol *coup d'état* in 1970

OCIJ: Office of the Co-Investigating Judges at the ECCC

PDK: Party of Democratic Kampuchea; initial Khmer Rouge government after the CPK officially disbanded in 1981

PRK: People's Republic of Kampuchea; the Vietnamese-backed government of Cambodia between 1979 and 1989; name changed in 1989 to the State of Cambodia

PRCK: Kampuchean People's Revolutionary Council; transitional government (1979 to 1981) prior to the constitutional establishment of the PRK

S-21: Khmer Rouge detention and torture facility in Phnom Penh; today referred to as the Tuol Sleng Genocide Museum

SFT: Sharp force trauma

UNTAC: United Nations Transitional Authority in Cambodia; a short-term (1991-1993), multinational protectorate in Cambodia to assist with the transition to democracy and de-militarization

YFP: Youth for Peace; Cambodian organization that helps youth cultivate a culture of peace and bring change to civil society

Figure 1. Map of Southeast Asia.

Figure 2. Map of Cambodia.

CHAPTER 1: INTRODUCTION

Nearly 7,000 faceless crania stare back from behind the glass of the Choeung Ek Genocidal Center's memorial *stupa* (Buddhist shrine) as you pay your respects to the unidentified deceased. Who are these men, women, and children, and what befell them during the Khmer Rouge period? While their individual identities may forever be lost, the primary objective of this research is to augment knowledge and answer questions not yet addressed regarding Khmer Rouge violence in Cambodia. By systematically analyzing the human skeletal remains at the Choeung Ek Genocidal Center, which directly retain evidence of violent actions, I integrate previously undocumented data into a more holistic narrative of Khmer Rouge atrocities.

This research employs a biocultural anthropological approach to address questions concerning the individuals executed by the Khmer Rouge and the agency (the effect on living individuals) of the resulting skeletal remains. To achieve this objective I analyzed hundreds of human crania at the Choeung Ek Genocidal Center to assess demographics and osteological manifestations of violence, analyzed original Khmer Rouge documents at the Tuol Sleng Genocide Museum (the former S-21 security center), and assessed the sociocultural implications of incorporating unidentified human remains into national and local memorials. It is anticipated that this research will greatly contribute to the literature on Khmer Rouge violence, as well as to the ongoing forensic anthropological focus on crimes against humanity and genocide.

The Khmer Rouge Regime

After years of civil war in Cambodia, the Khmer Rouge regime came to power in Phnom Penh in April 1975, and established the new state of Democratic Kampuchea (DK) by 1976. Led

by the infamous Pol Pot, DK leadership enacted sweeping changes: money, education, religion, and private property were abolished. The Khmer Rouge emptied cities and all Cambodians were forcibly relocated to rural collective communities where they participated in agricultural and development projects for DK. It is estimated that 1.5 million people were evacuated from the capital of Phnom Penh in 1975 in order to "sweep clean" the past. Only a small number of individuals, primarily Khmer Rouge officials and factory workers, were left in the cities (Ea 2005).

The living conditions under the Khmer Rouge were severe, with historical estimates stating that between 1975 and 1979 approximately one quarter of the Cambodian population of nearly eight million died from mistreatment, overwork, malnutrition, and violence (Kiernan 2008). Various scholars have provided different estimates for the percentage of this figure that were executed; ranging between 30 and 40% of deaths, the number of executed individuals equates to roughly 527,000 to 680,000 (Ea 2005).

Inspired by Mao Zedong's revolutionary Great Leap Forward in China, and an extreme focus on Cambodia's national pride, the primary goal of the DK leadership was to establish an ethnically "pure" Khmer society (Kiernan 2006). In addition to establishing policies idealizing the peasantry and creating a complete agrarian economy, the Khmer Rouge sought the complete destruction of internal and external "enemies," both real and imagined. In order to suppress these enemies, security centers were established to imprison, interrogate, torture, and often execute enemies and their families (Ea 2005). On January 7, 1979 the Vietnamese army, with assistance from Cambodian supporters, overthrew the Khmer Rouge in Phnom Penh ending the three years, eight months, and 20 days of Democratic Kampuchea.

Genocide and Human Rights Scholarship

Mass killing, particularly in the context of ethno-political violence as a means of controlling populations, is not a recent phenomenon in human history; however, terms to define such killings have developed in the modern era. The terms "genocide" and "crimes against humanity," although often used synonymously to denote violence on a large scale, have specific legal definitions. Developed in the context of the Nuremberg Trial of Nazi war crimes in the late 1940s, "crimes against humanity" is a broad category encompassing extermination, persecution, and deportation of religious, political, and racial groups (Adelman et al. 2005). The term "genocide"—derived from the Greek words *genos* meaning race or tribe and *cide*, to kill (Rothenberg 2005)—coined by Raphael Lemkin and adopted by the newly formed United Nations in 1948, is defined as "acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group" (Gellately and Kiernan 2003). Thus, genocide is considered the most egregious, or "aggravated," form of crimes against humanity. While the definition of crimes against humanity includes political groups, the UN definition of genocide does not include social or political groups. Additionally, crimes against humanity can only occur during times of war while genocide can be committed during both war and peace (Adelman et al. 2005; Gellately and Kiernan 2003).

Anthropology and the Study of Genocide and Human Rights

Anthropologists, until the 1980s, have been relatively disengaged from the study of genocide, especially given the discipline's past contributions to genocidal regimes (*e.g.*, archaeology and physical anthropology were used by the National Socialists to justify their ideological destruction of Jews and others in the Holocaust) (O'Neill 2010). But why have

anthropologists and other social scientists neglected to engage themselves in research on this topic, despite being involved in research on warfare, conflict, and violence in early human societies (Hinton 2002a; Hinton 2002b)? Hinton (2002a) suggests that cultural relativism, a focus on globalization, and general feelings of discomfort or insufficiency in the face of such a broad and complex topic are a few reasons anthropologists may not have actively engaged in the study of genocide.

Hinton (2002b) and O'Neill (2010) argue, however, that anthropologists have a great deal to contribute to the interdisciplinary study of genocide. Anthropologists, as Hinton (2002b) notes, have local, sociocultural knowledge that can be directly linked to the macro-level dimensions of genocidal actions. Anthropology's qualitative and quantitative foci, according to O'Neill (2010), permit contributions to the study of genocide particularly regarding discourses of truth, memory, and representation in post-genocidal contexts. Ethnographically, anthropologists can question the historical representations of genocides and the role of the nation-state in the formation of national identity as well as a focus on individuals and groups such as refugees in post-conflict diasporic contexts. From a more applied approach, anthropologists, as engaged observers, can also be activists supporting human rights organizations and provide cultural critiques questioning the historical, political, and cultural origins of genocide (O'Neill 2010). In other words, anthropologists are able to contribute unique cultural and social information to the understanding of genocides which might otherwise be overlooked.

Role of Forensic Anthropology and Archaeology

Forensic anthropologists and archaeologists, in contrast to the sociocultural anthropologists Hinton describes, have been involved in the exhumation of mass graves resulting

from crimes against humanity and/or genocide, as well as the subsequent analysis and identification of remains generated by such violence for decades (Ballbé and Steadman 2008; Crossland 2013; Crossland and Joyce 2015b; Kimmerle and Baraybar 2008b; Komar 2008; Komar and Lathrop 2012; Steadman and Haglund 2005).[1] The first human rights investigation to utilize forensic anthropologists occurred in 1984 when forensic experts were asked to investigate the "disappeared" from Argentina's military dictatorship in the late 1970s and early 1980s (Steadman and Haglund 2005). Forensic involvement occurs in the aftermath of crimes against humanity and the analysis/research primarily involves interpretation of violent acts. Forensic anthropologists and archaeologists can locate and exhume graves, collect physical evidence, conduct osteological and material culture analyses (primarily analyses of traumatic injuries), provide legal testimony, and collect antemortem data (Steadman and Haglund 2005; Kimmerle and Baraybar 2008).

For decades, however, the work of forensic anthropologists and archaeologists, particularly in U.S. domestic criminal or medicolegal contexts, was critiqued for being atheoretical. Recent forensic anthropological contributions to studies of genocide and crimes against humanity has addressed his critique. Today, a more theoretically grounded forensic anthropology is developing; in the context of genocide or mass violence, broader issues of human behavior must be addressed using anthropological theory (Martin 2015). Analyzing human remains and their associated contexts can therefore provide information that may not be available from other sources. For example, mass graves are a clear indication of widespread death, but anthropologists are able to assess how these individuals died. Did they die from illness, from violence, or from some other cause? In the case of traumatic injuries, information

[1] This is only a small example of the scholarly literature discussing the incorporation of forensic anthropology or archaeology into human rights work. For further elaboration, see Chapter 9.

from osteological analyses can reveal what mechanism may have caused these injuries. Particularly if there were no eyewitnesses to an atrocity, the human remains are invaluable lenses into the past.

Additionally, evidence of violence and victim demographics are important for legal justice. If leaders of violent regimes are held accountable in a court of law, evidence from the human remains can help quantify the violence and document whether patterns were present within or between different targeted groups. By embracing more social theory, forensic anthropologists and archaeologists can also assess the behavior of the perpetrators via the physical evidence: body disposal (burial, incineration, casually discarding), body placement within a grave (orderly placement or dumped), and how the graves were concealed can all help anthropologists theorize about the possible motives of the perpetrators and the sociocultural contexts the may have led to mass violence or genocide.

Finally, the impacts of forensic anthropological work can been seen at both local and global levels. In some cases of genocide or mass violence, the information provided by forensic anthropologists and archaeologists can aid in the personal identification of victims and the return of remains to their family members. While identifying a victim of mass violence is never pleasing, families can begin to find closure and can provide the victim with culturally appropriate death rituals. On a larger scale, if the forensic evidence is used in legal proceedings, it can promote (although not always) national healing, transitional justice, or the revision of a nation's history. Globally, analysis of violence and osteological traumatic injuries at the population-level allows for geographic and temporal comparisons of atrocities (Komar 2008) which directly contribute to the interdisciplinary nature of genocide and human rights studies.

Mass Violence and Memorialization

Memory making and memorialization—the process and result of collective remembrance—are social practices that connect humans and objects in both the past and present and are important for countries transitioning after violent repression (Hamber et al. 2010). As Hamber et al. (2010) state, memorialization allows for confrontation of the past and addressing of conflict while also involving large numbers of individuals over long periods of time; it is also a process that can be initiated by both communities and governments. However, in the case of state-sponsored memorialization, there is often a specific national narrative associated with the commemoration of violence that can hinder local or individual remembrance (Jinks 2014). Power, truth, conflicting memories, justice, and social contexts of reconciliation and forgetting are all intertwined in the process of memorializing the past (O'Neill and Hinton 2009). Memory, much like truth in post-genocidal contexts, as O'Neill and Hinton (2009) state, is often crafted and reworked to fit the present.

The study of genocide and mass violence memorials, as Jinks (2014) states, is now a distinct area of scholarly research. Holocaust-related memorials have received the most attention in the past decade, although other sites of mass violence (such as Cambodia) are slowly, yet unevenly, gaining attention. As with the majority of social science research today, Jinks (2014) calls for a comparative analysis of genocide/mass violence memorials as it will permit scholars to move beyond the memorials' similarities and help to identify power dynamics, memory, and representation in post-genocidal contexts.

After genocide or mass violence, victims, communities, and nations often seek ways to remember the past in order to recover. In some cases this memorialization and commemoration of trauma is symbolic, while in others, preservation of trauma sites or the constructions of

material monuments/memorials occur. While symbolic and material memorialization are not mutually exclusive, for clarity they are discussed below independently.

Symbolic Memorialization

Symbolic memorialization helps to solidify collective social memories. These memories are rarely, if ever, homogenous, and debates abound between political and social groups as to whom and what should be remembered and how this should be achieved. As such, I prefer Young's (1993) notion of "collected" rather than "collective" memory. "Collected memory" permits the various and competing memories of a society to be aggregated "into common memorial spaces and assigned common meaning" (Young 1993). Despite heterogeneous individual memories, typically a dominant narrative is developed and collected memories are distilled into practices that become rituals.

Symbolic memorialization can take various forms, many of which are artistic. For example, genocides and other mass atrocities have been commemorated through film, fiction and non-fiction literature, dance, and theater (Eltringham and Maclean 2014). Another example, as Jelin (2007) discusses, is the establishment of dates on the national calendar. These dates—which are often contested—mark anniversaries for commemoration and remembrance of important events during a period of violence or trauma. For example, dates of regime collapses, deportations, a particular battle or incident of violence, or liberations can be marked on the national calendar as a form of symbolic memorialization.

These symbolic, yet overtly political, holidays have been deployed in Cambodia. January 7 marks "Victory Day" or "Victory over Genocide Day" celebrating the fall of the Khmer Rouge regime in 1979, and May 20 is the "Day of Maintaining Rage" marking the day in 1976 when

Cambodian life was collectivized (Jarvis 2015; Sion 2011). The May 20 holiday is discussed in more detail in Chapter 7. Both of these national holidays are based on the Gregorian calendar, rather than the Khmer Buddhist (lunar) calendar, and were established by the People's Republic of Kampuchea (PRK) in the 1980s (Sion 2011). However, neither holiday emphasizes the survivors or victims; January 7 commemorates the "saviors" or "liberators" of Cambodia from the clutches of the Khmer Rouge, and May 20 focuses on condemning the Khmer Rouge regime and their policies. "These official ceremonies are neither remembering victims nor comforting survivors," as Sion (2011) purports; "they are self-serving spectacles that feed the ambiguous discourse of the government and its manipulation of commemorative performances and memorial sites for political and economic purposes." These holidays, while not necessarily commemorating victims or survivors, are examples of symbolic memorialization. Individual memories are consolidated in a symbolic form without the need for physical sites or objects to convey or remember the atrocity.

Material Memorialization

The material memorialization of mass violence can also accommodate many forms including repurposed sites of violence, monuments, memorials, artwork, museums, markers or plaques, etc. These material forms can serve to remember heroism or resistance, represent survivors, or commemorate mass murder and the dead. Regardless of whom or what is being remembered or commemorated, as with symbolic memorialization, "depending on where and by whom these memorials are constructed, these sites remember the past according to a variety of national myths, ideals, and political needs" (Young 1993). Before proceeding, a few terms should be clarified. In general, "monuments" are presumed to celebrate individuals or

triumphant events (*e.g.*, obelisks, such as the Washington Monument) while "memorials" commemorate a loss of life and are locations for mourning (*e.g.*, the 9/11 memorial). However, the meaning of the terms "memorial" and "monument" are not necessarily intrinsic as they can serve both functions. As Young (1993) notes, a monument can engender feelings of loss and tragedy (*e.g.*, St. Peter's Basilica is monumental, but is built over the grave of St. Peter) and a memorial, such as the Martin Luther King, Jr. Memorial, can promote positive thoughts and actions including peace and nonviolence. In what follows, however, I will use the term "memorial" to describe a structure indicative of loss, a place commemorating death or the dead, and a site where mourning can take place.

Of the memorials, monuments, or markers that are constructed to remember suffering, Jacobs (2011) argues that those "established at former sites of terror where the memory of suffering, torture, and extermination is encoded in the buildings, grounds, and grave sites" are the most provocative and often render the location a sacred space. Similarly, Foote (1997) has proposed four categories describing how sites of past violence are remembered: sanctification, designation, rectification, and obliteration. Sanctification and obliteration represent the extremes along the continuum of memorialization, and Foote (1997) argues that for survivors, mass gravesites tend to become sanctified, while for perpetrators they are sites of obliteration.

Sanctified sites are those dedicated to the memory of a group, person, or event and clearly demonstrate a relationship between memory and landscape. Sanctified sites are carefully maintained, are ritually commemorated, clearly bounded, and there is usually a durable marker designating the event. Sanctification of a site can be spurred by communities who have suffered a loss, but this can cause political and social struggles if, for example, a marginalized group wants to sanctify a space while the group in "power" wants to ignore it (Foote 1997). For

example, the grounds and buildings of the former Nazi concentration camp Auschwitz-Birkenau are sanctified sites. *Obliterated* sites are effaced in order to conceal the violence that occurred; consecration is absent, the site is not returned to use, and there is a desire to forget the event. Obliterated sites often stand out on the landscape just as sanctified sites do, but they are stigmatized rather than revered. Sites that have been obliterated are often associated with notorious individuals and show the dark sides of humanity (Foote 1997).

In Cambodia, for example, the People's Republic of Kampuchea sanctified the sites of Khmer Rouge mass graves such as Choeung Ek. The overthrown Khmer Rouge regime, however, tried to (verbally) obliterate such sites. The Provisional Government of National Union and National Salvation of Cambodia, an unofficial and internationally unrecognized government run by the Khmer Rouge from Pailin Province from 1994 to 1998, said in a clandestine radio broadcast that the site of Tuol Sleng and the human remains displayed there "are purely and simply part of the psychological war waged by Vietnam in its aggression against Cambodia. The communist Vietnamese collected skulls and bones from graveyards all over north and south Vietnam, brought them by trucks to Cambodia, and displayed them in an exhibition at Tuol Sleng as part of a psychological propaganda campaign to legalize their aggression against and occupation of Cambodia" (KR: Tuol Sleng Bones Belong to Vietnamese 1994). Thus, the sanctification or obliteration of sites can be contested.

While sanctified and/or memorialized sites may be seen as sacred spaces for remembrance, it must always be acknowledged that the memorialization of wide-scale trauma occurs within a particular political and social context. Whom or what—victims, survivors, sites of trauma, whose religion or gender, physical remains or objects, etc.—is memorialized is deeply rooted in the political and social climate (which can be at odds with each other) at the time the

monument or location is rendered, and these categories can shift over time (Jacobs 2011; Tyner 2017). These physical structures or markers, however, are not memories in themselves and are not inherently valuable; they are embodiments and material support for subjective memory, collective action, and reaffirmation of collected national identities (Jelin 2007; Young 1993). They are focal points to which collected memories can be attached and ordered and that commemoration can be transmitted into the future.

In many cases, however, violence leaves absences, voids, disappeared individuals, and silences. Specifically in Cambodia, as (Tyner 2017) argues, many of the traces of the violent past are no longer visible. "Apart from a select few locations, most places [in Cambodia] associated with past violence remain unmarked on the landscape: mass graves have been converted to rice fields, schools-turned-prisons have returned to their original function, and wooden structures used to house forced laborers have long since been demolished" (Tyner 2017). How can these losses or voids be represented physically? What objects or actions can take the place of absences (Jelin 2007)? Constructing memorials to genocide or mass violence is often a mechanism for overcoming these voids. In her study of two memorials erected in the absence of bodies—the Memorial to the Murdered Jews in Berlin and the Memory Park in Buenos Aires commemorating victims of state terrorism—Sion (2015a) discusses possible representations:

> It is the absence of bodies that distinguishes a memorial from a cemetery. A cemetery is marked by the physical presence of remains; by certainty, individuality, and funerary rites that focus on the place where the body was buried…In the absence of a body to lay to rest, the ritual that marks the passing of the deceased out of the community of the living cannot be performed; mourners are stranded between the need to turn the page and a lingering doubt about the actual death of their loved one.

In these cases, memorials can serve as surrogates for missing bodies and silences. While in Cambodia there are bodies, or at least aspects of bodies, the remains are unidentified and

therefore the challenges of absences, voids, and lack of certainty described by Sion (2015) are present.

The commemoration and memorialization practices after mass violence or genocide vary widely. Symbolic and material memorialization can be deployed by disparate groups, at various times, and for collective or individual reasons. These forms of remembrance are never apolitical and always reflect the temporal context in which they were developed. In the case of Cambodia, the impetus for erecting memorials to shelter human remains disinterred from mass graves throughout the country was political in nature. However, what is the state of these memorials today and how have their meanings shifted in the subsequent 30 years since they were created? This dissertation, in part, seeks to answer this question.

Biocultural Theoretical Approaches

The biocultural anthropological approach was developed in the mid-20th century and has helped to unite various sub-disciplines of anthropology including medical, sociocultural, and biological (Zuckerman and Martin 2016). By permitting scholars to address questions that span time and space, the biocultural approach delves to the core of anthropological thought addressing the human condition. Although the definition of the biocultural approach has varied over the decades, the fundamental theme combines the cultural and biological aspects of humanity, especially as it relates to the interaction between human culture, human biology, and the environment (Zuckerman and Martin 2016). In the case of evaluating mass violence, a biocultural approach permits a more comprehensive understanding of why and when violence is used; what cultural, biological and environmental conditions led to violence and the resultant osteological trauma; who were the victims and what do their traumatic injuries tell us about how

they died; and what were the behaviors of the perpetrators. Individually addressing the biological or the cultural aspects of violence is not sufficient and results in incomplete conclusions.

As such, a biocultural approach for this research was an anthropological imperative. While a biological analysis of human remains resulting from mass violence provides demographic data and permits quantification of the traumatic injuries, without integrating the sociocultural context, these remains persist as isolated specimens of scientific or historical evidence. By evaluating the agency, or social impact of these remains—via their presence within memorial structures—I will address the conceptions of human remains as both active materials (objects) and as embodied memories (subjects) (Krmpotich et al. 2010) in modern Cambodian culture. Rather than focusing exclusively on what has been done to/with the human remains since they were exhumed in the 1980s—a strictly biological approach—this research also evaluates the sociocultural affects the remains have on the living.

Biological Component

For the biological anthropological aspect of this research I scientifically analyzed human crania at the Choeung Ek Genocidal Center to assess the demographic characteristics of the victims and to document evidence of violence in the form of distinct skeletal injury patterns. Specifically I sought to determine whether execution methods were standardized by age, sex, or some other factor, and what mechanisms of violence (*e.g.*, blunt force, sharp force, or high velocity projectile trauma) the Khmer Rouge used to *komtec* (កំម្ជ ២, "smash") their victims.

The biological component of this research is grounded in the incorporation of forensic anthropological/archaeological techniques into the analyses and interpretations of skeletal

remains resulting from human rights violence, as discussed above (Ballbé and Steadman 2008; Kimmerle and Baraybar 2008b; Komar 2008; Komar and Lathrop 2012; Steadman and Haglund 2005). In particular, I draw on the research of Komar and Lathrop (2012), Bird (2013), and Ta'ala et al. (2006) who evaluated human remains in post-conflict Timor Leste, Lithuania, and Cambodia, respectively. This more "modern" conception of osteological analysis moves beyond the purely "forensic" approach of analyzing human remains at an individual-level, to a broader, more contextualized population-level approach. Group- or population-level analyses of osteological trauma patterns are common in bioarchaeological research, but are infrequent in forensic work, particularly U.S. domestic medicolegal cases. However, in the context of human rights conflicts, a population-level approach allows for the comparison of trauma between different conflicts and generates data not captured by the traditional forensic examination at the individual-level (Komar and Lathrop 2012). For example, a population-level approach allows for questions such as "is the violence seen in crimes against humanity/genocide/mass murder isolated to each specific cases, or are there global patterns?" to be asked and potentially answered (Komar and Lathrop 2012; Martin 2015).

Unlike established bioarchaeological studies of violence (Martin and Harrod 2015), the sociopolitical, cultural, and economic contexts of modern cases of mass violence or genocide are generally known. In Cambodia, for example, extensive research has been conducted by social science scholars over the past three decades to theorize and ultimately explain the causes and context of the structural and physical violence effected by the Khmer Rouge regime. Therefore, using violence theory—in the form of anthropological or evolutionary approaches to the sociocultural history of human violence (Martin and Harrod 2015)—to frame osteological analyses of modern mass violence is perhaps ineffective. Instead, I argue that for the remains in

Cambodia, and other human remains disinterred after modern human rights conflicts, a more productive theoretical approach embraces the effects of the body, or remains, on the living; not relegating the remains to the past, but contextualizing them as "agential subjects" in the present (Joyce 2015). How do unearthed bodies from recent violent conflicts shape mourning and how the living speak about the dead? How do these bodies or remains re-frame historical narratives about the violence that transpired? Do the remains trouble or haunt the living in their present sociopolitical climate (Crossland and Joyce 2015a)?

Addressing these questions requires stepping outside the bounds of the laboratory, and beyond the remains themselves, to embrace the biocultural approach. Specifically, the sociocultural conceptions of agency theory and the "political lives of dead bodies" (Verdery 1999) are productive for exploring the relationships between the dead and the living as discussed below. In addition to contextualizing the remains in the present using theoretical approaches, this research sought to situate them in the past. The analyses of the Choueng Ek remains were not conducted in a contextual vacuum; these osteological data were compared to Khmer Rouge archival data from execution lists. By linking the remains of mass violence to both the past and present, a truly biocultural analysis is achieved.

It should be noted, however, that while the individuals at Choeung Ek were killed just over 30 years ago in the context of crimes against humanity, my research is not inherently forensic, as there are no medico-legal implications for my work. Although my data are not forensic, the work conducted by the Cambodian team on the human remains at Choeung Ek has been converted into forensic evidence, as discussed in Chapter 9. Thus, I conducted a biological anthropological osteological analysis, but the potential forensic relevance and context places this research within the realm of forensic anthropology.

Sociocultural Components

The sociocultural component of this research evaluates the incorporation of osteological remains into Cambodian memorials. While the memorials throughout the country are well-documented (Bennett 2015; Brouwer 2007; Chandler 2008; Documentation Center of Cambodia, Mapping of Cambodia Killing Fields n.d.; Guillou 2012; Guillou 2013; Guillou 2015; Hinton 2013a; Hughes 2006; Jarvis 2002; Jarvis 2015; Lesley 2015; Lim 2010; Sion 2011; Tran 2013; Tyner 2017; Williams 2004b), few scholarly publications have specifically addressed the role of the physical remains within the memorials. Since these structures were constructed to shelter the remains, studying their primary contents provides a more nuanced assessment of the role of human remains in modern Cambodia.

This component of my research draws on anthropological, archaeological, and sociological theories of agency, materiality, and memorialization to address the role(s) of human skeletal remains within national and local Cambodian memorials. In 2006, Sofaer argued that there was a relatively inflexible dichotomy in the fields of archaeology and bioarchaeology separating the study of human remains into two domains: scientific (osteological) data collection that saw human remains as material objects, and social theory in which the human body was seen as a social and historical construction, but in which the physical remains were not assessed. At this time, Sofaer felt that there were few scholarly realms in which these two approaches to the human body could be combined. Drawing on Scheper-Hughes and Lock (1987), Martin et al. (2013) suggest that human remains have biocultural identities and therefore the physical remains and the social context in which the remains were shaped must be analyzed simultaneously. Bodies, both deceased and alive, can be interpreted from numerous perspectives and by incorporating the social and political contexts of the body, the individual (biological) body can

be understood as both a material object and the product of sociocultural factors (Martin et al. 2013; Scheper-Hughes and Lock 1987; Sofaer 2006).

However, in the case of the human remains enshrined in the Cambodian memorials, I did not have physical access to the bones for a biological/osteological analysis. Therefore, rather than focusing on the human remains as individual bodies capable of shedding light on past cultural, social, and political processes—as is conventional when conducting a bioarchaeological study utilizing a biocultural approach—I chose to emphasize the interrelationship between the remains as material objects and the modern Cambodian sociopolitical construction of Khmer Rouge violence. Primarily employing the theory of human remains' affective materiality and agency (Krmpotich et al. 2010), I evaluated observational and interview data from multiple memorials to assess what the enshrined skeletal remains provoke, enable, constrain, and/or permit regarding the memory of Khmer Rouge violence.

Agency theory, or the contextualization of human actions/effects in relation to other humans and with material objects, was initially applied only to living humans (Robb 2010). But the attribution of agency to non-human things (Gell 1998; Latour 2005; Thomas 1991) ushered in a new theoretical approach: if inanimate objects are imbued with "personhood" or intentionality, they can interact in social relationships, thereby having agency (Knappett and Malafouris 2008; Robb 2010; Turner 1996). Anthropological and sociological research applying agency and material culture theory to the dead (both corpses and skeletal remains) is now prevalent (Crossland 2009; Crossland 2010; Fontein and Harries 2013; Green and Murray 2009; Hallam and Hockey 2001; Hallam et al. 1999; Krmpotich et al. 2010; Moon 2012; Sofaer 2006; Williams 2004a; Williams 2006). These scholars argue that human remains, as both subjects (symbolic of the once living individual) and objects (inanimate osseous material), have agency

and can affect and interact with the living. Human skeletal remains, as remnants of the deceased, are corporeal "material agents" that influence memory and remembrance (Hallam and Hockey 2001; Williams 2004). It is this affective materiality of human remains I addressed with my research. What do the remains of Khmer Rouge victims represent to Cambodians? What do they reveal about sociocultural and religious practices following the fall of the Khmer Rouge regime?

The present research also draws on Verdery's (1999) model of the "political lives of dead bodies." Verdery's work emphasizes the politics of corpses in post-Socialist Eastern Europe, and the post-Socialist model is particularly applicable in Cambodia as the demise of the Khmer Rouge—a regime blending extreme Maoist-Leninist ideology—was replaced by the communist PRK government supported by the Socialist Republic of Vietnam. The politics of dead bodies, as she argues, is founded on the relationship between the living and the dead and how the dead are symbols manipulated by the living, often for political purposes. Bodies or disarticulated bones, as is the case in Cambodia, are concrete objects that can be used as politically symbolic capital to shape historical and social narratives as well as to legitimize control (Verdery 1999). By analyzing the human remains (as objects, agents, and symbols) in the context of memorials, I address the influences of the enshrined remains on collected memory, the politics of commemoration, and sociocultural recovery from past violence.

Additionally I evaluate the post-conflict tensions between victim anonymity and individuality. Throughout the Khmer Rouge period, "enemies," both real and imagined, were imprisoned, interrogated and forced to confess to their counter-revolutionary indiscretions. Particularly at the S-21 security center in Phnom Penh, these confessions were later filed as evidence of traitorous activity (Chandler 1999a; Dy 2007). As long as a confession had not been

extracted, each "enemy" was seen as an individual with an intrinsic story; but once this confession was obtained, the "enemy" ceased to exist as an individual in the eyes of the regime. As Chandler (1999) states, if tortured detainees died after a confession was obtained, authorities at S-21 were unconcerned, but if a detainee died prior to a complete confession, the interrogators were suspected of sabotage. Once an individual had confessed, s/he was summarily executed, anonymously disposed of in clandestine mass graves, and forgotten by the regime (Ea 2005).

Comparatively, prior to the Khmer Rouge regime, deceased individuals were distinct entities with accompanying funerals and culturally acceptable body disposal. During the Khmer Rouge period, the abolishment of traditional mortuary practices in favor of clandestine mass burial (Cougill n.d.) eliminated individual distinction. Has this anonymity been reversed since the fall of the Khmer Rouge, and what are the sociocultural implications of sheltering unidentified, and therefore anonymous, human remains in local and national memorials? Is this perpetuating Khmer Rouge-imposed victim anonymity or does each cranium or bone, as representative of a distinct person, promote individuality? These questions will be addressed by this dissertation.

Research Questions and Hypotheses

The following primary questions were asked, and the corresponding hypotheses were tested, for this dissertation research:

1. How do the osteological demographic profiles of the Choeung Ek remains correspond with the Tuol Sleng archival records?
    1.1. The demographic profiles derived from these skeletal data are not significantly different from the demographic profiles derived from historical records.

2. Based on cranial trauma patterns, what are the specific methods of violence that can be distinguished at Choeung Ek and are they distributed evenly between cranial regions and individuals?
    2.1. The pattern and distribution of skeletal trauma, regardless of mechanism (*i.e.*, blunt force, sharp force, high velocity projectile trauma), do not differ significantly between cranial regions and individuals.
3. How have victims of the Khmer Rouge been memorialized in Cambodia, and how have memorials containing human remains been integrated into Cambodian society?
    3.1. The memorialization patterns and integration of memorials do not differ significantly throughout Cambodia/Cambodian society.
4. How do Cambodians address victim anonymity and the mutable treatments of the dead?
    4.1. The treatment of the anonymous Khmer Rouge-period victims is not unique within the traditional mortuary practices of Khmer Buddhism.

Research Sites

The Choeung Ek Genocidal Center

The "Killing Fields," or mass gravesite for thousands of the Khmer Rouge's victims—primarily from S-21 security center (see below)—are located just outside Phnom Penh in the Commune of Choeung Ek (Figure 3). Known today as The Choeung Ek Genocidal Center (Choeung Ek), this is the location of over 100 mass graves and where the mortal remains of nearly 7,000 individuals are sheltered in a memorial *stupa*. Due to the exhumation and sorting of the skeletons in the 1980s, the remains at Choeung Ek are primarily crania and commingled

postcranial elements. This site and the human remains therein was the primary focus for this research.

Tuol Sleng Genocide Museum

S-21, now called the Tuol Sleng Genocide Museum (Tuol Sleng) (Figure 3), was the highest level Khmer Rouge interrogation and torture facility in Cambodia. Discovered in 1979 by the Vietnamese, records indicate that thousands of men, women, and children were held during the facility's three years of operation, and all but approximately 200 were executed (Keo

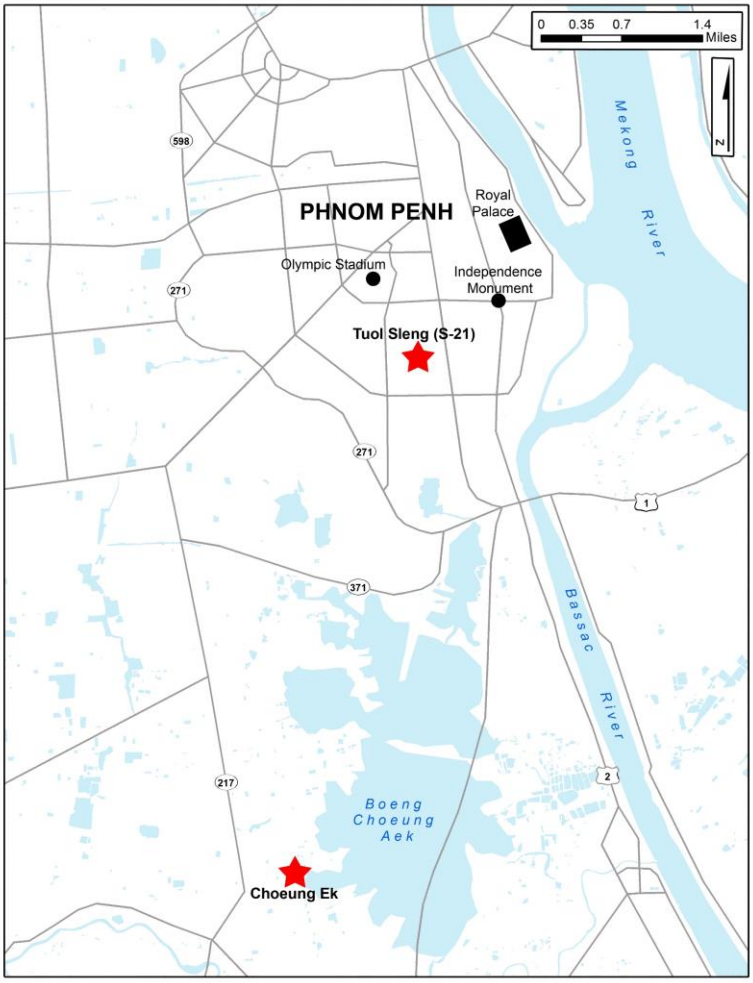

Figure 3. Map of Phnom Penh. The red stars indicate the locations of S-21 in the central part of the city, and Choeung Ek, approximately 15 km to the southwest.

and Yin 2011). Today, in addition to being a public museum where visitors come to learn about the Khmer Rouge and the grisly purpose of S-21, Tuol Sleng is also home to an extensive archive of documents and photographs pertaining to the operations at S-21. In particular, the archive contains execution lists detailing the demographics of those who were killed, and presumably buried, at Choeung Ek.

Cambodian Memorials

After the Khmer Rouge were driven from power in January 1979, citizens and local governmental authorities across Cambodia were directed to collect human remains and artifacts from mass graves and place them in memorials for preservation (Hughes 2003). According to research conducted by the Documentation Center of Cambodia (Documentation Center of Cambodia, Mapping Project n.d.), there are 81 memorials throughout the country containing human remains from the Khmer Rouge period.

In the subsequent decades, however, the memorials and the remains began to deteriorate. After noting this degradation, the Cambodian government issued a circular in 2001 calling for the preservation of the remains of Khmer Rouge victims:

> In order to preserve the remains as evidence of these historic crimes and as the basis for remembrance and education by the Cambodian people as a whole, especially future generations, all local authorities at province and municipal level shall cooperate with relevant expert institutions in their areas to examine, restore and maintain existing memorials, and to examine and research other remaining grave sites, so that all such places may be transformed into memorials…for both citizens and tourists (Royal Government of Cambodia 2001).

The preservation of remains and memorials in Cambodia was, therefore, officially sanctioned and encouraged. The work has been slow, but the preservation of memorials and the remains within is underway (Fleischman 2016).

Research Goals and Relevance

This research represents the first large-scale biological analysis, with simultaneous incorporation of cultural significance, to be undertaken on the human remains at the Choeung Ek Genocidal Center. While Cambodians have begun their own analysis of human remains in various memorials (see Chapter 4 and Fleischman 2016), this dissertation research contributes a more nuanced, yet holistic, anthropological assessment of the remains. This research provides sound evidence and quantification of Khmer Rouge violence, as well as cultural documentation of how the unidentified dead in Cambodia are conceptualized and treated. These data will contribute to future forensic anthropological analyses of genocidal/mass violence—particularly evaluations of osteological traumatic injury patterns—and will permit both scientific and cultural comparisons between previous (and potentially future) cases of genocide or crimes against humanity. Thus, by analyzing skeletal remains from Cambodia using a biocultural perspective, I am uniting scientific and humanistic knowledge in the production of a more holistic representation of Khmer Rouge violence for Cambodians and the international community.

My research broadly addresses theoretical questions that span physical, sociocultural, and archaeological anthropology. With my focus on (re-)emergent theories of agency and materiality (Fontein and Harries 2013) and memorialization, I will be contributing to the growing anthropological literature addressing the corporeality of the dead. However, the themes of this research—memorialization after mass violence, scientific analysis of human remains, the effect of human remains on survivors—can certainly contribute to disciplines beyond anthropology such as history, comparative genocide studies, and law.

The discipline of forensic anthropology has long been criticized for its deficiency in strong theoretical foundations and the individualistic approach it frequently applies. The

forensic sciences, as Nordby (2002) states, are generally placed within the applied sciences genre with little need for theory. Simultaneously the multivariate contextual settings and circumstances encountered by forensic anthropologists, particularly in international post-conflict situations, make the development of a single robust theory extremely difficult (Boyd and Boyd 2011; Nordby 2002; Thompson 2015). To address this atheoretical critique, as Martin (2015) encourages, I am attempting to reframe post-conflict osteological analysis by imbuing it with cultural context. Using a biocultural approach, my research contributes to a more theoretical and contextualized anthropological analysis of genocidal violence than either a biological or sociocultural approach alone. Finally, as a trained biological/forensic anthropologist, I bring a unique approach to this research because I am able to conduct the osteological analyses as well as evaluating the shifting relationships between the living, the dead, and the cultural narrative of the Khmer Rouge violence.

CHAPTER 2: CAMBODIAN HISTORY AND THE KHMER ROUGE

The modern country of Cambodia has a long and rich history dating back to the prehistoric period. Entire volumes have been penned about the prehistory and history of the Khmer Empire, so it is beyond the scope of this dissertation to provide an extensive history of the region. What follows is a brief discussion of the early history of Cambodia, with further details beginning in 1970 with the Khmer Republic.

The most well-known and popularized period of history is that of Angkor (7th to 15th centuries CE) with its monumental temples representing the pinnacle of the Khmer Empire.[2] Following the collapse of the Angkorian civilization, the Empire's capital was moved to Phnom Penh and subsequent incursions by the Thai (Siamese) and the Vietnamese were frequent (Mabbett and Chandler 1995). Cambodia became part of the French protectorate in 1863 and was under direct colonial rule until the collapse of French Indochina in 1945 (Goscha 2012). Cambodia gained full independence from France on November 9, 1953 under the leadership of King Norodom Sihanouk (Chandler 2000).

The Khmer Republic and Civil War: 1970 – 1975

In a 1970 *coup d'état*, King Norodom Sihanouk was deposed by the National Assembly led by General Lon Nol and deputy prime Minister, Sisowath Sirik Matak (Chandler 1991b).

[2] The Angkorian period was the height of the Khmer Empire and has long been considered the epitome of Khmer culture. However, as Edwards (2007) notes, the conception of past greatness and nationalism stretching from the Angkorian period is a myth crafted by French colonialism. Modern historical and archaeological scholarship has discredited this colonial conception of the Khmer nation and the Angkorian past. Recent research has shown that rather than a distinct rise, peak, and decline of the Angkorian civilization, power, stability, and leadership varied greatly across the period; the kingdom expanded and then collapsed numerous times, there was frequent fighting and warfare, and rules of succession were often problematic (Chandler 2000; Higham 2002).

Lon Nol's new government, the Khmer Republic, set out to establish economic stability in Cambodia and to address the Vietnamese occupation of border areas within Cambodia; while these intentions were positive, the new government was not supported by the populace. In response, Sihanouk declared war against Lon Nol and established a new government, the National United Front of Kampuchea (NUFK) (Chandler 1991b), and numerous peasant uprisings—called for by Sihanouk—against Lon Nol's government occurred within weeks of the *coup* (Kiernan 1982a).

Lon Nol had a close relationship with the United States government which supported him as an essential partner in their war against the North Vietnamese (Chandler 1991b). Thus, questions have been raised regarding the role played by the United States in the overthrow of Sihanouk who had begun to support the Communist Party of Kampuchea (CPK) (Chandler 1991b; Kiernan 2004a). In turn, the Chinese began to support Sihanouk and the Cambodian communists because of their socialist and "anti-US-imperialist" stance (Jian 2006).

It was also in 1970 that the Vietnam War officially expanded into Cambodia; the U.S.-South Vietnamese forces attacked the North Vietnamese sanctuaries in Cambodia, while the North Vietnamese attacked Lon Nol's forces. The U.S. incursion into Cambodia furthered Sihanouk's call to resist Lon Nol and his U.S. allies which simultaneously expanded the NUFK's pro-communist insurgents (Kiernan 2004a). Towards the end of 1970, as Kiernan (2004a) notes, thousands of Khmers (the largest Cambodian ethnic group) were fighting in communist units in the war against Lon Nol, and Khmer and Vietnamese communists were fighting together in many places along the border between the two countries (Chandler 1991b). In late 1970 and 1971, Lon Nol launched his "Chenla" offensives against the Vietnamese communists, the first of

which reduced fighting for a while, but the second Chenla offensive was a loss which undermined the optimism the Americans had placed in Lon Nol (Chandler 1991b).

In 1972 North Vietnamese troops withdrew from Cambodia and Lon Nol proposed a presidential election, which he later won. As the Khmer Republic began to deteriorate and the U.S. halted its bombing campaign of Northern Vietnam and Cambodia in 1973, the Khmer communists were able to tighten their control on Phnom Penh. By late 1973 and early 1974, as Kiernan (1982b) states, the Lon Nol regime was primarily surrounded by revolutionary forces, held little presence in rural areas, and was dependent on U.S. military and economic aid. In early 1974, the Khmer communist regime began an attack to take control of Phnom Penh and to recruit more members for their army, by force if necessary. On January 1, 1975, the Khmer communists launched another attack on Phnom Penh and cut off supplies along the Mekong River. In April, Lon Nol and his family fled Cambodia, and on April 17, 1975 the communist troops entered Phnom Penh taking complete control of Cambodia (Chandler 1991b).

Khmer Rouge Period: 1975 – 1979

The name "Khmer Rouge" is the French derivative of *khmer kroham* (ខ្មែរក្រហម) or "Red Khmer;" this term was first used by Prince Norodom Sihanouk in the 1960s to describe Cambodian members of the Communist party. Khmer Rouge can refer to the regime as well as to individuals who worked for the regime, also known as cadre (Nhem 2013). The term "Khmer Rouge" is often used interchangeably with "Communist Party of Kampuchea," discussed below. For the accuracy of terminology, the regime was officially referred to as the "Communist Party of Kampuchea," while "Khmer Rouge" was the informal title. Where possible these terms are

separated throughout the remainder of this dissertation; however, Khmer Rouge is more prevalent in the literature and colloquially, therefore it is used more frequently.

The history of the Khmer Rouge began in 1930 with the foundation of the Indochina Communist Party (ICP) in Vietnam. Led by Ho Chi Minh, members of the ICP later organized the Cambodian left (Nhem 2013). Under the supervision of Vietnamese communists, the Khmer People's Revolutionary Party (KPRP) was formed in 1951 and recruited heavily from the peasants and the monkhood (Kiernan 1996a). The KPRP developed out of the communist-led "Khmer Issarak," or Free Khmer, movement and would later transform into the CPK in 1967 (Kiernan 2004b).

A restructuring of the KPRP occurred during a national congress in 1960 with a younger, French-educated group of Cambodians, including Saloth Sar, alias Pol Pot, taking over leadership of the KPRP in early 1963 (Carney 1989). Fearing political repression from Prince Sihanouk, Pol Pot and other KPRP leaders fled Phnom Penh and took up residence in the forests of Cambodia where they fought small insurgencies throughout the 1960s (Carney 1989).

While in exile in Beijing in 1970 after his deposition by Lon Nol, Norodom Sihanouk sought the support of Pol Pot's communist insurgency. Thus, China lent financial and military support both to Sihanouk and the Khmer communists during the early years of the Cambodian civil war against Lon Nol (Carney 1989). The North Vietnamese also supported Pol Pot's insurgency with arms and military assistance. Beginning adamantly in 1972, the Khmer Rouge also began to organize the local population in order to recruit new troops and cadre and to produce food for the regime. By 1973, collectivization of land and demonetization was implemented in the regions controlled by the Khmer Rouge, thus beginning the socioeconomic system that would prevail throughout the Khmer Rouge period (Carney 1989). It was also in

1973 when the Khmer Rouge began their split from Sihanouk—they believed he had served his purpose of uniting the peasantry and gaining foreign support. Finally, although Pol Pot's revolution was strong, it would not have succeeded had the United States not economically and militarily destabilized Cambodia during the Vietnam (American) War—the U.S. bombing of Cambodia pushed much of the local population to join the anti-U.S. Khmer communist party (Kiernan 1996a).

After the takeover of Phnom Penh in 1975, the CPK became the official government of Cambodia. Less than one year later, on January 5, 1976, the CPK enacted a new constitution and established the state of Democratic Kampuchea (DK) (Kiernan 1996b). However, the Party, its leadership, and its socialist agenda were kept a closely guarded secret until they were revealed in 1977; in fact, the CPK did not correct the assumption by foreigners that Norodom Sihanouk was still the head of the Cambodian government. By concealing its agenda, its leaders, and its ties with other communist states, the CPK was able to give the impression that their revolution was completely independent (Chandler 2000).

Given this secrecy, the CPK referred to itself as the "revolutionary organization" (*Angkar Padevoat*), but the general populace only knew it as the "organization" or *Angkar* (Nhem 2013). In 1975 the Central Committee of the CPK was comprised of Pol Pot, Nuon Chea, Sor Phim, Ieng Sary, Son Sen, Ta Mok, and Vorn Vet. These individuals were joined in 1977 by Khieu Samphan, Ke Pauk, and Nhim Ros (Nhem 2013). Norodom Sihanouk was the nominal head of state until his resignation in 1976 when he was replaced by Khieu Samphan; Pol Pot became the CPK's general secretary and Nuon Chea became the deputy general at this time as well. In 1976 the CPK also subjectively determined that the founding date of the Party was 1960 (rather than

1951) which had the effect of removing all Vietnamese influence from the KPRP/CPK (Nhem 2013).

Khmer Rouge Ideology

Kiernan (2006) argues that while the CPK called itself a communist party and focused on collective labor and political and class purges, which would seem to have arisen from external models of communism, the idealization of the peasantry, the destruction of commerce, ethnic violence, and territorial expansion were rooted in Khmer culture and history. Thus, there are both internal and external influences on Khmer Rouge ideology. Chandler (1991a) concurs and notes that in order to understand the Khmer Rouge revolution, it must be evaluated as both connected to Cambodia's past—even though the CPK stated that with their revolution 2,000 years of Cambodian history had come to an end—while also having foreign influences.

Three aspects of the Khmer Rouge political ideology that were pre-revolutionary or intrinsic are as follows: a focus on Cambodia's glorious past and nationalism, the uniqueness of the "race" of Cambodians, and the "universal" Cambodian hatred of Vietnam (Chandler 1991a). The idolization of Cambodia's Angkorian past was not new to Pol Pot or the Khmer Rouge as the two prior governments (that of Sihanouk and Lon Nol) also believed in the glory of the Angkorian era. Racism, especially that dividing the ethnic Khmer and the Vietnamese has strong roots in Cambodian culture (Kiernan 2006), so the Khmer Rouge were able to divide the Cambodian population into racial, geographic, and political groups. There were the "base people" who were ethnic and peasant Khmer and the "new people" who were urban inhabitants considered contaminated by foreign influence. These groups were further subdivided into the "deportees"—the lowest group comprised of the urban evacuees and ethnic minorities such as

the Cham Muslims, Chinese, and Vietnamese—the "candidates" who were the remainder of the "new people," the "full rights people," and the peasant "base people" (Kiernan 2006).

Despite the glory of the Khmer past that the Khmer Rouge attempted to harness, their policies directly destroyed the traditional social relations and religious practices of the Khmer people. As Jackson (1989) states, religion, family life, work structure, and language were either transformed or abolished during the Khmer Rouge period. Prior to the Khmer Rouge, Cambodian religion and social status were important means for distinguishing among different classes or levels within the society, but this was destroyed in favor of the Khmer Rouge's egalitarian model.

The primary external influence on the CPK's policies was communism, specifically Maoism from China. Unlike the prior governments, however, the CPK strictly denied these foreign influences stating that their revolution was unlike any other in history (Chandler 1991a). Pol Pot and the upper leaders of the CPK were inspired by China's revolutionary Great Leap Forward (1958-1961) that espoused collectivized agrarianism, urbanization, and industrialization (Kiernan 2006). Despite the failure of Mao's Great Leap Forward, the Khmer Rouge idealized the rural agrarian peasant way of life and considered the urban working class to be the enemy. Pol Pot therefore appropriated aspects of Maoism—viewing it through a lens of Khmer nationalism—but failed to learn from the lessons of the Great Leap Forward.

In order to completely transform Cambodia into a peasant-class agrarian country, the CPK wrote their Four-Year Plan, or "Super Great Leap Forward," in 1976. This Plan, disregarding Mao's urbanization and industrialization, collectivized all private property and placed rice production as a high national priority (Kiernan 2006). The Plan called for an average national rice yield of three tons per hectare, which had never been achieved in Cambodia. The

rice crop was divided into four categories: food for the Cambodian people, seed rice to be kept for the next harvest, rice was to be held in reserve, and (the largest portion) of the crop was sold abroad so the Khmer Rouge could fund its revolution. Unfortunately the rice crop never yielded the high volumes proposed by the CPK, and what rice was produced was sold leaving little rice for eating and further planting resulting in famine and even lower crop yields each year (Dy 2007).

Khmer Rouge ideology was therefore a unique combination of intrinsic and extrinsic influences, some of which were acknowledged, others which were kept secret. Pre-revolutionary conceptions of nationalism and racism were the primary intrinsic ideological influences, while communism played an extremely important role in the Khmer Rouge ideology and Pol Pot's structuring of the Democratic Kampuchean society.

Khmer Rouge Security System

The Khmer Rouge believed that there were enemies located throughout the country, so security centers were established at all political levels for the arrest, imprisonment, interrogation, and execution of these enemies (Ea 2005). There were two types of enemies designated by the Khmer Rouge: external and internal. External enemies were those from foreign countries opposed to socialism who were often thought to be working for intelligence agencies such as the United States' CIA or the Soviet KGB. Internal enemies included former Lon Nol/Khmer Republic security or soldiers, "new people" evacuated from Phnom Penh (see below), Khmer Rouge cadres or soldiers accused of being "traitors" or of participating in treasonous activity, and individuals who were accused of participating in subversive politics. The internal enemies

were considered to be more threatening because they were difficult to identify (Chandler 1999a; Ea 2005).

There were five levels of security center in DK, which from lowest to highest security, were as follows: *subdistrict militia centers* (held a few inmates who were generally released after a short detention period for small infractions); *district reeducation* and *region security centers* (used for detention, interrogation, and execution; prisoners were held for varying infractions such as being a member of Lon Nol's government/military, or speaking against *Angkar*—those at the region security centers were frequently Khmer Rouge cadre accused of betraying *Angkar*); *zone security centers* (large prisons—often former schools, *wats* (pagodas/temples), or office buildings—holding over a thousand prisoners; where Khmer Rouge soldiers and their families were sent when accused of a zone-level offense; these were sites of both hard labor and execution); and the *central-level security center* or S-21 (see Chapter 4 for a more thorough discussion of S-21). The purpose of these security centers was to "sweep clean" enemies of the revolution who were standing in the way of the ideal Khmer agrarian society. The operations of these security centers were uniform and communication was both bottom-up and top-down through the chain of command (Ea 2005).

Khmer Rouge Violence

In order to dramatically transform Cambodia, almost every individual residing in Phnom Penh, except for the families of top CPK leaders and some factory workers, were evacuated from the city beginning on April 17, 1975 (Chandler 2000; Nhem 2013). Cities and towns throughout Cambodia were also forcibly evacuated (Kiernan 1996b). The reasons for this transfer were never explicitly clear to the general populous, but the primary ideological reason was to shift the

focus of the country and the people towards an agrarian lifestyle without the corruption of the city life (Chandler 2000; Nhem 2013). In addition to forced transfers from cities, the Khmer Rouge abolished money, education, religion, and private property (Chandler 1999b; Kiernan 1996b). The CPK also divided the country into seven zones, and within these zones, 32 administrative centers; living conditions and work levels within these zones varied across time (Chandler 2000).

Under the Khmer Rouge, urban and rural populations received disparate labels and treatment. The urban population was designated the "new people," "1975 people," or "the April 17 group." These individuals were often treated more harshly and killed more frequently because they were considered to be enemies of the peasant-inspired regime (Hinton 2004). In addition to espousing an anti-urban ideology, the Khmer Rouge was suspicious of the inhabitants and activities of people in the cities; thus, emptying the cities and classifying the former inhabitants as "new people" prevented opposition (Grenke 2011). These "new people" were considered "class enemies" because they were educated, served in government positions, or were skilled laborers—even after leaving the city, these individuals were still considered to be enemies because they were not peasants (Grenke 2011). Conversely, the rural peasant inhabitants were termed "old people" or "base people" and were treated less harshly as they embodied the Khmer Rouge's ideal citizen (Chandler 1999b; Hinton 2004).

The Khmer Rouge regime pursued complete control, particularly over individuals. In addition to the closing of all markets and the intensification of agriculture, social and religious life was altered (Grenke 2011). Buddhism and other religious practices were forbidden, monks were disrobed, formal education was nearly eliminated, and rules were established for leisure time, marriages, sexual relations, and family life. Parents lost control of their children as

children were considered to be untarnished by the past, while the adults were corrupt. Men and women had similar haircuts and all wore similar black clothing (Grenke 2011).

There were, however, several political rebellions against the Khmer Rouge during the DK period. This fueled the regime's paranoia about "hidden enemies" and was used as justification for the violent purges within the Party (Quinn 1989). These purges initially began in the 1960s when the CPK murdered Party members thought to be too close to the Vietnamese (Kiernan 2013). These purges were followed in the early 1970s by the Vietnamese-trained Khmer communists who had returned to Cambodia to fight with the Khmer Rouge against the Khmer Republic. The systematic purges within the Khmer Rouge ranks began in 1976 with most suspected traitors being taken to S-21 (Tuol Sleng) for torture and execution (Quinn 1989). From these forced confessions, further cadre were rounded up for execution in 1977, and for months, senior leaders would disappear only to be replaced by new leadership. All were thought to be traitors and enemies of the regime. In mid-1977 further killings of former Lon Nol soldiers and government officials was carried out (Quinn 1989). Thus, by 1978, as Kiernan (2013) states, internal purges had removed half of the CPK's Central Committee.

But why resort to such violence? Hinton (2004) argues that the killings during this period were directly and indirectly prompted by the Khmer Rouge leaders as a form of revenge against "class enemies" and those who had formerly "oppressed" them. The concept of revenge in Cambodia, he suggests, is based on disproportionate retaliation or revenge. The Khmer Rouge's model of disproportionate revenge went as follows: the oppressors had wronged the poor by making them suffer; the poor were angry and retained this anger until it became a "burning" and they wanted to attack their oppressors and overcome the wrong that had been done to them; this ideology also necessitated that entire family lines be killed so that no one was

left to harbor a grudge or exact later disproportionate revenge (Hinton 2004). Thus, violence expanded to include entire families and strings of traitors (the idea of "strings" being drawn from the Cambodian patronage social system), rather than simply eliminating the traitorous individual (see Chapter 4). With their ideology of class struggle and oppression, the Khmer Rouge encouraged this internal anger among the peasants towards those who had wronged them. Therefore, Cambodian social norms such as face (one's self-image that is dependent upon relationships with others), patronage (which is often used to gain power, wealth, or prestige), and disproportionate revenge (Hinton 2004) contributed to the normalization and escalation of violence during the Khmer Rouge period, particularly the massive purges of their own ranks.

From 1975 to 1979, living conditions in Cambodia were severe. When the Khmer Rouge regime was overthrown after three years, eight months, and 20 days, the death toll was staggering. Historical estimates suggest mistreatment, overwork, malnutrition, and direct violence resulted in the deaths of approximately 1.7 million—nearly one quarter of the Cambodian population (Kiernan 2008).

Cambodia Since 1979

People's Republic of Kampuchea: 1979 – 1989

There were two phases of the socialist revolution in Cambodia: from 1975 to 1979 under the Khmer Rouge, and 1979 to 1989 under the Vietnamese-backed People's Republic of Kampuchea. The Vietnamese, with the assistance of Cambodian supporters, began to attack DK on December 24, 1978 with the overthrow of the Khmer Rouge in Phnom Penh by January 7, 1979. A new government was established in Phnom Penh on January 8, 1979: the Kampuchean People's Revolutionary Council (PRCK) which remained the transitional government until the

People's Republic of Kampuchea (PRK)—established on January 12, 1979—was legally sanctioned by the 1981 constitution. With the establishment of the PRK, as Chandler (2000) notes, it was the first time since the 1950s that Cambodia had been governed by a foreign state, and the direct ties with the Vietnamese made many Cambodians uncomfortable. The PRK wanted to advance towards a "pure" state of socialism based on Marxism-Leninism, as opposed to the communism purported by Pol Pot which was influenced by Maoism (Slocomb 2003).

As the Vietnamese and their allies advanced throughout Cambodia, the retreating Khmer Rouge destroyed roads and bridges, burned crops and harvest stores, and killed even more people to spite the Vietnamese (Slocomb 2003). And while the Khmer Rouge was pushed into the northern zones of Cambodia, they remained a powerful guerilla force for the next decade continually threatening the PRK government. The PRK, according to Slocomb (2003), was confronted with a classless society with no industry, economy, or agricultural surplus; they were faced with establishing a socialist country with peasants and some urbanites as its foundation. The PRK did not have a state to appropriate; rather, they had to create an entirely new one. The PRK had to develop a new government and select individuals returning to the city to rebuild the skilled labor force that was lost. However, with the lack of qualified individuals, many former DK political and military officers were incorporated in the PRK administration (Slocomb 2003).

Despite being heavily reliant on foreign aid, credit, and the assistance of the Vietnamese, the PRK was able to normalize the economy in a fairly short amount of time (1979-1984) after the devastation left by the Khmer Rouge (Slocomb 2003). Although the economy never prospered, the PRK was able to return the economy to its pre-revolution status.

In addition to economic changes, the PRK had to re-establish socialist ideologies. The promotion and acceptance of ideology is most keenly developed through civil society, such as

the arts, religious organizations, schools, the media, and other types of social associations (Slocomb 2003). In the case of the PRK, they had to make unpopular public decisions, but simultaneously convince the nation to support them and act selflessly. To do so, the PRK promoted the arts and culture and improved education and healthcare infrastructure (Slocomb 2003). Unlike the DK, the PRK recognized that public education was beneficial to the society and that science was important for development of the economy. It was important for the PRK to eliminate illiteracy and to make sure that those whose educations were interrupted during the Khmer Rouge period were able to complete their degrees.

In 1989 the PRK renamed itself the State of Cambodia, and at this time was functioning fairly independently from Vietnam (Chandler 2000). Because of this self-sufficiency, reduced aid coming from the Soviet bloc, and watching the Soviet Union withdraw from Afghanistan, the Vietnamese decided to remove their troops from Cambodia in 1989. At this time, Buddhism was reestablished as Cambodia's national religion, the flag and anthem were changed, individuals were able to own land, and free market and black market economies replaced collectivism (Chandler 2000).

Legacy of the Khmer Rouge

Although Democratic Kampuchea officially fell in 1979, the Khmer Rouge regime was not dead. The remaining Khmer Rouge leaders and thousands of members of the local population were rebuilding and regrouping in the jungle areas of northwestern Cambodia (Rowley 2006). The CPK was disbanded in the mid-1980s and was replace by the new Party of Democratic Kampuchea (PDK)—which joined the Coalition Government of Democratic Kampuchea (CGDK) in 1982—and Pol Pot's "retirement" was announced in 1985, although he

remained the de facto leader. As the Vietnamese began to withdraw their forces in the late 1980s the Khmer Rouge rebuilt their bases along the northern and southwestern borders of Cambodia, and by 1990 controlled the towns of Pailin and Anlong Veng (Rowley 2006). In 1993 there was a rift in the Khmer Rouge leadership as Ieng Sary and Son Sen were removed from their leadership roles because they were accused of supporting the United Nations Transitional Authority in Cambodia's (UNTAC) peacekeeping mission, thus leaving Pol Pot, Khieu Samphan and Ta Mok in control of the Khmer Rouge.

In 1996, Ieng Sary denounced Pol Pot and blamed him, Ta Mok, and Son Sen for the crimes that occurred from 1975 to 1979, and then defected to the newly established Cambodian People's Party (CPP) government of the Kingdom of Cambodia with much of the Khmer Rouge's armed forces (Rowley 2006); he received a royal pardon for his participation in DK crimes (Heder 2002). A year later, Pol Pot organized the final internal Khmer Rouge purge by having Son Sen murdered. However, Ta Mok had Pol Pot arrested for this measure and kept him under house arrest (Heder 2002). In April 1998, while still under the control of Ta Mok, Pol Pot was pronounced dead, although the circumstances of his death remain unknown—did he die of natural causes, was he killed in order to disrupt the pending Khmer Rouge trials (Ciorciari and Heindel 2014)? In 1998, Nuon Chea and Khieu Samphan defected and Ta Mok was arrested near the Thai border toppling the last remaining strength of the Khmer Rouge leadership (Ciorciari and Heindel 2014). Thus, as Rowley (2006) states, the Khmer Rouge regime died not once, in 1979, but twice by the end of the 1990s.

The Extraordinary Chambers in the Courts of Cambodia

In 1997, nearly two decades after the fall of Democratic Kampuchea, co-Prime Ministers, Hun Sen and Prince Ranariddh, jointly asked the United Nations to begin the process of bringing the Khmer Rouge to justice (Ciorciari and Heindel 2014). After years of extensive negotiations as to the type of court (international, Cambodian-only, a hybrid, etc.) that would be created and who would be in control, a hybrid court, the Extraordinary Chambers in the Courts of Cambodia (ECCC), was established in 2004 (Ciorciari and Heindel 2014). The role of the ECCC is to prosecute senior leaders who were most responsible for crimes during Democratic Kampuchea (Heder and Tittemore 2004). Research conducted in the late 1990s and early 2000s has confirmed that numerous policies of mass execution existed throughout the DK period, and that these policies were devised at the highest levels of the CPK by its senior leadership—particularly Nuon Chea, Ieng Sary, Khieu Samphan, Ta Mok, Kae Pok, Sou Met, and Meah Mut (Heder and Tittemore 2004). As of the writing of this dissertation, the court is still operating and trials of the top leaders have recently concluded. The ECCC and its recent use of osteological data is discussed further in Chapter 9.

Memorialization

While the ECCC attempts to provide legal justice and closure, how are other aspects of memory and reconciliation addressed in Cambodia? Shortly after the PRK was established in 1979, the government implemented initiatives to represent the violence that had transpired during DK. They transformed S-21 into the Tuol Sleng Genocide Museum, they tried Pol Pot and Ieng Sary in absentia for genocide, a Genocide Research Committee was established to investigate DK crimes which included the exhumations of mass graves (1981 to 1983), directed

the building of local memorials to contain human remains in provinces and municipalities, established a national day of remembrance on May 20, and constructed a memorial *stupa* at Cheoung Ek in 1988 (see Chapter 4) to contain the human remains from the mass graves there (Hughes 2003). Thus, politics and memory were inherently intertwined.

Today, Cambodia has no national memorials to the Khmer Rouge period beyond Tuol Sleng and Choeung Ek—which are also the foremost tourist attractions in Phnom Penh. As was the case during the PRK, these memorials (and the human remains displayed within) are still indicative of "evidence" of what transpired under the Khmer Rouge and a reminder that action and justice still need to occur (Hughes 2003; Williams 2004b). However, as Williams (2004b) states, the memory represented at Choeung Ek and Tuol Sleng is not likely representative of the experiences (rural and agrarian) of survivors; by focusing on death and violence, other aspects of what was lost during the Khmer Rouge period is eclipsed. Thus, Williams (2004) concludes that it is difficult to state whether Tuol Sleng and Choeung Ek help Cambodians remember and reconcile with the past or whether they are meant more as tourist attractions.

CHAPTER 3: ASSESSING HUMAN OSTEOLOGICAL TRAUMA

Trauma Analysis Introduction

Trauma, broadly defined, is an injury to living tissue caused by an extrinsic mechanism or force either intentionally or accidentally (Lovell 2008). More nuanced definitions and categories of traumatic injuries exist for both clinical and anthropological purposes, although as Judd and Redfern (2012) note, in the case of bioarchaeology/paleopathology, there is little agreement among scholars as to what types of injuries should be classified as trauma. Despite the challenges of classifying traumatic injuries, trauma to the human skeleton is a critical component to any biological analysis.

Osteological injuries can provide abundant knowledge about past populations including health, levels of conflict, cultural practices, and occupation (Kroman and Symes 2013; Lovell 2008; Roberts and Manchester 2007; Walker 1997). In contrast to historical records depicting violence and injuries, human skeletal remains provide direct evidence of traumatic events that are not hindered by cultural constructs. Different types of behavior, particularly those that are violent, leave distinct osteological injury patterns that can be assessed by anthropologists. As Walker (1997) notes, "analysis of these patterns in modern and ancient populations can thus provide information on the historical, cultural, and environmental factors associated with different types of aggressive behavior." Yet accurate reconstructions of violent behavior or accidental injuries can only transpire if osteological trauma is carefully documented and interpreted.

Whether in a bioarchaeological or forensic anthropological context, the most important aspect of an osteological trauma analysis is the detailed and accurate descriptions of the injuries.

To enhance the accuracy of the description, radiographs and photographs should be taken whenever possible (Kimmerle and Baraybar 2008a; Komar and Buikstra 2008). Additionally, diagrams and microscopic assessment of the lesions are also useful. Galloway et al. (1999) suggest that to be precise, an anthropologist should examine all skeletal elements, not just those with obvious traumatic lesions. For standardization, each bone with a traumatic lesion should be recorded and the location of the injury on the bone should be documented and measured (*i.e.,* the size of the lesion itself as well as its location from an anatomical landmark) (Kimmerle and Baraybar 2008a; Komar and Buikstra 2008).

But why is an accurate and detailed analysis of osteological trauma imperative? An accurate analysis permits anthropologists to interpret the category, force, and timing of the traumatic injury as well as what these variables indicate about the injury and/or death of an individual. For example, if an individual presents with an incomplete butterfly fracture, the anthropologist will likely interpret this as a blunt force injury resulting from compression and tensile forces that occurred while the individual was alive (antemortem). The interpretation of what event caused this injury may be far more complicated, but the description of the injury provides a great deal of information. A detailed analysis also permits anthropologists to compare patterns of traumatic injuries seen in one individual or group, to other individuals or groups across time and geographic regions. Finally, these anatomical and biomechanical descriptions can facilitate communication among interdisciplinary colleagues (*e.g.,* anatomists, paleoanthropologists, forensic anthropologists, pathologists, paleopathologists, and bioarchaeologists).

Mechanisms and Sources of Osteological Trauma

Bone and Fracture Biomechanics

Before undertaking an analysis of trauma, it is essential for anthropologists to understand the biomechanical properties of bone and how bones fracture. Bone is a heterogeneous material composed of protein and minerals that permit it to withstand forces from multiple directions, but it is also a viscoelastic material that behaves differently depending on the rate and duration of loading (Berryman et al. 2012; Berryman and Symes 1998; Galloway 1999a). Under high rates of loading, such as high velocity projectile trauma, bone will behave as a brittle material and will shatter, while under low rates of loading, such as blunt trauma, bone will behave as a ductile material and will plastically deform before fracturing (Berryman et al. 2012; Berryman and Symes 1998).

Traumatic osteological injuries are the result of both intrinsic and extrinsic factors. The dynamics of fracture production are determined by stress (distortion) and strain (deformation) (Berryman and Symes 1998; Galloway 1999a). The stress-strain curve indicates that bone passes through elastic and plastic phases as a load is applied. Bone begins to elastically deform under a load, but will return to its original shape if the load is removed; if the load is sufficient, the bone will move beyond the elastic phase and will enter the plastic phase where it will be permanently deformed even if the load is removed. If a bone continues to be loaded beyond the plastic phase it will fail resulting in a fracture (Berryman and Symes 1998). Fractures begin at either the weakest area of bone—bone is weaker in tension than compression so it will fail first in tension—or where the force first overwhelms the strength of the bone (Berryman et al. 2012; Berryman and Symes 1998).

If the bone is fractured, the type of fracture and its shape should be noted as well as the force that produced the fracture. Fracture type refers to the degree of bone breakage—complete or incomplete, and simple or compound (Galloway 1999a). Complete fractures result in discontinuity between the fractured elements while incomplete fractures maintain at least partial continuity between the bony elements. Simple (closed) fractures remain beneath the skin while compound (open) fractures disrupt the overlying skin (Galloway 1999a). Complete fractures can be further categorized based on the shape of the fracture line: transverse, oblique, spiral, comminuted, butterfly, and segmental (Galloway 1999a). If possible, the force involved in the fracture should also be noted: tension (stretching), compression (compaction), shearing (sliding), rotation (twisting), and angulation (bending) (Galloway 1999a).

Trauma Mechanisms

There are four general mechanisms of osteological trauma based upon the type of force that is applied: blunt, sharp, high velocity projectile, and thermal (Galloway et al. 1999; Kroman and Symes 2013). Blunt trauma is the result of slower loading forces applied by a blunt object to a large impact area and there is often a clear indication of the point of impact (Galloway et al. 1999; Kroman and Symes 2013). Blunt force trauma usually presents with radiating and concentric fractures and the bone is often plastically deformed (Berryman and Symes 1998; Galloway et al. 1999; Kroman and Symes 2013). Sharp force trauma, a subcategory of blunt trauma, is caused by a sharp implement impacting a small surface area of bone creating an incised wound. Sharp force trauma can present with radiating and concentric fractures in addition to the incised wound (Kroman and Symes 2013). High velocity projectile or ballistic trauma results from an object traveling at high speed and penetrating the bone. Projectile injuries

are typically accompanied by an entrance and an exit wound with the beveled edges indicating the direction of the traveling object. These beveling patterns are most distinct when they affect the cranial vault (Smith et al. 1987). High velocity projectile trauma can also present with radiating and concentric "heaving" fractures, but the bone is generally not plastically deformed (Kroman and Symes 2013). Thermal trauma can cause fractures but it can often be difficult to distinguish between traumatic injuries caused prior to burning and thermal-induced trauma. When analyzing thermal trauma, an anthropologist must consider the heat and duration of the fire as well as how much soft tissue was present when the fire began (Kroman and Symes 2013).

Although these categories of trauma are considered to be the analytical standards (Kroman and Symes 2013), they should not be used as strict criteria. Due to the overlap in trauma types, these categories should be used to loosely classify traumatic injuries. Kroman and Symes (2013) suggest that skeletal trauma should be viewed as a biomechanical continuum based on the intrinsic factors of bone and the extrinsic factors of force, including the force of impact, surface area of the impacting interface, and the rate of acceleration and deceleration.

Trauma Sources

In addition to the mechanisms of skeletal trauma discussed above, there are four primary sources of injury: interpersonal violence (intentional trauma), accidents, underlying pathological conditions, and repeated stress (Bennike 2008). Particularly within the context of intentional trauma, there are numerous causes for skeletal injury including warfare, abuse (both domestic and child), ritualized or culturally sanctioned violence, and interpersonal disputes (Judd and Redfern 2012). However, for both the bioarchaeologist and the forensic anthropologist,

distinguishing between these sources of trauma can be challenging and requires comprehensive and critical analysis of the skeletal remains and cultural context.

For example, distinguishing between accidental and intentional trauma is an important aspect of bioarchaeological and forensic anthropological analyses. Often, if osteological trauma is accidental in origin it is of limited analytical significance; conversely, if trauma is intentional it has larger sociocultural, and perhaps legal, ramifications. Judd and Redfern (2012) state that determining whether a traumatic lesion was inflicted intentionally or accidentally depends on the identification of the causative mechanism/instrument as well as additional contextual evidence. Walker (1997) suggests focusing on the location of the skeletal lesions and the age of the individual to distinguish between accidental and intentional injury. With regards to interpersonal violence, assailants generally target the head and neck because these areas are likely to produce painful (if not lethal) and conspicuous injuries. Violent injuries are more likely to be seen in adolescents and adults while accidental injuries are more common among children and the elderly (Walker, 1997).

Lovell (2008) also suggests evaluating traumatic lesions based on anatomical location. She notes that fractures to the cranium (especially the face), posterior ribs, vertebral spinous processes, and hands and feet are more indicative of interpersonal violence than accidental injuries. Facial fractures are commonly caused by violence including assault, domestic violence, and child and elderly abuse, although they may also be caused by recreational activities, occupational hazards, and motor vehicle accidents (Lovell, 2008; Walker, 1997). Similarly, Lovejoy and Heiple (1981) state that age and sex are important factors for distinguishing between accidental and violent injuries. In their study of the Libben population in Ohio, Lovejoy and Heiple (1981) concluded that high rates of fractures in young adults were more likely due to

activity rather than violence since there was not a significant difference between the sexes. If violence or warfare was the cause of these injuries, more fractures should have been present among adult males. Older individuals in this population displayed injuries of an accidental nature including: Colle's, Pott's, mid-shaft clavicular, and femoral neck fractures (Lovejoy and Heiple, 1981). However, forensic and medical literature state that the same fracture patterns can be caused by accidents and intentional violence making a distinction between the two sources of injuries difficult (Judd and Redfern, 2012). While there is not a standard set of criteria by which accidental and intentional traumatic injuries can be distinguished, both intrinsic (age and sex) and extrinsic (mechanism of trauma and cultural circumstances) variables must be assessed to most accurately interpret skeletal trauma. If distinctions can be made, much information is gained about individual life histories and the population at large.

Timing of Injuries

As an important component of trauma analysis, one of the primary roles of the forensic anthropologist or bioarchaeologist is to determine the timing of injuries which helps establish whether the injury was related to the individual's death (Moraitis et al. 2008; Sauer 1998). There are three temporal categories typically used by forensic anthropologists: antemortem, perimortem, or postmortem.

Antemortem

Antemortem, or remote, injuries occur prior to death and show some evidence of healing (bony callus and rounded margins), although it is possible for an individual to have sustained an injury close to death allowing no time for healing (Moraitis et al. 2008; Sauer 1998). In a study

of cranial injury healing, Barbian and Sledzik (2008) found that in most cases, a full week is needed before any macroscopic indicators of healing are seen.

Perimortem

Perimortem, or acute, injuries occur at or around the time of death, are usually associated with the manner of death, and the fracture patterns are indicative of fresh or "green" bone (Sauer 1998). While antemortem and postmortem injuries are generally easy to interpret, perimortem injuries can be problematic and require detailed analysis. Perimortem trauma will display no evidence of healing. However, Wieberg and Wescott (2008) found that perimortem (fresh) characteristics of bone persist into the postmortem interval (as long as five months after death) making the distinction between perimortem and postmortem injuries challenging. Perimortem fractures in fresh bone are usually uniform in color, the fracture edges are smooth with sharp projections, and the angles of the fractures are acute and/or obtuse; these fractures are often associated with bone tears (delamination), breakaway spurs, secondary fracture lines, and plastic deformation (Moraitis et al. 2008; Wieberg and Wescott 2008).

Postmortem

Postmortem injuries occur after death, reflect changes associated with decomposition and taphonomic variables, and the fracture patters are indicative of dry bone that has lost its elasticity (Sauer 1998). Postmortem fractures usually vary in color, the fracture margins are blunt and irregular, and in long bones, the fractures tend to occur at right angles to the long axis (Moraitis et al. 2008; Wieberg and Wescott 2008). However, Cappella et al. (2014) experimentally demonstrated that there is a high rate of error among practioners when distinguising between

perimortem and postmortem fractures. They found that error rates were very high (5.5% to 14.8%) for postmortem fractures and between 14.8% and 37% for perimortem fractures.

It is imperative to recognize that bone retains its "fresh" properties long after death and does not consistently begin to display postmortem characteristics until around five months. Taphonomic changes can also alter traumatic injuries. Thus, multiple morphological characteristics should be used collectively to improve the accuracy of distinguishing between perimortem and postmortem fractures (Wieberg and Wescott 2008). Additionally, microscopy and radiography can be used to assist with the determination of injury timing.

Trauma Analyses in Context

The context in which anthropologists are assessing osteological trauma is important to consider as it influences the scope of analysis. In the forensic context, trauma analysis is often requested to assist with the determination of the cause/manner of death or to obtain additional information regarding whether injuries were inflicted before, around, or after the time of death. In bioarchaeology, the emphasis on trauma analysis tends to focus on the larger cultural and social contexts in which individual(s) lived and sustained traumatic injuries. The following discussion addresses two contexts in which anthropological osteological trauma analyses are performed: U.S. domestic forensic casework and human rights conflicts.

Forensic Casework

The analysis of osteological trauma has long been considered the purview of bioarchaeologists and paleoanthropologists, since traumatic injury assessment within the context of forensic anthropology is fairly recent (Dirkmaat et al. 2008; Symes et al. 2012). However, as

collaboration with medical examiners becomes more common and research on skeletal trauma increases, forensic anthropologists have become more involved in the analysis of traumatic injuries.

In a forensic context, the primary purpose of a trauma analysis is to reconstruct the circumstances of an individual's death and to assist with identification (SWGANTH 2011). In particular, forensic anthropologists can help interpret whether human intervention was responsible for the traumatic injuries or whether the injuries were more likely accidental (based on fracture patterns and the forces that produced the fractures, as discussed above) (Symes et al. 2012). Anthropological interpretation of antemortem injuries can also assist with the identification of an individual if antemortem and postmortem radiographs are available for comparison.

Generally, the focus of trauma analysis in forensic anthropology is the individual decedent—or perhaps a few decedents if it was a more extensive death event such as an automobile accident or an airplane crash (Dirkmaat et al. 2008). The forensic anthropologist will describe and document the traumatic lesions, but will rarely compare these lesions to another case unless they are unusual or difficult to interpret. Analyses of osteological trauma patterns at the group- or population-level are uncommon in forensic anthropology unless it is within the context of human rights conflicts.

In forensic analyses of trauma, contextual evidence is also essential for the interpretation of skeletal injuries. While sociocultural contexts are not frequently addressed by forensic anthropologists, although this is changing, the demographic context of an individual must be determined before analyzing trauma since age, sex, health, and social status can all affect patterns of injuries (Walker 1997). Additionally, the environmental context in which the remains

were found must be carefully documented. The context of the crime scene, or body deposition site, can provide the forensic anthropologist with information that cannot be obtained from the human remains alone (Symes et al. 2012). Many scholars argue that to achieve a comprehensive recovery of human remains, and an effective interpretation of osteological injuries, it is best to have a forensic anthropologist at the scene working to document the remains *in situ*, so answers to questions such as "How long have the remains been there?"; "Why are some of the bones missing or broken?"; and "Why are some bones out of place?" can be answered (Symes et al. 2012). Thus, forensic anthropologists are concerned with the environmental context in which human remains are discovered.

Related to the environmental context, forensic anthropologists must also evaluate taphonomy which can alter the skeleton. Given the importance of context and precise documentation, forensic anthropologist must rule out taphonomic—decomposition, bone transport, scavenging, sun-bleaching, weathering, or acidic soil—and normal variation before concluding that an abnormality is traumatic in nature (Dirkmaat et al. 2008; Symes et al. 2012). Taphonomic factors can alter the skeleton and ultimately the anthropologist's ability to interpret the traumatic injuries.

Human Rights Conflicts

Forensic anthropologists and archaeologists have long been involved in the aftermath of human rights conflicts and genocide, and their analyses/research primarily involves interpretation of violent acts, as discussed in Chapter 1. Unlike the analysis of osteological trauma in domestic forensic casework, in the context of human rights conflicts, trauma and violence analysis can be conducted at the population-level. This approach allows for the

comparison of trauma between different conflicts and generates data not captured by the traditional forensic examination at the individual-level (Komar and Lathrop 2012). The comparison of geographically and temporally disparate conflicts, as Komar and Lathrop (2012) state, may help to classify different types of interpersonal conflict such as warfare, genocide, or other violent human rights violations. However, due to the infrequency of such mass killings and the inaccessibility of these human remains for research, these population-level comparisons can be challenging.

Limitations of Osteological Trauma Analyses

In both bioarchaeology and forensic anthropology the evaluation of traumatic injuries is a necessary component of analyzing human remains. However, there are numerous limitations that can hinder the interpretation of traumatic lesions including taphonomy, pseudo-trauma, and the application of forensic models to bioarchaeological remains.

Taphonomic changes to human skeletal remains such as carnivore and insect damage, rodent gnawing, root erosion, soil disturbances, and water and wind erosion can pose challenges for trauma analysis; until taphonomic changes can be ruled out, interpersonal violence should not be suggested (Saul and Saul 2002). For example, Calce and Rogers (2007) found that in an experimental porcine study, different taphonomic factors such as rain, snow, the freeze-thaw cycle, and soil erosion can disguise or alter blunt force cranial trauma. While osteological trauma analyses should always be conducted with care and accuracy regardless of the condition of the remains, even more attention should be given to skeletal elements affected by taphonomic conditions to prevent the over- or under-estimation of traumatic lesions.

One of the primary challenges in evaluating traumatic lesions in taphonomically altered human remains is pseudo-trauma. While "pseudopathology" has long been recognized in the paleopathology literature as a pitfall for correct interpretations of pathological lesions (Wells 1967), "pseudo-trauma" is infrequently discussed by name. From a bioarchaeological perspective, perhaps this is because trauma is often considered under the broader category of "pathological conditions;" in forensic anthropology it is rarely address as a specific issue. While apparently not warranting its own book chapter or article title, pseudo-trauma is discussed in the literature. As Saul and Saul (2002) note, fractures caused by invading roots can mimic cannibalism, burial disturbances or secondary burial might suggest decapitation, or root erosion may be confused with incised wounds from sharp force trauma. Ubelaker (1997) states that cracks caused by weathering can resemble blunt force trauma, trampling and carnivore damage can mimic sharp force trauma, and fungus growing on bones can blacken them simulating thermal trauma. Therefore, a detailed examination is imperative for distinguish between true trauma and pseudo-trauma.

These limitations can be challenging for both modern and ancient human remains, but careful and critical assessment of suspected traumatic injuries is always warranted. Determining what may have caused osteological injuries before, around, or after death is vital for a comprehensive understanding of individuals' life histories.

CHAPTER 4: RESEARCH MATERIALS

The Choeung Ek Genocidal Center[3]

Early Site History

The modern Choeung Ek Genocidal Center, colloquially known by foreigners as the "Killing Fields,"[4] sits approximately 15 km southwest of the center of Phnom Penh in Choeung Ek Commune, Dangkor District. Today it is the location of at least 129 Khmer Rouge period mass graves. Prior to the Khmer Rouge, however, this region had a rich and significant history.

From the sixth to twelfth centuries CE (pre-Angkorian and Angkorian eras), the region was known as ចុងច្រមុះ (*jong jrmoh*), or "tip of the nose" (personal communication with Choeung Ek Genocidal Center staff 2015). Recent archaeological work has uncovered architecture, statuary, inscriptions and pottery dating from the fifth to the tenth centuries indicating that initial settlement of this region occurred during prehistoric times (Phon 2011). An early site with 61 pottery kilns was discovered in the region of Choeung Ek suggesting that this was one of the largest pottery production locations in Cambodia (Phon et al. 2013).

Unfortunately, little is known about the Choeung Ek region from the post-Angkorian era until the mid-20th century. Documentation begins to reappear when discussing the use of the region by the Chinese-Khmer community. Beginning in the 1960s, this community used the land as a cemetery. According to Phon (2011), Chinese or ethnically Chinese residents of the region

[3] The text that follows is drawn from a co-authored book chapter with the staff at the Choeung Ek Genocidal Center and the Ministry of Culture and Fine Arts. The historic and modern accounts of Choeung Ek have therefore been approved (Fleischman et al. in press).

[4] The phrase "killing fields" was first used in 1980 by Sydney Schanberg, an American journalist, in his *New York Times* article "The Death and Life of Dith Pran." This phrase was adopted as the title of the 1984 film depicting Dith Pran's struggles under the Khmer Rouge (Hughes 2006).

would repurpose ancient mounds, and possibly ancient kilns, for the construction of tombs. This location was chosen for a cemetery because it encompassed features considered positive or lucky in Chinese funerary traditions such as a body of water east of the tombs—in this case, Lake Choeung Ek is directly east (Phon 2011) (refer back to Figure 3). At least 16 graves have been identified in what remains of this former Chinese cemetery (Narrowcasters 2011). Still visible today at the Choeung Ek Genocidal Center are a few Chinese gravestones (Figure 4) and a cement kiosk that was used for Chinese funeral services. Today, this kiosk is used for national-level ceremonies held at Choeung Ek.

Figure 4. Three examples of the remaining Chinese gravestones at the Choeung Ek Genocidal Center, as of 2014.

In addition to the Chinese cemetery, in the mid-1960s, this region was well known for its glass factory (រោងចក្រកែវ) where glass bottles were produced for beer (personal communication with Choeung Ek Genocidal Center staff 2015). This factory was equipped with electricity that later became important for the Khmer Rouge's activities at Choeung Ek.

After the establishment of Democratic Kampuchea in 1975, Khmer Rouge work groups were sent to the region of Choeung Ek for agricultural production. These work groups were responsible for growing rice and hemp and harvesting palm juice to make palm sugar (Extraordinary Chambers in the Courts of Cambodia 2016j; personal communication with Choeung Ek Genocidal Center staff 2015). Farming, however, would not remain the only

activity conducted in this region. Between 1976 and mid-1977, Duch, the Chairman of S-21; Duch's deputy, Hor; and Duch's superior, Son Sen, determined that a new execution and burial location for S-21 prisoners was needed (2016h). In his testimony before the ECCC, Duch stated that the decision to bury victims further away from S-21, and thus the reason for the establishment of Choeung Ek, was that the number of corpses at S-21 was posing a risk for disease epidemics (2016h). The staff at the Choeung Ek Genocidal Center suggest instead that the Khmer Rouge deemed this location acceptable because it was far from the city center, had numerous large trees for privacy, and was already a cemetery (personal communication 2015).

Upon determining that this site was to be their new execution and burial grounds, a fence with five rows of barbed wire was built around the former Chinese cemetery. Electricity from the aforementioned glass factory was brought in to power only a few lights and a loudspeaker playing Khmer Rouge revolutionary propaganda (personal communication with Choeung Ek Genocidal Center staff 2015). As a reported practice at execution sites throughout Cambodia, the propaganda from the loudspeaker is said to have dampened the sounds of victim's screams. Despite the fact that many Khmer Rouge cadres were working in the vicinity, the purpose of Choeung Ek was a closely guarded secret. According to interviews with local farmers, Bennett (2015) states that Choeung Ek was known to be a Khmer Rouge facility, and trucks were seen driving in and out, but the farmers thought it was a training ground for the army. No one was permitted to enter the site unless they worked within.

Modern Site

While it is still unknown how many individuals were killed and buried at this site between 1977 and 1979, its location and purpose were revealed shortly after the Khmer Rouge

were overthrown. However, accounts of the discovery of Choeung Ek and the exhumation of the graves vary. Chandler (1999) and Hughes (2006) state that Choeung Ek was not discovered until 1980—one year after the Khmer Rouge abandoned the site in January, 1979. Conversely, Jarvis (2015) states that in 1980, Choeung Ek was opened as a memorial suggesting it had been discovered, and the remains exhumed, prior to this year.

In line with the latter chronology are accounts of Cambodians interviewed by Caroline Bennett and myself. After the Khmer Rouge were disbanded, villagers began returning to their homes. Those who returned to their villages near Choeung Ek stumbled into the site seeking anything of value. Villagers began to unearth the graves searching for gold, equipment, and other valuables (Bennett 2015). One Choeung Ek staff member informed me that he arrived at the site only two days after the Khmer Rouge had abandoned it. He and other villagers took chemicals and tools left by the Khmer Rouge to sell at a local market; other villagers dismantled the buildings at Choeung Ek using the wood to build new homes. He said that the Vietnamese/PRK had been informed about Choeung Ek, but were initially more concerned with preserving and documenting S-21 (personal communication with Choeung Ek staff 2015). Thus, Choeung Ek and its physical evidence of massacre was known, although perhaps not well-documented, prior to 1980.

In late 1979 or early 1980, formal exhumations of the mass graves at Choeung Ek began. Of the estimated 129 mass graves covering more than two hectares of land, 86 graves were excavated. The exhumed skeletal remains were placed along the edges of each grave, the crania were counted, and a plaque was placed next to each grave indicating the number of individuals that had been disinterred (Figure 5) (personal communication with Choeung Ek staff 2015). In

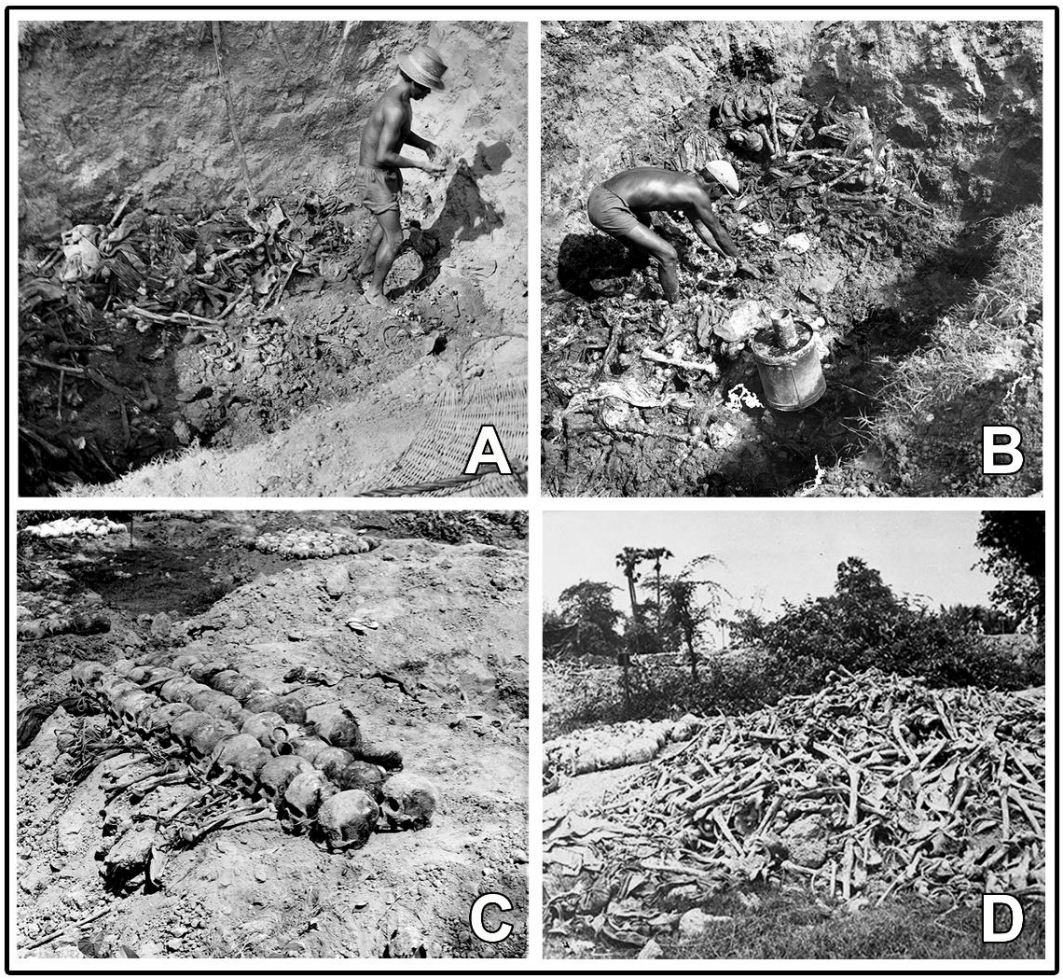

Figure 5. Photographs from the formal exhumation of the mass graves at Choeung Ek. Images A and B depict workers within the graves removing skeletal elements. Images C and D depict the remains placed on the edges of the mass graves after removal. In some cases the remains (primarily the crania) were neatly ordered, as in image C, while the remainder of the skeletal elements were commingled in piles, as seen in image D (images courtesy of the Tuol Sleng Genocide Museum).

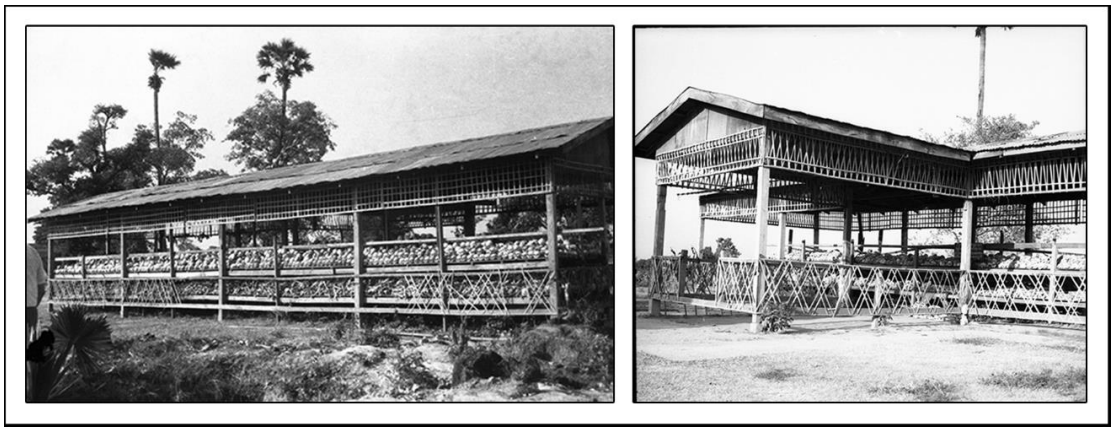

Figure 6. The original wooden memorial constructed at Choeung Ek in the 1980s (images courtesy of the Tuol Sleng Genocide Museum).

total, 8,985 crania were exhumed and the Department of Culture and Information of Kandal Province officially counted and recorded this figure.

After the formal exhumations, the PRK established the Choeung Ek Killing Center (មណ្ឌលពិឃាតជើងឯក) in 1981. Despite the formal establishment of this Center, for numerous years the bones remained at the edges of the graves and local villagers continued to search through the graves to find valuables and clothing. At some point in the early 1980s, the PRK put an end to the grave looting by assigning guards to Choueng Ek (personal communication with Choeung Ek staff 2015). Also at this time, an open-walled, wooden memorial was constructed and the human remains were placed inside (Figures 6 and 7). In 1986, Choeung Ek officially became the responsibility of the Department of Culture and Information of Kandal Province.

In 1988, the provincial boundaries shifted and the Choeung Ek Killing Center fell within the province of Phnom Penh instead of Kandal. As such, the responsibility of the Center was transferred to the Phnom Penh Municipality and the name was changed to the Choeung Ek Genocidal Center (មជ្ឈមណ្ឌលប្រល័យពូជសាសន៍ជើងឯក) (personal communication with Choeung Ek staff 2016). At this time, the Phnom Penh Municipality's Department of Culture commissioned a scientific study of the remains by a Vietnamese team from Ho Chi Minh University. Directed by Professor Quang Quyen and Dr. Tran Hung, the team cleaned approximately 4,000 crania with water and lye, evaluated the crania for age, sex, and cause of death, and wrote identification numbers on them (Fawthrop and Jarvis 2004; personal communication with Choeung Ek Genocidal Center staff 2015). In this same year, under the

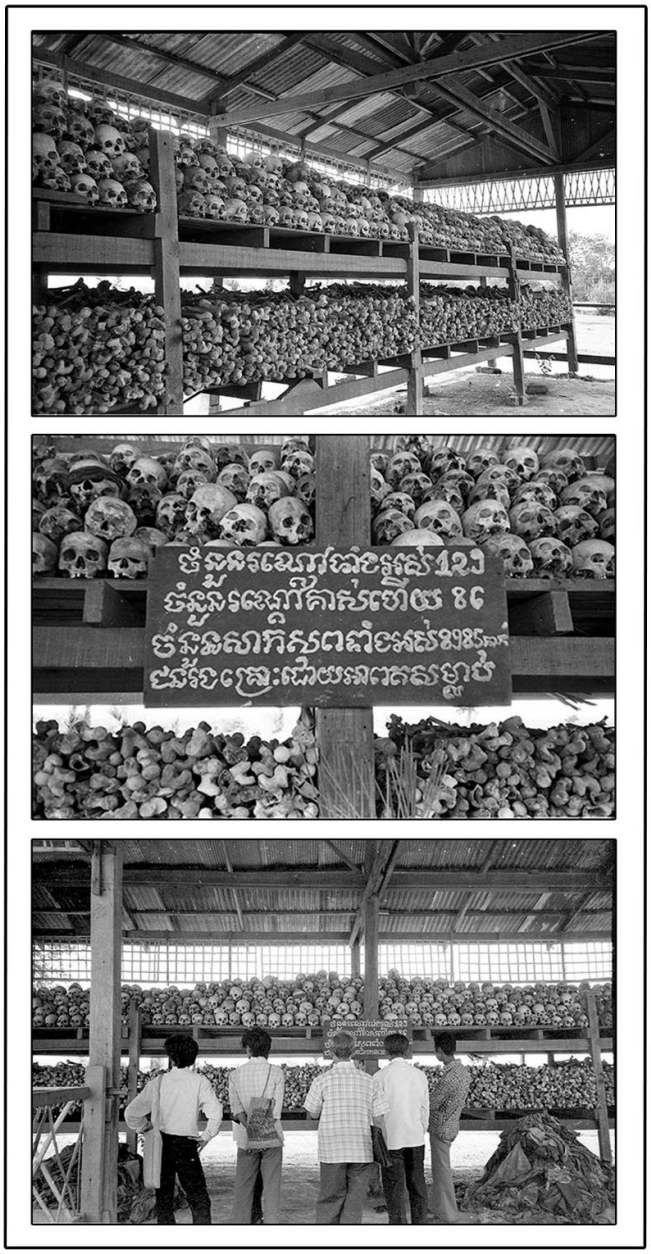

Figure 7. Inside the original wooden memorial at Choeung Ek. The date of these images is unknown. The middle image shows a sign within the memorial describing the mass graves and the number of victims. It reads: "The total number of graves: 129. The total number of graves excavated: 86. The total number of corpses: 8,985 people. The victims were killed by Pol Pot" (image courtesy of the Tuol Sleng Genocide Museum; translation by author).

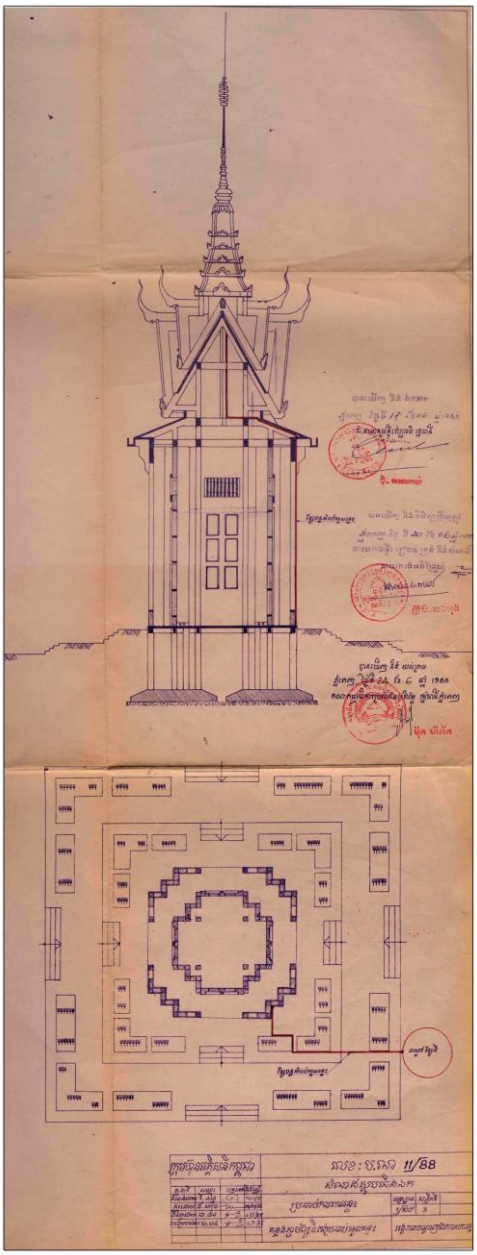

Figure 8. The original blueprint of the Choeung Ek memorial by architect Lim Ourk (1998) (image courtesy of the Documentation Center of Cambodia).

direction of Vietnamese General Mai Lam, the government had a large concrete *stupa* erected on the site to more effectively house and memorialize the remains (Figures 8 and 9). A *stupa*, as Thompson (2006) describes, is a common Buddhist architectural structure. It is pyramidal, invoking Mount Meru, the center of the Buddhist cosmic universe, and houses relics or remains.[5] The Choeung Ek Genocidal Center was also officially opened to tourists, although as Bennett (2015) notes, international visitors and journalists had been brought regularly to Choeung Ek since 1980. With the public opening of the site, it came to serve as the national memorial to the victims of the Khmer Rouge and as an educational center (Cheung Ek Genocidal Center 2016; Bennett 2015).

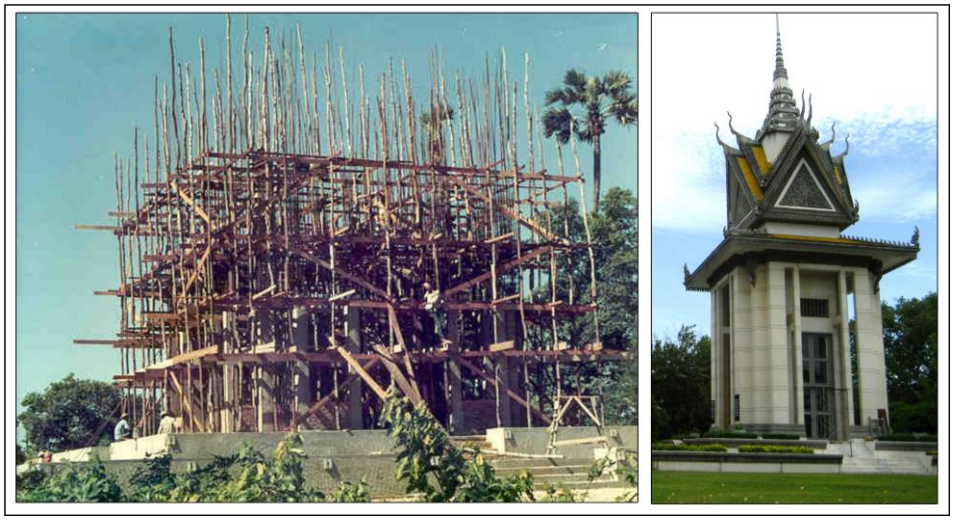

Figure 9. Construction of the Choeung Ek memorial in 1988 (image courtesy of the Documentation Center of Cambodia); the memorial today.

[5] The memorial at Choeung Ek is generally referred to a *stupa* although there are critiques about the use of this term (for a detailed description of the architecture, symbolism, and critiques of the Choeung Ek memorial see Hughes 2006). During my fieldwork, I also encountered another word describing a similar structure. In some cases, the pyramidal structures housing human remains from the Khmer Rouge period were called *stupa* (ស្ទូប, pronounced *stoup*), while in other cases they were called *chetey* (ចេតិយ). After discussing this discrepancy with a Khmer Buddhist monk, I was provided with the following distinction: a *chetey* is a Buddhist structure where the bones and ashes of the dead are retained in keeping with the teachings/laws of the Buddha. A *stupa*, is a memorial or a monumental reminder of an event, rather than a person. So when I asked why human remains from the Khmer Rouge period were kept in *stupa*, the monk responded that it was a means of reminding people of what happened and a way to remember the deceased (personal communication 2016). With regards to the memorials containing remains from the Khmer Rouge, the two terms seem to be used interchangeably.

Figure 10. A) View of the different levels inside the Choeung Ek *stupa*; B) Long bones on the first level, some with ligatures still attached to the humeri; C) Some of the crania within.

The *stupa*, with its visceral and confronting display of human remains (Figure 10), situates the site as a location for evidence of the Khmer Rouge's crimes. "Choeung Ek," as Hughes (2006) states, "serves to illustrate 'typical evidence' of mass political violence." Jarvis (2015) argues that the display of human bones at Choeung Ek, as well as the artifacts and photographs at S-21, have become iconic images representing Cambodia and the legacy of the Khmer Rouge. The Choeung Ek Genocidal Center therefore plays a central role in memorializing Cambodia's past and reinforcing the place of Khmer Rouge violence in the country's national historic discourse.

In order to advance the conservation of the site and protect the human remains, in 2005, the Phnom Penh Municipality agreed to a 30-year contract in which the Choeung Ek Genocidal Center will be managed by the JC Royal Company, Ltd. (Cheung Ek Genocidal Center 2016; Bennett 2015). Since this contract was signed, extensive improvements have been made to the Center. A new museum and parking lot were built in 2008, the memorial *stupa* was renovated,

and the audio guide by Narrowcasters was first offered in 2011—and today the guide is available in 15 languages. In 2015, vertical blinds were installed within the *stupa* to protect the human remains from direct sunlight, and vast stretches of wooden walkways were built to keep visitors off of the ground where bones and clothing continue to erode (Figure 11). In addition to all of

Figure 11. A) and B) Above-ground, wooden walkways built in 2015 to prevent visitors from walking on exposed bone; C) Bone and clothing (within the red ovals) eroding out of the soil; D) Sign encouraging visitors not to walk on the eroding bones (these signs were in place prior to the construction of the walkways).

these site works, the Choeung Ek Genocidal Center initiated the first systematic analysis of the human skeletal remains from the Khmer Rouge period: the "Choeung Ek Conservation of Victims at the Killing Fields" project (Beavan 2015). The primary goal of this project, as its name suggests, was to physically preserve the human remains to prevent further deterioration. Osteological analyses of the remains were also conducted (Fleischman 2016).

Contrary to Tyner's (2017) critical, and seemingly Eurocentric analysis of Choeung Ek, the osteological, conservation, and excavation work conducted at the site is not "faux archaeology" or a "manipulation to cater to Western expectations of what a mass grave should look like." The "faux excavation 'site'" he refers to (Figure 12), as well as a more extensive excavation I witnessed while working there (Figures 13 and 14), were conducted by trained Cambodian archaeologists to expose the stratigraphic layers of the site, scientifically

Figure 12. Mr. Voeun Vuthy, the Director of the Choeung Ek Laboratory, showing me (behind the glass display) their archaeological excavation through a slab of concrete on July 15, 2014. Note the carefully preserved stratigraphy below my feet, protected by the glass.

documenting the various depositional events and the material culture preserved below the soil. These excavations were carried out to gain additional information about the site and its history, and not simply for the morbid curiosity of Western tourists. With that said, I do agree with Tyner (2017) in that Choeung Ek is not an "authentic site of forensic investigation." Yet, I argue that Choeung Ek has never claimed to be a forensic site. The Conservation project of the human remains was also not forensic in nature as the results were never intended to be used in legal

proceedings. This research is perhaps best described as applied osteology with an emphasis on conservation. However, the nature of this project changed in 2016 (see Chapter 9).

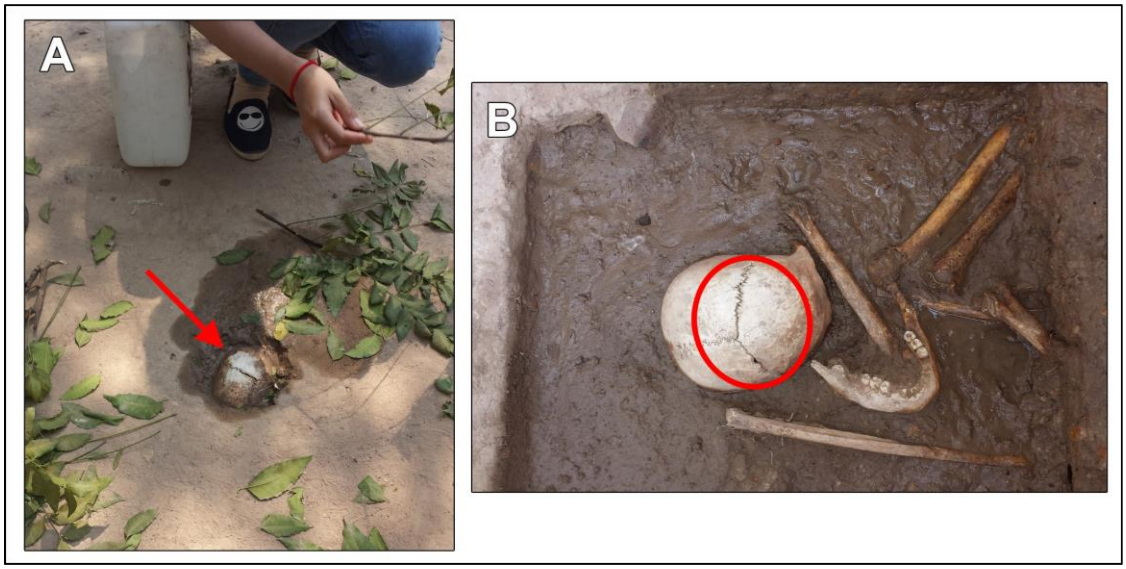

Figure 13. When the mass graves were originally exhumed (see Figure 6), remains were scattered throughout the site, particularly along the edges of the graves. As such, bones continue to erode out of the soil across the site. A) On February 11, 2016, the top of a cranium (indicated by the red arrow) was discovered eroding out of the soil along one of the walking paths. B) To remove the cranium, Mr. Voeun Vuthy and his team archaeologically excavated the surrounding area. By February 15, a mandible and six long bones had also been exposed; the red circle approximates the area of the cranium exposed in photo A.

Figure 14. Many more bones, teeth, fragments of clothing, and other artifacts were unearthed as the excavation continued. Governmental permission was not granted for complete removal, so Mr. Voeun Vuthy and his team carefully pedestalled the remains and artifacts. A) Composite picture taken of the completed excavation on May 31, 2016. Glass was placed along the walls of the excavation to preserve all elements *in situ*. The red box indicates the approximate size of the original test pit seen in Figure 13B. B) Sign in English and Khmer on the top of the display informing visitors that they are viewing "Piece [sic] of bones remaining after excavation in 1980."

Osteological Sample

For this research, a sample of 508 complete and fragmentary human crania from the memorial *stupa* at the Choeung Ek Genocidal Center was used. Over the course of the two and a half year "Choeung Ek Conservation of Victims at the Killing Fields" project mentioned above, all of the remains were removed from the *stupa* and housed in the Choeung Ek laboratory as the team cleaned and analyzed them. With the assistance of the team members, the crania for this research were randomly sampled from those that were in the laboratory at the time I was conducting my analyses (Figure 15).

Figure 15. A portion of the crania analyzed for this research, and my workspace within the Choeung Ek laboratory.

This sample of 508 represents approximately 8% of the nearly 7,000 crania within the *stupa* (Cheung Ek Genocidal Center 2016). While this sample was randomly selected from the crania available to me, it is not necessarily a random sample of the entire *stupa*. When the Conservation project began in 2013, crania were removed from the lowest levels of the memorial first, progressing towards the top levels. Many of the crania on the lower levels of the *stupa*—those at eye-level for pedagogical purposes—have less taphonomic damage and have clearly discernable traumatic injuries. These crania have been placed on the lower levels to show the

various age categories and sexes of the victims (Figure 16)—contrary to Tyner's (2017) assertion that the crania are not organized by the age and sex categories stated on the informational signs within the *stupa*—as well as to demonstrate examples of traumatic injuries that are purportedly representative of all of the crania in the *stupa*. The crania I evaluated were from the highest levels of the *stupa* since I was conducting my research towards the end of the Conservation project. Thus, the crania used for this research may not be a truly random or representative sample.

Figure 16. Sign on the first level of the *stupa* informing visitors about the age and sex of the crania. Note that these crania are relatively intact with limited taphonomic damage.

Tuol Sleng Genocide Museum's Archival Records

History of Tuol Sleng (S-21)

The Tuol Sleng Genocide Museum (Tuol Sleng), as it is known today, was formerly a Khmer Rouge facility called S-21. Established in the buildings of the abandoned Chao Ponhea Yat high school, S-21 was the highest level Khmer Rouge security center in Cambodia (Dy

2007; Ea 2005). The code name "S-21" (ស ២១) was a designation created by the Khmer Rouge to conceal the purpose of the center. There are, however, various interpretations for the meaning of the code "S-21." Chandler (1999a) states that the "S" stood for *sala*, meaning "hall," and "21" was the code number for the Khmer Rouge's security police, or *santebal*. Conversely, Keo and Yin (2011) note that "S" stood for *santebal* while "21" was Nath's, the former center's chief, walky-talky number. Dy (2007) states that "S" stood for "security" (*santisuk*) and "21" was the code for the center's location in Sangkat Tuol Svay Prey, southern Phnom Penh. Despite the incongruities in the interpretation of the name, the purpose of S-21 is well accepted.

The mission of S-21, as Chandler (1999) states, was to locate, interrogate, and obliterate enemies of the CPK, and since protecting itself from enemies was a critical emphasis, S-21 was one of the most important and efficient institutions created by the CPK. While frequently referred to as a prison, S-21 is more accurately described as a facility for torture and interrogation as it "combined incarceration, investigative, judicial, and counterespionage functions" (Chandler 1999). Release from S-21, as would occur in a typical prison, was rare, although recent research by the Documentation Center of Cambodia and Tuol Sleng suggests that at least 179 individuals were released from S-21 between 1975 and 1979 (Keo and Yin 2011). As such, I will refer to individuals held and/or executed at S-21 as "detainees" rather than "prisoners," although this word is regularly employed in the scholarly literature.

Secrecy was an extremely important component of the CPK and therefore of S-21. Maintaining secrecy at S-21 was accomplished by restricting access to the compound and removing all non-staff members from the neighborhood, burning documents rather than throwing them away, limiting S-21 document distribution, blindfolding detainees as they were being transferred, forbidding contact between the different S-21 work units, prohibiting guards to speak

to detainees, and forbidding detainees to communicate with one another. Ultimately, execution of nearly all detainees was the final assurance of secrecy (Chandler 1999).

The Goals and Functions of S-21

Individuals brought to S-21 were accused of committing traitorous activities against the CPK and it was the goal of the staff to extricate confessions, primarily though interrogation and torture. Treasonous confessions were needed so the CPK could prove it was the pinnacle of vigilance and that it was successfully identifying and destroying enemies (Short 2004). "The role of S-21," as Short (2004) argues, "was not to kill but to extract confessions. Death was the finality, but it was almost incidental." For whatever reason they were brought to S-21, nearly all detainees were forced to confess their crimes against the regime which usually took the form of "admitting" to being KGB, CIA, Vietnamese agents, or another category of traitor that included being a foreigner or members of the Thai or East German intelligence services, or even being a supporter of Chiang Kai-shek's Kuomintang (non-communist party) in Taiwan. In some cases, individuals confessed to being spies for both the United States' CIA and the Soviet Union's KGB simultaneously which Pol Pot and the CPK did not consider contradictory (Short 2004). Confessions of traitorous activities, or thoughts against the regime, were expected out of all detainees, and violence and torture were encouraged to extract such confessions.

As an institution, S-21 had three primary units: interrogation, documentation (with a photography subunit), and defense (Chandler 1999). The interrogation unit was responsible for extracting confessions from detainees to confirm the validity of their arrest. For days, weeks, or months, as Chandler (1999) describes, interrogators "invaded the prisoners' bodies, minds, and histories, teasing out, inducing, and inventing memories to coincide with prepackaged

accusations." In addition to confessing their traitorous activities or thoughts, interrogators also forced detainees to implicate their associates. This 'string of traitors' (*khsae kbot*) list, often containing hundreds of names, was attached to the majority of confessions creating the impression of a vast conspiracy network (Chandler 1999).

The surviving confessions from S-21 vary in topic, length, and completeness. Some are only a few pages including a basic biography and perhaps a photograph. Most of the confessions are between ten and 40 pages long, although some are more than 100 pages, and were the result of prolonged interrogations (Chandler 1999). Some confessions were handwritten—most of these were later transcribed by staff in the documentation unit—some of which appear to be first drafts, and others were jointly written by the detainee and the interrogator. By the end of 1976, the confessions tended to follow a designated four-part format. The first section was the "life stories" in which the detainee detailed his/her relatives and associates and work unit. The second section was titled "my political biography" or "history of [my] treasonous activities," followed by the third section called "plans" in which the detainee explained what s/he would have done if not arrested. The final section was the "string of traitors" in which the detainee listed associates and their last known locations (Chandler 1999). This "string of traitors" would be used to locate additional individuals suspected (after being implicated) of sabotaging the CPK who were subsequently arrested and brought to S-21, perpetuating the cycle.

Individuals assigned to the documentation unit at S-21 were responsible for typing handwritten confessions, as noted above, transcribing confessions that had been tape-recorded, preparing confession summaries, and maintaining detainee files (Chandler 1999). Within the documentation unit, members of the photography subunit were responsible for taking mug shots of the detainees as they arrived, photographing detainees who died in captivity (particularly

individuals of significance who had been executed), and taking photographs of the S-21 staff. The defense unit was the largest and included subunits responsible for guarding detainees, bringing detainees into S-21 and removing them for execution, providing basic medical care, and economic support (Chandler 1999). S-21 was a well-structured and functioning institution for detention, torture, and execution.

Detainees at S-21

The majority of the detainees at S-21 were Khmer Rouge cadre purged at various times as Pol Pot and the upper echelon of the CPK became increasingly paranoid about internal enemies (Chandler 1999a; Keo and Yin 2011). These individuals, often holding high official positions in ministries, the military, or regional administrations, were accused of betraying the Party by collaborating with foreign governments as spies, as discussed above. According to Chandler (1999), the majority of the detainees were young males, of ethnic Khmer background, and were rural peasants. In accordance with the CPK's ideology that all enemies needed to be discovered and removed, a Party slogan stated that "when pulling out the weeds, remove them roots and all" (Locard 2004), indicating that wives, children, and other family members of accused individuals must also be destroyed. In addition to believing that all members of an enemy's family were guilty, the torturers/executions feared the vengeance of surviving children. Thus, children and wives were also brought to S-21 and executed—usually after being detained only briefly (Chandler 1999). In addition to Khmer Rouge cadre, S-21 was used to detain, torture, and execute purged S-21 staff and their families, Cambodian intellectuals and others of high social status, individuals who had supported Lon Nol's Khmer Republic, Vietnamese and other foreigners, and anyone else accused of contradicting or subverting the CPK's power and

ideologies (Chandler 1999; Dy 2007). S-21 was therefore an institution designed primarily to address political and internal enemies accused of the most egregious offense: betraying *Angkar* or the Party.

The total number of detainees held at S-21 from 1975 to 1979 varies, as does the total number of victims executed. In his 1999 publication, *Voices from S-21*, Chandler states that the total number of detainees was 13,206, but given that documents are known to be missing from the archive, the total number is likely to be around 14,000. Dy (2007) also uses the figure of approximately 14,000. However, in a previous volume, Chandler (1991c) suggested that the total number of detainees may have been as high as 20,000. In 2009, a list was submitted to the ECCC identifying 12,273 individuals who had been detained at S-21 (Extraordinary Chambers in the Courts of Cambodia 2016c). Upon completion of additional archival work by the Office of the Co-Investigating Judges and the Office of the Co-Prosecutors, a revised list was presented to the court in April 2016 identifying a total of 16,707 S-21 detainees. While this number is based on more comprehensive data than figures presented in the past, the Office of the Co-Prosecutor duly acknowledges the limitations of the archive and recognizes the impossibility of definitively determining a total number of detainees or executions. In addition to missing S-21 documents, the Office of the Co-Prosecutor acknowledges that:

> …many of those who entered S-21, particularly children, were often killed without having their names recorded. Further, the lists were written by different S-21 personnel, many of the lists are handwritten and the writing is not always clear. Sometimes the same name could be spelled differently and mistakenly listed as two individuals, while other times two individuals with the same or similar names who appear on separate lists could mistakenly be considered duplicates (Extraordinary Chambers in the Courts of Cambodia 2016c).

As independent and legal research utilizing the original S-21 documents continues, the number of detainees and executions will likely change over time. In fact, as of May 2017, the

Office of the Co-Prosecutor had identified more than 1,000 additional detainees raising the total to 18,133 (Dr. Helen Jarvis, personal communication 2017).

Discovery of S-21 and the Creation of the Museum and Archive

As Vietnamese troops and their Cambodian allies were traversing Phnom Penh on January 8, 1979, one day after the Khmer Rouge fled the city, two Vietnamese photojournalists were drawn to the southern section of Tuol Svay Prey by the smell of decomposition (Chandler 1999). The photojournalists entered a fenced and barb wired compound with no identification except a sign that read "Fortify the spirit of the revolution! Be on guard against the strategy and tactics of the enemy so as to defend the country, the people and the Party" (Chandler 1999). The photojournalists discovered corpses, shackles and torture devices, hastily constructed detention cells, and office equipment. In the following days, hundreds of thousands of documents, photographs, undeveloped photograph negatives, and artwork depicting Pol Pot were discovered in nearby houses (Chandler 1999).

As the Vietnamese and their Cambodian partners began to clean the site and comprehend what role this facility had played in the CPK system, the value of the archive and the site itself for propaganda began to take hold (Chandler 1999). The Vietnamese invited journalists from socialist countries to visit S-21 on January 25, 1979 to report on the crimes of the Khmer Rouge. A few months later, Vietnamese general, Mr. Mai Lam, was brought to Phnom Penh to organize the S-21 documents into an archive and transform the facility into a museum.[6]

The museum, dubbed the Tuol Sleng Genocide Museum, was officially opened to the public on July 13, 1980 (Ledgerwood 1997). The name "Tuol Sleng," meaning hillock of the

[6] For more information and detailed analyses regarding the museum, its history, and the archive, see: Caswell 2014, Chandler 1999, Hughes 2003, Ledgerwood 1997, and Williams 2004b.

sleng tree (which happens to bear poisonous fruits), was the name of a primary school that adjoined the Chao Ponhea Yat high school. Tuol Sleng therefore became the name designating the entire S-21 compound (Ledgerwood 1997; Chandler 1999; Dy 2007).

The archive at the Tuol Sleng Genocide Museum contains thousands of documents detailing the activities and the detainees at S-21 (Caswell 2014). For example, there are entry and execution lists; internal memoranda and rules of conduct; biographies and confessions of detainees; cadre study notebooks discussing politics, medicine, mathematics, aircraft identification, etc.; CPK directives and speeches; internal summary reports; and notes by interrogators and S-21 directors (Chandler 1999). The archive was named to the UNESCO Memory of the World Register in 2009, and is available to researchers and the general public with permission from Mr. Chhay Visoth, the Museum's Director.

Khmer Rouge Execution Lists

It is extremely rare to have historical documents detailing antemortem information about individuals prior to mass violence. This archive is therefore an invaluable resource for the anthropological comparison of known demographics to those derived from osteological remains. For this research, I collected demographic data from documents produced at S-21 to compare to data generated from the human remains analyzed at Choeung Ek.

I examined more than 100 original documents at the Tuol Sleng archive. Upon establishing a set of criteria for inclusion in this research (see Chapter 5), execution lists produced by the Khmer Rouge at S-21 became the focus for obtaining demographic data. Generally these lists document the name and often the alias of the prisoner, his/her age, sex, home village or location of arrest, position/rank/job, and date of arrest (Figure 17). Some lists

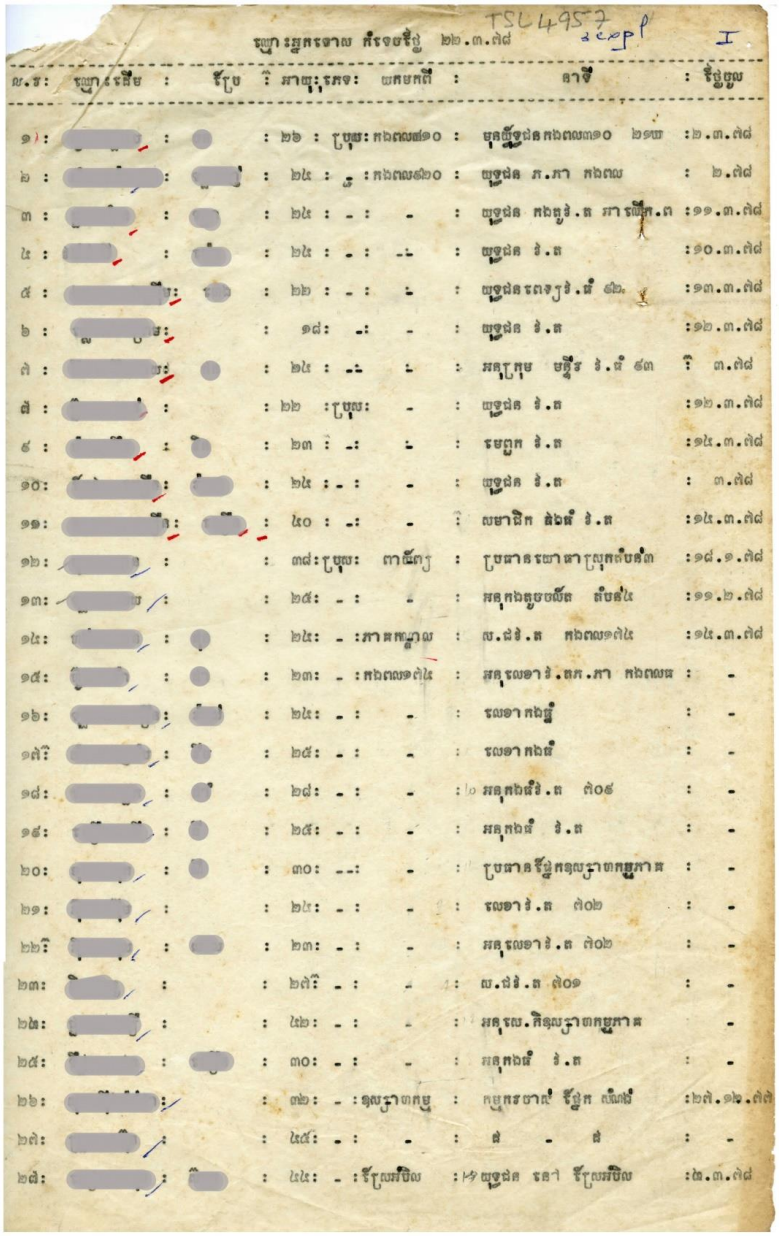

Figure 17. Example of an S-21 execution list. Out of respect for the deceased, I have blocked out their names and aliases (second column).

provide further information such as the name of the prisoner's spouse, the Ministry or government office s/he worked for, the number of children s/he had, and additional comments.

For this research, the sample consisted of 97 definitive execution lists, with an additional three lists that are probable execution lists. The lists have dates between March 1976 and

September 1978. The majority of lists were typed on a typewriter, although some were handwritten. All of the lists were in Khmer language, although occasionally there were comments or notes written in French, presumably by the original archival team who numbered the documents and attempted to tally the total number of victims. It must be noted, however, that these 97 lists are only a sample of all of the execution lists and do not account for every detainee at S-21.

Photographs

The Tuol Sleng Genocide Museum's archive also contains thousands of photographs. The most numerous and confronting of these photographs are those of the detainees. Often deemed "mug shots," these photographs were taken by S-21's documentation unit of each individual as he/she was registered upon arrival. Today, more than 5,000 of these photographs

Figure 18. Admittance photographs of S-21 detainees taken by the photography unit and currently on display in the Tuol Sleng Museum.

remain, and thousands are displayed in the Museum where visitors walk among them (Figure 18) (Caswell 2014). While the sheer volume of photographs stand as a testament to the dramatic loss of life, they also provide visual comprehension of the diversity of the detainees/victims at S-21. The number of women, young adults, and children is startling.

In addition to these admittance photographs of the prisoners, the Khmer Rouge fastidiously documented prisoners who died during torture or interrogation. Dozens of these, often graphic, photographs are also displayed in the Museum for visitors. The Khmer Rouge also had S-21 photographers document their staff and daily activities such as communal meals (Caswell 2014). Beyond the confines of S-21, the Khmer Rouge photographers captured a myriad of images documenting the Party's leadership, the cadre at work, military detachments, daily life, construction and agricultural projects, communal meals, Party meetings and rallies, etc. After the fall of the regime, many of these photographs—taken in various years and throughout the country—were deposited into the Tuol Sleng archive.

The archive also contains photographs that were taken after the regime fell. The first images of S-21 were captured by Vietnamese photojournalists as they entered the compound on January 8, 1979 (Caswell 2014). Documenting the grizzly scenes they encountered, including executed individuals who were left chained to metal beds and decomposing, these photographs provide valuable information about the violent purpose of S-21. Again, moving beyond S-21, the archive contains post-Khmer Rouge images depicting mass gravesites throughout the country and people returning to their homes and villages.

For this research, I was interested in the photographic component of the Tuol Sleng archive for documentary purposes. I sought to gather images pertaining to human skeletal remains, particularly at Choeung Ek and Tuol Sleng. For Choeung Ek, I gathered images of the

exhumed mass graves and the human remains stacked along the graves' edges, the exhumation process, the original wooden memorial built at the site to contain the human remains, and general images of the site to provide a more comprehensive understanding of what the area and the mass graves looked like in the early 1980s. For Tuol Sleng, I focused on images pertaining to the creation of a map constructed from disinterred skeletal remains that hung in the Museum from 1980 until 2002.

I was able to obtain scans of 59 original photographs of Choeung Ek and the map at Tuol Sleng from the archive. Unfortunately, none of these images had dates or the name of the photographer. Analyses were not conducted on these photographs as they were examined and collected to contextualize how the remains were discovered, treated and displayed. Many of these images have been reproduced in this dissertation, with the written permission of the Tuol Sleng Genocide Museum, to provide visual context for the reader.

Memorial Sites

Memorials Visited

In addition to Choeung Ek, numerous memorials containing human remains exhumed from Khmer Rouge-period mass graves were evaluated. In general, these memorials do not have names of their own; they are referred to by the name of the *wat* (pagoda) they are built within, or the name of the village/commune/district in which they are located. For example, the memorial at Choeung Ek does not have a specific name, but is located in the commune of Choeung Ek, and is therefore referred to as the Choeung Ek memorial (Table 1).

Table 1. Memorials visited.

Memorial Name (English)	**Memorial Name (Khmer)**	**Province**	**Year Built**	**Inside *Wat***	**Outside *Wat***
Wat Chhoung Leap Preah Sihanouk Reach	វត្ត ឈូងលៀប ព្រះ សីហនុរាជ	Kandal	2002	X	
Trapeang Sva	ត្រពាំងស្វា	Kandal	1999		X
Wat Ang Serei Sour Sdei	វត្ត អង្គសិរីសូស្ត្ី	Kandal	1995	X	
Wat Phnom Baseth Trae Troung	វត្ត ភ្នំប្រសិទ្ធិត្រ័យក្រិងរ	Kandal	2003	X	
Wat Roka Kaong	វត្ត រកាកកោង	Kandal	Unknown	X	
Wat Snguon Pich	វត្ត ស្ងួនពេជ្រ	Kandal	2010	X	
Kraing Ta Chan	ក្រាំងតាចាន់	Takeo	2002		X
Wat Kiri Bopharahm	វត្ត គិរីបុប្ផារាម	Kampong Cham	2002	X	
Wat Bo Knong	វត្ត ពោធ៍ ក្នុង	Battambang	Unknown	X	
Lakhoan (Killing) Cave	វត្ត គីរីរម្ស	Battambang	2007		X
Wat Samdech	វត្ត រាជវ៉ារាម សម្តេច	Battambang	2003	X	
Wat Samrong Knong	វត្ត សំរោងក្នុង	Battambang	2002		X
Wat Thmei	វត្ត ថ្មី	Siem Reap	2014-15	X	

I visited 13 memorials in five Provinces—Cambodia has 24 Provinces plus the administrative district of Phnom Penh—over a period of four months (Figure 19). In no particular order, the memorials are listed below. Six memorials were visited in Kandal Province: Wat Chhoung Leap Preah Sihanouk Reach (វត្ត ឈូងលៀប ព្រះសីហនុរាជ), Trapeang Sva

(ត្រពាំងស្វា), Wat Ang Serei Sour Sdei (វត្ត អង្គសិរីសូស្ដី), Wat Phnom Baseth Trae Troung (វត្ត ភ្នំ ប្រសិទ្ធិត្រ័យក្រិងរ), Wat Roka Kaong (វត្ត រកាកកោង) also called Wat Keo Muny Chot, and Wat Snguon Pich (វត្ត ស្ងួនពេជ្រ). Only one memorial was visited in Takeo Province and Kampong

Figure 19. Stars indicate the locations of the 13 memorials visited.

Cham Province: Kraing Ta Chan (ក្រាំងតាចាន់) and Wat Kiri Bopharahm (វត្ត គិរីបុប្ផារាម)[7], respectively. In Battambang Province, I visited four memorials: Wat Bo Knong (វត្ត ពោធ៍ ក្នុង), Lakhoan (ល្ហាន) Cave (colloquially known as the Killing Cave) of Wat Kirirom (វត្ត គីរីរម្យ) on Phnom Sampeau, Wat Reach Voreaream Samdech (វត្ត រាជវរារាម សម្តេច) shortened to Wat Samdech, and Wat Samrong Knong (វត្ត សំរោងក្នុង) colloquially called the Well of Shadows. Finally, I visited Wat Thmei (វត្ត ថ្មី), also called Wat Adthekaram, in Siem Reap Province.

Of these 13 memorials, nine are located within the grounds of their respectively named *wats*, while the remainder are located near the mass graves from which the remains were exhumed. For those with dates I could locate, the memorials were built between 1995 and 2015, although the structures I saw tended to be second or third construction iterations that replaced the original wooden structures built directly after the fall of the Khmer Rouge.

Interviews Conducted

In order to more thoroughly understand the history of these sites and the skeletal remains within, I conducted interviews at 10 of the 13 memorials. At some locations I interviewed the caretakers of the memorial; for example, Wat Bo Knong. For other locations, I interviewed laymen or monks who resided at the *wat* and knew some of the history of the site and the

[7] DC-Cam also refers to Wat Kiri Bopharahm as Kuk Santesokh Batheay (គុក សន្តិសុខបាធាយ), which is the name of the Khmer Rouge prison that was located at this pagoda.

memorial, but these individuals were not directly responsible for its creation or upkeep. At three of the memorial sites I did not conduct interviews. This occurred for two reasons: 1) there was no one present to interview, or 2) I was passing through and time and resources did not permit an interview. For example, at Wat Kirirom in Battambang Province, my translator informed me that a laymen is regularly present to provide information to visitors, but when we arrived at 5:00pm the man had gone home for the day.

All ten interviews were conducted with the assistance of a Khmer language translator. Multiple translators were employed, and their levels of experience with Khmer to English translation varied. Table 2 provides the relevant information about each interview.

Table 2. Memorial interviews conducted and relevant information.

Memorial	Individual(s) Interviewed	Translator(s)	Additional Information
Trapeang Sva	Two laymen	Mr. Vasomnoeak Ly and Mr. Thoul	Both men live in the area. One has lived here since he was a child and was nearly killed by the Khmer Rouge, but was able to escape when the Khmer Rouge sent all of the children away.
Wat Ang Serei Sour Sdei	Older monk	Mr. Vasomnoeak Ly and Mr. Thoul	The monk has lived at this *wat* since the Khmer Rouge and helped to build the memorial.
Wat Phnom Baseth Trae Troung	Older layman	Mr. Vasomnoeak Ly and Mr. Thoul	
Wat Roka Kaong	Monk and an older layman	Ms.Vibol Gnol Rumnea	The monk only spoke for a short time. The laymen was not from the region so he could only provide basic information about the memorial and its history.
Wat Snguon Pich	Two older laymen	Mr. Thoul	
Kraing Ta Chan	Older layman, caretaker	Mr. Khuoy Suosobranith and Mr. Heng Sophady	Caretaker was nominated by the local authorities to protect the remains. Interview conducted over two days.
Wat Kiri Bopharahm	Young monk	Ms.Vibol Gnol Rumnea	The monk has been studying at this wat for only one year.
Wat Bo Knong	Older layman, caretaker, and his middle-aged son	Mr. Khien Song	The older man was the memorial caretaker and opened the memorial for this visit. His son was fluent in English, so the interview was conducted in a mixture of Khmer and English.
Wat Samdech	Two monks and an older layman	Mr. Khien Song	One monk provided information about the remains and the memorial, but he had only been at the wat for a short time. The second monk and the layman were able to provide additional information.
Wat Samrong Knong	Young man and school children	Mr. Khien Song	The young man works for the Youth for Peace organization which runs a museum nearby. The memorial is adjacent to a primary school and children came to play on the memorial as I was documenting it.

CHAPTER 5: RESEARCH METHODS

Osteological Assessment

Sampling Strategy

As discussed in the previous chapter, I conducted my research under the auspices of the larger "Choeung Ek Conservation of Victims at the Killing Fields" project. As such, 1,000-2,000 crania were available in the laboratory during the time I was there. The sample of 508 crania was a relatively random sample from those that were available in the laboratory.

Skeletal analysis and data collection occurred in two phases. From September 17 to December 10, 2015, 500 crania were analyzed.[8] From February 12-17, 2016, an additional eight crania were analyzed. Complete and fragmentary (*i.e.*, calvaria, calottes, and neurocrania) remains were assessed, although the majority of the sample were complete, or nearly complete, crania (White and Folkens 2005). All osteological analysis was conducted at the laboratory of the Choeung Ek Genocidal Center. Permission to conduct this research was officially granted by the Ministry of Culture and Fine Arts in Phnom Penh and the Phnom Penh Municipality.

Biological Profile from Morphoscopic Traits

For each cranium, the following data were assessed and recorded: date of analysis, identification number,[9] sex, ancestry, age-at-death, traumatic injuries, and any pathologies or

[8] Five hundred crania were truly randomly sampled. The additional eight added to the sample in February, 2016 were hand-selected by me. After the completion of the "Choeung Ek Conservation of Victims at the Killing Fields" project, the *stupa* was re-opened and approximately a dozen crania were removed to use as teaching examples for a training workshop held for the Choeung Ek osteology team. I facilitated this training, and in conjunction with the Choeung Ek staff, removed crania from the *stupa*. I then chose eight, based on their perceived age (juveniles or probable juveniles) and evidence of traumatic injuries (both antemortem and perimortem), to make my sample more representative—particularly for age-at-death.

[9] During their systematic cleaning and analysis, the Choeung Ek team assigned each cranium an identification number. For example, a cranium would have "ជ 2541" or "ជ 6253" stamped in blue ink on the right side of the

anomalies. These estimates and any further notes and comments were recorded on an analysis form designed specifically for this research. A six-view skull diagram was also included for each individual; I sketched any traumatic injuries, indicated missing aspects of the cranium, and included other notes on these diagrams for later reference (Figure 20). All data were entered into an Excel spreadsheet, and later SPSS (version 24, IMB), for subsequent statistical analysis.

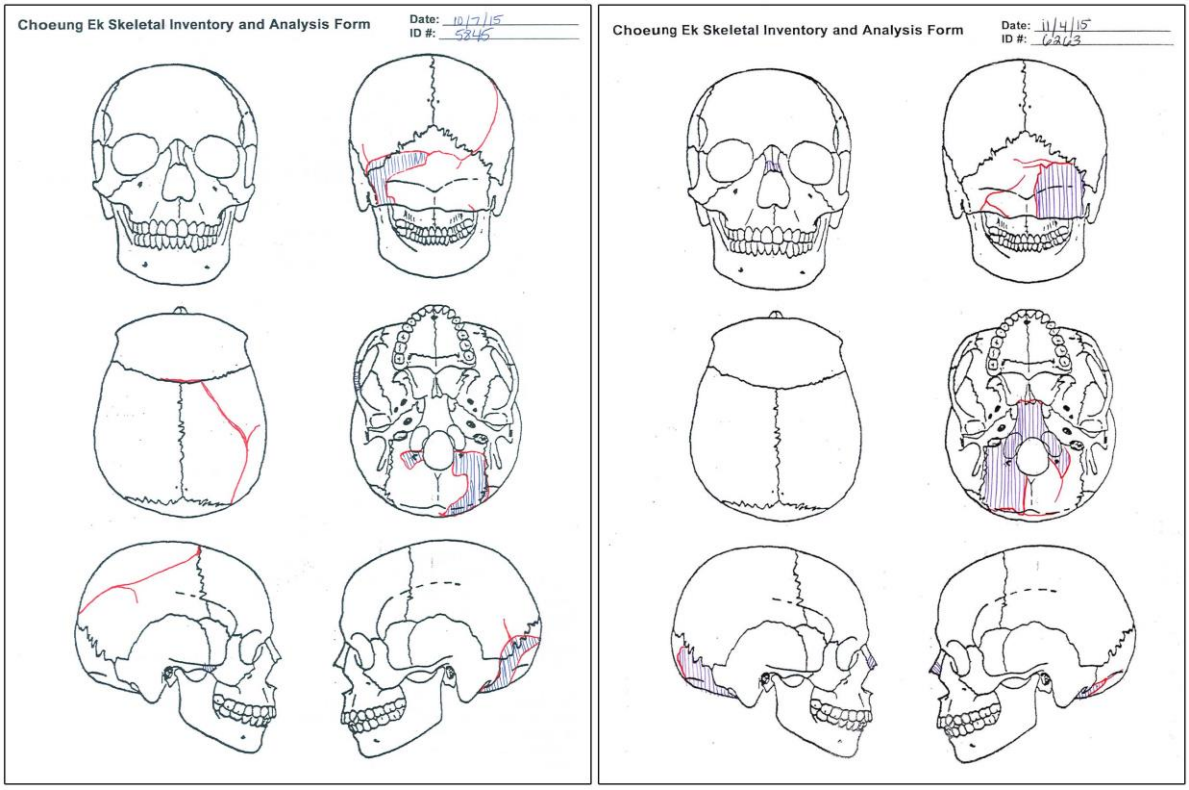

Figure 20. Two examples of the skull diagrams used to collect data at Choeng Ek. The red lines indicate perimortem fractures and the hash marks (either blue or purple ink) indicate missing bone.

Sex

Following the anthropological standards of Buikstra and Ubelaker (1994), the estimation of sex for each individual was based on a visual assessment of morphoscopic cranial features

cranial vault (usually the right parietal). I presumed the Khmer letter "ជ" stood for *Choeung Ek* (ជើងឯក), but the lab director, Mr. Voeun Vuthy, indicated that it stood for *chon rong gruoh* (ជនរងគ្រោះ), meaning "victim."

including the size/prominence of glabella and the supra-orbital ridge, the size of the nuchal crest and mastoid processes, and the sharpness of the supra-orbital margin. Additionally, general robusticity or gracility was considered. An individual's sex was recorded as either male, probable male, indeterminate, female, or probable female.

Ancestry

Ancestry was assessed for each cranium, when possible, primarily for the purpose of identifying outliers. The vast majority of those killed at Choeung Ek were Cambodian, Vietnamese, or individuals from nearby countries (Extraordinary Chambers in the Courts of Cambodia 2015e). Their skeletal morphology would therefore indicate Asian ancestry. Foreigners, including Australian, American, and British individuals, were also held and executed at S-21 (Chandler 1999a). However, it has been noted that Westerners may have been executed near S-21 rather than Choeung Ek (Extraordinary Chambers in the Courts of Cambodia 2010a). Ancestry was therefore visually assessed using morphoscopic features to potentially discern individuals of non-Asian ancestry. Using Hefner (2009) as a guide, the following traits were assessed: interorbital breadth, anterior nasal spine, inferior nasal aperture, nasal aperture width, and nasal bone contour. Additional traits, although not statistically supported, were also incorporated particularly when much of the cranium was missing. These traits included complexity of the cranial sutures, nasal bridge form, malar/zygomatic form, alveolar prognathism (Gill 1998), base cord (Rhine 1990), and os zygomaticum bipartium, sometimes referred to as "os japonicum," which tends to be frequent in human remains from East Asia, although less frequent in Southeast Asians, according to Hanihara et al. (1998). Ancestry was recorded as Asian, European, or Indeterminate.

Age-at-death

Assessment of age-at-death was conducted using the Mann et al. (1991; 1987) maxillary suture obliteration method. As per Mann et al. (1991; 1987), the following sutures were scored: incisive, anterior median palatine, posterior median palatine, transverse palatine, and the greater palatine foramen. If present, each suture was assigned an obliteration score from 0 to 4 (0 = 0% obliteration; 1 = less than 25% obliteration; 2 = 25-50% obliteration; 3 = 51 to 75% obliteration; and 4 = 76 to 100% obliteration). An age range from Mann et al. (1991), although exceptionally narrow, was assigned based on the suture with the highest percentage of obliteration. The age ranges presented in Mann et al. (1991) are as follows: incisive suture obliteration = 20 to 25 years old; posterior median palatine suture obliteration = 25 to 30 years old; greater palatine foramen suture obliteration = 30 to 35 years old; partial transverse palatine suture obliteration = older than 35 years, with more than 50% obliteration = older than 40 years; and complete, or near complete obliteration of the anterior median palatine suture and all others = older than 50 years. Thus, if an individual had incomplete obliteration of all maxillary sutures, an age of less than 20 years was assigned. Conversely, if all maxillary sutures were obliterated, or nearly obliterated, the individual was assigned an age of more than 50 years. If the maxillae were missing, or if numerous maxillary sutures were damaged, a general assessment of the lateral and vault cranial sutures was made using *Standards* (Buikstra and Ubelaker 1994). Additionally, if the individual appeared to be young, the fusion of the spheno-occipital synchondrosis (suture) was evaluated to determine whether the individual was a juvenile or an adolescent (Franklin and Flavel 2014). According to Schaefer et al. (2009), the spheno-occipital synchondrosis fuses between 11 and 16 years of age for females, and between 13 and 18 years of age for males. More recent research by Franklin and Flavel (2014) on a sample of Western Australian

individuals indicates a more narrow, and slightly older range, for complete fusion: females between 17.88 and 19.36 years and males between 19.14 and 20.53.

When an individual appeared to be an adolescent or a juvenile, dental radiographs were taken to assess dental development and eruption as juvenile age-at-death estimates from dentition are more accurate than those from other skeletal elements (AlQahtania et al. 2010). It was not possible, however, to radiograph all individuals, including some of the juveniles, due to time constraints imposed by the Choeung Ek Genocidal Center. Dental radiographs were taken using a NOMAD Handheld X-Ray System, generously loaned by the Aribex, Inc. Humanitarian Program for the duration of my research. The digital x-ray sensor and DEXIS dental radiograph software were generously donated by the KaVo Kerr Group.

In consultation with Dr. John Piakis, a Board Certified Forensic Odontologist at the Maricopa County Office of the Medical Examiner, I estimated age-at-death for 10 individuals from dental radiographs. Dental age was assessed using the London Atlas of Human Tooth Development and Eruption (AlQahtania et al. 2010) via the Atlas' online interactive software application (available at: https://atlas.dentistry.qmul.ac.uk/index.php?lang=english). For each individual, the software requires the following information to begin: Gender (Male, Female, or Unknown), Dentition (Deciduous or Permanent), Quadrant (Upper Left, Upper Right, Lower Left, or Lower Right), and the Notation System (I always chose the Anthropology Notation). While Upper and Lower Left and Upper and Lower Right Quadrants can be selected simultaneously, both Upper Quadrants (*i.e.,* the entire maxilla) cannot. Since the maxillae were the only elements available for this research, each Upper Quadrant had to be entered separately. After entering this information, the software creates an interactive chart in which each tooth is assigned a Development and Eruption stage by the researcher. The developmental stages for

both deciduous and permanent teeth assess cusp, crown, and root formation, and the eruption stages asses the location of the occlusal or incisal surface of each tooth in relation to the alveolar bone and occlusal plane. One limitation of this method is that resorption of deciduous tooth roots cannot be staged and incorporated into the final age assessment.

Based on the developmental and eruption stages entered, the software application provides one or more midpoint age values. For example, if the software provides a midpoint age value of 7.5 years, the individual is likely between 7.0 and 7.9 years of age. A more inclusive age range for each individual was developed using the standard deviations provided by AlQahtania et al. (2014).

For individuals with age-at-death estimates produced via dental radiographs, a more narrow age range could be assigned. However, for dentally and skeletally mature adults, the age ranges were inherently wider. As research and practice indicate, estimating adult age-at-death from cranial sutures is not the most accurate method (Christensen et al. 2014; Garvin and Passalacqua 2012). While narrow age ranges (five years) can be produced with the Mann et al. (1991) maxillary suture closure method, the authors of the study suggest that maxillary sutures are best used for assigning general age categories.

Each individual evaluated for this research was therefore assigned both narrow and broad age categories based on dental development and/or maxillary and cranial suture closure. The narrow age ranges were as follows: juvenile (fetal, 0-2 years, 3-5 years, 6-8 years, 9-11 years, 12-14 years, and 15-17 years) and adult (18-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years, 61-70 years, and 71+ years). The broad age categories were drawn from Buikstra and Ubelaker (1994): juvenile (less than 12 years old), adolescent (12 to 19 years), young adult (20 to 35 years), middle adult (36 to 50 years), and older adult (more than 50 years old).

Pathologies or Anomalies

Skeletal pathologies, primarily cribra orbitalia and porotic hyperostosis, and anomalies were noted on the data collection sheets. They were not formally scored as health and disease were not the primary focus of this research. If the pathologies and anomalies were distinct or unique, they were photographed. Pathologies and/or anomalies were radiographed on three individuals to assess the composition of bone in the affected area and to determine whether the defect was traumatic in nature.

Trauma Assessment

Each of the 508 crania was macroscopically assessed for traumatic injuries. Antemortem, perimortem, and postmortem trauma or damage was recorded. However, because every cranium had postmortem and taphanomic breakage or weathering, unless there was distinct damage (*e.g.*, broken/missing bone from sharp implements, presumably used during exhumation), postmortem damage was generally not recorded. If traumatic injuries (or distinct postmortem damage) were present, the following information was documented: location, timing, force, type, whether the injury represented a direct impact, cranial region, and whether or not the spheno-occipital synchondrosis was fractured.

Injury location refers to the specific cranial bone(s) affected. The cranium was divided into 11 locations: frontal, right parietal, left parietal, right temporal, left temporal, occipital, right zygomatic, left zygomatic, right maxilla, left maxilla, nasals, sphenoid, and the orbits. Timing was assessed as antemortem, perimortem, postmortem, or indeterminate based on the presence or absence of osseous healing, the sharpness and angles of the bone margins, the color of the fractured edges, etc. (Moraitis et al. 2008; Sauer 1998; Wieberg and Wescott 2008). As

discussed in Chapter 2, force refers to the mechanism of skeletal trauma. In this case, force was categorized as blunt, sharp, high velocity projectile, or indeterminate (Galloway et al. 1999; Kroman and Symes 2013). Injury type refers to the classification of cranial fractures: depressed, (linear) radiating, concentric, or other (Galloway 1999b; Kroman and Symes 2013).

While it is important, particularly in a forensic context, to document each fracture as it traverses the cranium, identifying the location or region of the cranium that sustained an impact(s) is more effective for a population-level analysis. Documenting and quantifying impacts will establish patterns of traumatic injuries that can be compared within and between populations, or episodes of mass violence. Thus, each fracture on the cranium was documented as well as whether that fracture represented an impact site. Impact sites were categorized as yes, no, or indeterminate. If a fracture was determined to be an impact, the affected cranial region was noted. For the purposes of this research, cranial regions were divided as follows: vault (frontal and parietal bones), basicranium (occipital, inferior sphenoid, petrous portion of the temporals), right and left lateral (temporal bones and greater wings of the sphenoid), and face (bones of the face excluding the frontal and mandible). Finally, perimortem and postmortem fractures of the spheno-occipital synchondrosis were recorded, as well as my notes and comments about each of the fractures.

Photography

All 508 crania were photographed in the Frankfort Horizontal plane from the following views: anterior, right lateral, left lateral, posterior, and inferior. If the superior aspect of the cranial vault had trauma or pathology, the superior view would be photographed. Traumatic injuries and some pathologies were photographed in detail. Each cranium was photographed

with a scale and identification number on a black background. The lighting inside and outside of the Choeung Ek laboratory varied, so an additional flash was regularly used to produce clear and accurate photographs.

Intra-observer Error Data

Throughout the data collection period, 50 crania were randomly set aside for an intra-observer error test of the biological profile data and traumatic injuries. After analyzing the initial 500 crania, I returned to this set of 50 to repeat the analyses. These 50 crania were both complete and fragmentary. Sex, ancestry, age-at-death, pathologies/anomalies, and traumatic injuries were assessed as described above. Data for each cranium were recorded on analysis forms identical to those that were used for the initial sample. Traumatic injuries, missing aspects of the crania, and pathologies/anomalies were sketched again on the skull diagrams. These data were later entered into a separate Excel spreadsheet and SPSS for analysis. These crania were not re-photographed.

Archival Research

Sampling Strategy

To begin the archival research at the Tuol Sleng Genocide Museum, I first evaluated a digital spreadsheet titled "List of Names of Victims Killed at Office S-21 or Tuol Sleng or Choeung Ek" on the archive's computer to assess to what degree Tuol Sleng had already recorded the demographics and total numbers of executed individuals. After determining that ages had not been recorded in this spreadsheet, and sex designations were sporadic, I had to decide which original documents, of the thousands that are available in the archive, to evaluate.

For the purposes of this project, execution lists, or those of similar content, were determined to be the exclusive focus. While Tuol Sleng does have thousands of lists of detainees' names and their demographics, execution lists were chosen because it cannot be guaranteed that all of the detainees were executed. Individuals recorded on execution lists are known to have been killed, likely at Choueng Ek, so their demographics are more likely to correspond with those derived from the skeletal remains at the Choeung Ek Genocidal Center.

The titles of the documents archived at Tuol Sleng are handwritten in Khmer language in notebooks kept at the archive. It is therefore not possible to search a database for keywords or document titles. After consultation with the archival staff, I was directed to a particular notebook in which the execution lists were recorded. I reviewed this notebook, chose execution lists and other documents that might be relevant, and provided these document numbers to the archive staff in order to view them.

I viewed hundreds of documents, and developed the following inclusion criteria: 1) a title indicating it was a list of executed individuals (see below); 2) a stated execution date; 3) age and sex data associated with each individual. While documents with all of the above criteria were ideal, the level of detail specified in each document varied over time as the Khmer Rouge adjusted their documentation strategies. Thus, documents were evaluated and recorded, although not included in the final analysis, that did not have specified age and/or sex information, execution dates, or the date the document was created.

Choosing documents to view based on their titles was an efficient method for inclusion or exclusion. The word *kamtech* (កំទៃ, meaning to "smash" or "crush") is one the euphemisms the Khmer Rouge used to indicate "to kill" or "to execute" (Kiernan 1996b). Many of the documents were titled "Names of Prisoners Smashed" and the date (Figure 21). For example,

document TSL 4898 is titled “ឈ្មោះអ្នកទោស **កំទេច**ថ្ងៃ ២៥.៧.៧៨” which reads “Names of Prisoners Smashed on 25.7.78,” indicating that the individuals on this list were killed/executed on July 25, 1978. If *kamtech* was not in the title, it was often a column heading. Document TSL 4108 is titled “ឈ្មោះអ្នកទោសដែលងាប់នៅ មន្ទីរ ‘ស_២១គ’” or “Names of Prisoners Who Died at Office ‘S-21’,” with a column heading titled *thngai kamtech* (ថ្ងៃ**កំទេច**) for which the literal translation is “smash day” or, more articulately, “date of death/execution.” Thus, the word *kamtech* was the primary search word used when sorting through the documents.

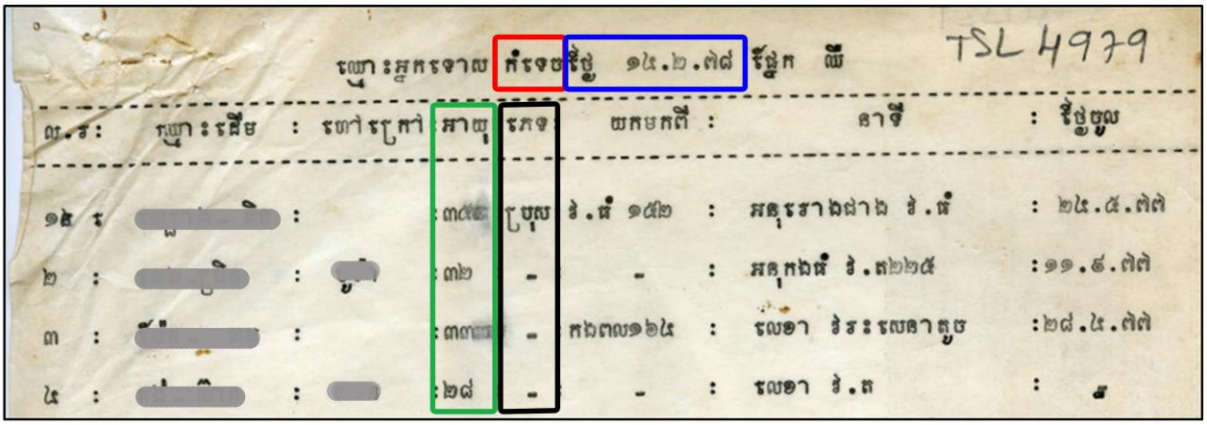

Figure 21. Example of the Tuol Sleng execution lists. In the red rectangle is the word កំទេច (*kamtech*) indicating this is an execution list. The date (14. 2. 78) is in the blue rectangle. The individuals’ ages (អាយុ) are listed in the green column—from top to bottom: 35, 32, 33, 28—and their sexes (ភេទ) are in the black column (all four are male “ប្រុស”).

Document Analysis

An Excel spreadsheet was created to record the execution lists’ data. When present, and legible, the following information was collected from each document: 1) archive number; 2) title

and notes written on the document; 3) date of creation; 4) date of access at the archive; 5) ages of the listed individuals; 6) sexes of the listed individuals; 7) total number of individuals on the list (with specified execution dates). For documents that had both age and sex information, I recorded the age and sex for each individual (see Figure 21 above). For documents that had sexes, but not ages, I tallied the number of males and females. One document (TSL 4935) was a list primarily of females and the notes section indicates whether or not the women were pregnant. This type of information was included in the data collection spreadsheet as well.

Translation

As discussed above, all of the lists and documents assessed for this research were in Khmer language. Occasionally there were comments or notes written in French. The archive notebooks listing each available document were also exclusively in Khmer language.

I translated the majority of the relevant information on each document into English. When assistance was needed to interpret a word, or a Khmer Rouge euphemism, I asked the (exclusively Cambodian) archival team for assistance. Occasionally, an online Khmer dictionary or Google Translate was consulted.

Beyond the document titles, which eventually became repetitive and were thus easy for me to read, the majority of the data relevant for this research were the words for sex (*pheat*, ភេទ), male (*bros*, ប្រុស) and female (*srei*, ស្រី), age (*ayo*, អាយុ), and numerals—in the form of ages and dates. Translation was therefore not extensive and manageable, with assistance as necessary.

Memorial Site Visits

Sampling Strategy

The 13 memorials were chosen based on their distance from Phnom Penh, the feasibility of transportation to the location, and the availability of Khmer language translators. The memorials were identified using the Documentation Center of Cambodia's (DC-Cam) online Geographic Database which was created after their ten-year project to locate and map sites of Khmer Rouge atrocities including mass graves, former prisons and security centers, and memorials. From 1995 to 2004, DC-Cam visited 22 of Cambodia's 24 Provinces, plus Phnom Penh. At the completion of the project, DC-Cam had identified 19,733 mass graves, 196 former prisons, and 81 memorials (Documentation Center of Cambodia, Mapping Project n.d.).

Of the 22 Provinces visited by DC-Cam, 17 (including Phnom Penh) have memorials. The memorials can be found via the Geographic Database (Documentation Center of Cambodia, Geographic Database n.d.) by clicking on each Province to view lists of mass gravesites, prisons, and memorials subdivided by District. As stated in Chapter 4, I was able to visit memorials in Kandal, Takeo, Kampong Cham, Battambang, and Siem Reap Provinces, in additional to the Choeung Ek memorial in Phnom Penh.

Visual Assessment of Memorials and Remains

At each site, a visual assessment of the memorial and the remains was made and photographs were taken. For the majority of the memorials, I was not permitted direct access to the remains, so close visual inspection and photographs were important for documenting the osteological details.

Visual assessments were made at all 13 memorials visited. A memorial data collection form was created with the following questions: 1) How are the remains displayed?; 2) How are the remains preserved?; 3) What skeletal elements are present?; 4) Approximately how many individuals are present?; and 5) Are there any obvious traumatic injuries? Between 10 and 20 minutes were spent observing the memorials and answering these questions. I recorded my observations and any additional thoughts or notes on the data collection forms.

Interview Methods

In accordance with Michigan State University's IRB protocols, ethnographic interviews were conducted at 10 of the 13 memorial sites to gather site history, impressionistic views of the site, and what transpires there. Using nonprobability and purposive sampling, culturally specialized informants were chosen for the interviews (Bernard 2011). While these informants were not necessarily experts in Khmer Rouge history, or the history of the memorial, the majority were monks who are experts in Khmer Buddhism and the cultural practices associated with the dead. If the informants were laymen, they often had survived the Khmer Rouge regime and had tended to their memorials for many years. Thus, I determined that these individuals were culturally specialized informants or experts.

Interviews were not scheduled prior to arriving at the memorial sites. When my translator(s) and I arrived at each site, I would introduce myself and my research project and ask if anyone was available to answer questions about the memorial. Each informant was provided a copy of the interview questions and the IRB approved consent form in Khmer language.

Interviews were semi-structured and included an interview guide, or list of questions (Bernard 2011). The informants were asked about modern Cambodian cultural and religious

conceptions of the memorial, Khmer perceptions of individuality and anonymity in relation to the enshrined remains, and what effects the remains have on local and foreign visitors (*i.e.*, what is the agency of the remains?). Following the semi-structured interview approach, the questions were determined in advance yet they allowed for open-ended responses from the informant and for flexible enquiries from the interviewer (Bernard 2011).

The following questions were asked during each interview:

1. Have the bones been preserved or protected from deterioration? If so, what has been done?
2. At this memorial/*stupa*, why are the remains visible to the public? How does this display of human remains fit within Cambodian or Buddhist beliefs? (Is the display of bones right or wrong for the beliefs of Cambodian people and for Buddhism)?
3. Will the individuals within the memorial/*stupa* ever be identified?
4. If the individuals cannot be identified, how does their anonymity affect recovery from the Khmer Rouge period?
5. How many people visit the memorial each month and why do they come to visit? Are the visitors primarily Cambodian or foreigners?
6. What do you want visitors (foreign and Cambodian) to learn from these remains?
7. Do you provide any information to visitors about the Khmer Rouge period and what happened to these individuals?
8. Generally, what are the visitors' reactions to the remains?
9. What are the future plans regarding these remains? Will they be kept here permanently or moved to another place?

10. What do you think about the remains being put in the *stupa* instead of being cremated or buried?
11. In what year was the *stupa* built? Who built the *stupa*?
12. Where did the bones come from? How many people's bones are in the *stupa*?

As the interviews progressed, additional questions were asked by me and/or the translator to illicit further clarification or to gather supplementary information. When possible, the interviews were recorded (with the respondent's permission), and I took notes as the informants/translators were speaking. Nine of the 10 interviews were recorded.

The sampling of informants was biased for numerous reasons. First, nonprobability and purposive strategies are inherently biased as informants are not selected randomly from the population (Bernard 2011); in this case they were chosen for their knowledge and expertise. Second, the informants were not representative of the ages or sexes of the local community. All of the interview subjects were male, but since many of them were monks, this was inherent (females cannot be Khmer Buddhist monks); the majority of the subjects were of middle age or were older, so perspectives of the younger generations were limited. Despite these limitations and biases, the informants provided important opinions and perspectives on Khmer culture, religion, and the memorials.

Translation

Written and oral translation assistance was required for this aspect of the research. The interview questions and research consent forms were translated from English to Khmer. The consent form was graciously translated by Mr. Hoin Channara at the Tuol Sleng Museum. The

interview questions were translated by me, with assistance and corrections from Ms. Sam An Sopheaktra and Mr. Heang Mesa at the Choeung Ek Genocidal Center, and Mr. Veng Seanghai at DC-Cam.

As shown in Table 2 in Chapter 4, six native Khmer speakers assisted with oral translations during the interviews. After introducing myself, my research, my translators, and asking permission to record the interview in Khmer, I would read aloud each interview question in Khmer. In some cases, due to my non-native level of Khmer speech, it was more efficient and effective to have the translator read/ask the interview questions.

The interview subject's responses to each question were verbally translated into English. Translation levels—clarity of meaning in English, frequency of translation (*i.e.,* translations were provided while the informant was speaking or only after the informant finished speaking), and accuracy in English—varied, as none of the six individuals were professional translators. No translations were verbatim. Based on the English translations and my own comprehension, the informants' answers were recorded on a data collection form. All translators were compensated for their time and assistance either monetarily and/or by me assuming the cost of his/her transportation and meals.

CHAPTER 6: ANALYTICAL METHODS

Osteological Analysis

Demographics

Descriptive statistics to assess demographic frequencies were generated using SPSS software (version 24, IMB). Frequencies were calculated for sex, ancestry, and age-at-death categories (*i.e.*, juvenile, adolescent, young adult, middle adult, and older adult) for all 508 individuals. To compare the difference in mortality between adult males and females, sex ratios for both the total sample as well as by age cateogry were calculated (Heilen et al. 2012). In order to calculate the sex ratios, the estimated sexes were pooled (*i.e.*, probable males were pooled with males, probable females were pooled with females), and those of indeterminate sex were removed. This resulted in the following pooled sample values: males (n = 484) and females (n = 12), with the removal of 12 crania of indeterminate sex. Additionally, hazard modeling (see below) was used to assess whether there were statistically significant differences in mortality and survivorship between males and females in the Choeung Ek sample.

Evaluation of Traumatic Injuries

Timing of Trauma

Frequencies of antemortem and perimortem traumatic injuries were obtained using SPSS software (version 24, IMB). Nearly every cranium had postmortem and/or taphonomic damage, therefore frequencies of postmortem damage were not evaluated. Some crania had evidence of more than one perimortem traumatic injury so two different frequencies were calculated, one

documenting the number of crania with trauma and one documenting the total number of injuries and/or impacts.

Assessing the frequency of crania with trauma was straightforward. Assessing the number of direct impacts was more challenging. A discernable impact was considered an identifiable focal point of traumatic injury, rather than a fracture (or other damage) that may have been radiating away from, or towards, the site of impact. Due to the taphonomic condition of the remains, as well as the numerous postmortem missing portions of crania, my ability to assess and count the discernable impacts was limited. For example, if there were radiating fractures on the temporal bones or frontal bone, but the facial skeleton was missing postmortem, it is likely that this individual received a blow (direct impact) to the face; however, without the facial bones, I could not discern the precise impact location and would therefore categorize this crania as having an indeterminate number of impacts.

The following categories were developed to account for the number of discernable impacts: 1) one impact; 2) minimum of one impact; 3) two impacts; 4) minimum of 2 impacts; and 5) indeterminate number of impacts. The "minimum number of impacts" classification again arose from my inability to conclusively determine the location of all impacts based on the available osteological elements and the postmortem damage. Providing a minimum number of impacts reduces over-interpretation of these data. In many cases, the precise location of the impact could not be determined and was therefore assigned "indeterminate number of impacts."

Trauma by Sex

The frequencies of perimortem trauma were assessed by sex for all crania with perimortem trauma as well as for crania with discernable impacts only using SPSS software

(version 24, IMB). In addition to trauma frequencies and descriptive statistics, Chi-square or Fisher's exact tests were calculated to determine whether there was an association between an individual's sex and whether they had traumatic injuries. When at least one of the contingency table cells had a frequency of less than 20%, a Fisher's exact test was used rather than a Chi-square test. These tests were conducted using all five of the sex categories for this research, as well as a pooled sex sample, resulting in only males and females with those of indeterminate sex removed. The same tests were used to determine whether there was a relationship between the sex of an individual and the number of perimortem impacts sustained.

In order to assess the dependence between an individual's sex and the various aspects of traumatic injuries (*i.e.*, mechanism, fracture type, and location), correspondence analyses were performed. Correspondence analysis permits the two- or three-dimensional graphic display of contingency table information to evaluate patterns, variance, and relative dispersions of variables. Correspondence analysis relies on three concepts of contingency tables—chi-square distances, profiles, and masses—to generate points in space (Hefner 2007). The relative distances between the points on the resulting plots provide information about the correspondence between the variables (Alberti 2013). While the distances between the points are not statistically significant, if variables are found to be relatively close together on the plot, the relationships or correspondences can be further evaluated to determine if the variables are in fact associated (Monslave and Hefner 2016).

Numerous variables required comparison so multiple correspondence analysis (mCA) was used. A singular value decomposition performed on the standardized residuals matrix was used to plot data in two dimensions (Monslave and Hefner 2016). These matrices were then displayed in joint bi-plots to explore the relationship between the variables of interest including

sex, age-at-death categories, trauma mechanisms, trauma regions, fracture types, and fractures of the spheno-occipital synchondrosis—all variables used in mCA are noted here, rather than repeating this methodological description in each respective section below.

Finally, a Spearman's rank-order correlation was computed to determine the strength of association between all of the aforementioned variables, as well as for the number of direct impacts. Again, for the sake of brevity, this statistical test will not be discussed in each individual section below. Spearman's correlation coefficients were generated and a correlation matrix was produced.

Trauma by Age Categories

In order to evaluate traumatic injuries by age categories, frequencies were again generated for all crania with perimortem trauma as well as for crania with discernable impacts only using SPSS software. In order to assess whether there was a relationship between an individual's age-at-death category and the presence or absence of traumatic injuries, Chi-square or Fisher's exact tests were calculated. These tests were also used to assess whether there was an association between the number of perimortem impacts sustained and an individual's estimated age category.

Trauma Mechanism and Fracture Type

The mechanisms of traumatic injuries—blunt force, sharp force, high velocity projectile, and indeterminate mechanism—were evaluated on multiple levels. First, the frequencies of each mechanism were generated for the crania with discernable impact sites. Second, the frequencies of an individual having one mechanism of trauma, or multiple/mixed mechanisms, were

calculated. In order to evaluate whether the mechanisms of trauma were associated with an individual's age category or sex, Chi-square or Fisher's exact tests were run using SPSS software.

Frequencies of fracture types were generated using SPSS. There were five categories of fracture types: depressed fractures, radiating fractures, concentric fractures, other fractures, and multiple types of fractures. The "other" variable was generally associated with sharp force trauma which does not often leave a fracture (it is usually an incised wound), or fractures that were indeterminate in nature. There were five multi-fracture type combinations: 1) depressed and radiating; 2) radiating and concentric; 3) radiating, concentric, and other; 4) radiating and other; and 5) depressed and other. These combinations were present on crania that only had one impact as well as those that had multiple impacts. Only crania with identifiable perimortem impact sites were assessed. Chi-square or Fisher's exact tests were run to assess relationships between the fracture type(s) and sex and age-at-death categories.

Trauma Location

As discussed in the previous chapter, for the purposes of data analysis, the cranium was divided into five regions: vault (frontal and parietal bones), basicranium (occipital, inferior sphenoid, petrous portion of the temporals), right and left lateral (temporal bones and greater wings of the sphenoid), and face (bones of the face excluding the frontal and mandible). This provided for a more efficient evaluation compared to assessing the frequency of trauma or impacts to each individual cranial bone. Another challenge that had to be addressed to effectively asses the frequencies of traumatic injuries was accounting for impacts that spanned multiple bones and/or cranial regions. Twenty-four multi-bone combinations were present for

perimortem impacts—two additional multi-bone combinations were identified for antemortem only trauma. While slightly reduced when bones were lumped into cranial regions, there were still 13 multi-region combinations for perimortem impacts (see Appendix).

Frequencies of impacts to the five regions, plus an additional "multiple regions" variable were generated using SPSS. Only crania with identifiable perimortem impact sites were assessed and Chi-square or Fisher's exact tests were run to evaluate relationships between the impacted cranial region(s), sex, and age-at-death.

An additional fracture location required further examination. The frequencies of fractures located near the spheno-occipital synchondrosis (*i.e.*, the basilar portion of the occipital) were calculated, as was the timing of these fractures. The basilar portion of the occipital bone is located between the foramen magnum and the articulation with the body of the sphenoid. In juveniles, this articulation is called the spheno-occipital synchondrosis or suture. This synchondrosis ossifies during adolescence resulting in a fusion of the occipital and sphenoid. Once again, Chi-square or Fisher's exact tests were computed to assess whether there were associations between the presence or absence of perimortem fractures and sex, age-at-death, and the presence or absence of blunt force trauma.

Intra-observer Error

Cohen's kappa measure of agreement was used to evaluate intra-observer error for a random sample of 50 previously analyzed crania. Throughout the analytical phase, I set aside 50 crania that I reassessed between seven and 60 days after the original evaluation. Cohen's kappa, is used to measure the agreement between two observations while accounting for any chance agreement (Cohen 1960). The closer the resulting value is to one the higher the agreement and

the lower the error. Cohen's kappa was calculated for estimations of sex, ancestry, and age categories, as well as frequencies of the presence or absence of traumatic injuries, total perimortem impacts, blunt force trauma, sharp force trauma, antemortem trauma, and fractures of the spheno-occipital synchondrosis.

Archival Data Analysis

Demographics

From the execution lists evaluated, frequencies of sex and age-at-death (if they were recorded) were generated and the total number of individuals on all lists were tallied using SPSS. The minimum, mean, and maximum ages-at-death for the entire sample were also calculated. As with the osteological data from Choeung Ek, sex ratios by age category were calculated to compare the difference in the demographic patterns between adult males and females and specific age categories (Heilen et al. 2012). Hazard models were also computed to assess the mortality and survivorship differences between males and females.

Comparison of Osteological and Archival Demographics

To compare the demographics between the known (archival) data, and those generated from the osteological remains at Choeung Ek, hazard modeling was used. Drawn from paleodemographic research, hazard models were applied to assess survivorship, mortality rates, and age-at-death and sex distributions (*i.e.*, probability density functions) (Heilen et al. 2012). Moving away from the construction of life tables with their numerous flaws (Wood et al. 2002), paleodemographers have shifted to hazard modeling which allows for more robust and accurate statistical analyses. Hazard modeling, according to Wood et al. (1992a) provides a framework

for assessing dynamic processes or hazards underlying demographic events across time; in this case, mortality or the risk of death across the lifespan. Hazard models do not necessarily overcome the challenges of accurately representing an osteological sample, such as non-stationarity in a population, selective mortality, hidden heterogeneity in risk, underrepresentation of certain age groups, and the ability to accurately estimate age-at-death for older adults (Trask 2012; Wood et al. 1992b). However, understanding and visualizing the demographic patterns of populations can provide important information.

Hazard analysis generates both survivorship and mortality models. Survivorship refers to the probability that an individual within a population will survive to a given age (Chamberlain 2006). The probability of surviving beyond a given age is expressed as a value between 1.0 (representing 100% chance of being born) and 0.0 (representing 0% chance of survival beyond the maximum recorded age). Conversely, mortality is the probability of a segment of the population that will die (hazard) within a given age interval (Chamberlain 2006). While mortality varies across the lifespan, and under various environmental and cultural conditions, the typical mortality model for past human populations demonstrates high juvenile mortality that decreases after approximately ten years old and remains fairly constant (low) for adolescents into early adulthood. With older age there is again a rise in mortality (Chamberlain 2006; Ubelaker 1989).

For this research, a Siler hazard model was used to evaluate the associations between the osteological data from Choeung Ek and the archival execution list data from Tuol Sleng. The Siler model, unlike the Gompertz model, incorporates the subadult age categories to assess the full lifespan (Wood et al. 2002). The Siler model builds on the Gompertz model—which describes the age-independent (adulthood, typically accidental or deaths due to childbearing) and

senescent (older adulthood) hazards—by adding and describing a juvenile (subadulthood) hazard component. For this research, a four-parameter Siler function was utilized to evaluate survivorship and mortality across the entire lifespan. The four parameters are represented by α_1 and β_1 (the juvenile component) and α_3 and β_3 (the senescent component). The α_2 parameter (the age-independent component) is excluded from this Siler function, according to Herrmann and Konigsberg (2002), because it is difficult to reliably estimate in paleodemographic samples due to heterogeneity in risk of mortality (Wood et al. 2002).

In order to utilize the Siler hazard model, sample age-at-death distributions were required. The archival and osteological data were therefore distributed into age-at-death categories as follows: 0-1 year, 2-5 years, 6-10 years, 11-15 years, 16-20 years, 21-25 years, 26-30 years, 31-35 years, 36-40 years, 41-50 years, etc. For the archival data, age-at-death greater than 50 years continued to be divided into 5-year brackets. For the osteological data, age-at-death greater than 50 years was defined as one bracket (*i.e.*, 51–infinity) since skeletal age estimation techniques become less accurate with advanced age (Schmitt et al. 2002). In general, five-year age categories were used because, according to Ubelaker (1989), five years is long enough to encompass probable errors in the age estimate and short enough to permit the recognition of patterns across the sample.

For the archival data, this process was straightforward as nearly all individuals on the execution lists had an age (point estimate) documented. For those that did not have an age recorded, the mean age-at-death for the archival sample (29 years) was assigned. The osteological data required more manipulation as anthropological assessments of age-at-death do not result in point age estimates. During data collection at Choeung Ek, as discussed in the prior chapter, I initially assigned each individual to a narrow age category based on dental

development and/or maxillary and cranial suture closure. The means of these narrow age categories were used as the point age estimates for the hazard model data. The mean point age estimates for the juveniles were: fetal, 1, 4, 7, 10, 13, and 16 years. The adult point estimates were: 19, 25.5, 35.5, 45.5, 55.5, 65.5, and 71+ years. At the time of data collection, two individuals had only been assigned to broad age categories. One individual was determined to be a young adult and the one was an adolescent; the mean ages of these broad categories were thus used for these individuals (27.5 years and 15.5 years, respectively).

After these age-at-death frequency distributions were created for the total osteological and archival samples, the frequencies were distributed by sex. However, because sex cannot be estimated for juvenile and adolescent skeletal remains, all individuals younger than 20 years old were removed from both the archival and osteological data when the samples were divided by sex. Again, for the archival data, dividing the sample by sex was straightforward as sex and age were documented. Individuals without their sex recorded were removed from the sample, and again, individuals without a designated age were assigned the sample mean of 29 years.

Separating the skeletal data by sex required further manipulation. First, the original categories assigned for sex (male, probable male, female, or probable female) needed to be combined. Probable males were pooled with males and probable females were pooled with females. Second, individuals of indeterminate sex were removed from the sample.

When all data were distributed into age-at-death categories, both the total samples and those divided by sex, were run in a Siler hazard function using RStudio (version 1.0.136, RStudio, Inc.) software to estimate the parameters (α and β). The resulting probability density function and survivorship and mortality graphs permitted comparisons of survivorship and mortality distributions between the total samples and between the sexes for the osteological and

archival data. To further assess the hazard models and whether there were statistically significant differences between the groups, log-likelihood ratio tests were calculated using the *mle* computer program (version 2.1, Holman 2003). It should be noted, however, that the *mle* log-likelihood test is often more conservative than desired; it typically identifies significant differences between samples.

Memorial and Interview Data Analysis

Memorial and Remains Observations

Using the notes and photographs taken while visiting each memorial, a descriptive analysis of observed patterns was performed. Particular attention was given to the similarities and differences at each memorial for the following aspects: preservation or condition of the human remains within the memorial, the skeletal elements that were present, the estimated number of individuals represented by the remains, and whether there was visible perimortem skeletal trauma. Comparisons between the memorials were described, and in the case of skeletal elements present, percentages for the most common elements between the memorials were calculated. While the number of perimortem traumatic injuries could not be calculated, the mechanism(s) of trauma were collectively described.

Interview Content Analysis

To effectively analyze the interview data, all of the translated responses were categorized into common, yet subjective, themes. The following themes were developed: identification, religion, care of remains, nationalism/politics, knowledge/teaching, history of the remains, and memory. The “identification” theme encompassed information regarding the identity of the

individuals represented by the human remains. "Religion" incorporated responses related to Buddhism and the appropriate religious treatment of the remains. "Care of the remains" was a theme used for information regarding how the bones have been maintained and cared for, and whether the remains have been, or will be preserved. The theme of "nationalism/politics" was used for responses that directly mentioned the government or Prime Minister, or those responses that were indicative of political or national rhetoric. "Knowledge/teaching" included responses that described how the human remains convey information or how the remains are used to teach individuals about the history of the Khmer Rouge period. "History of the remains" encompassed information pertaining to how the human remains were discovered, where they originated from, or how they came to be located in the memorial. Finally, the theme of "memory" was used for responses that invoked the idea that the remains, the victims, or history were being remembered or memorialized. In many cases, these themes were not mutually exclusive.

CHAPTER 7: RESULTS

Osteological Data

Demographics

When the demographics were assessed for the 508 crania at the Choeung Ek Genocidal Center, the majority of individuals are estimated to be male (82.9%) (Figure 22). There are 63 probable males, 12 of indeterminate sex, two females, and 10 probable females. When ancestry could be assessed, all of the individuals (*n* = 435) are of Asian ancestry (Figure 23 and Table 3). When distributed by age category (Figure 24 and 25), there are eight subadults (two juveniles and six adolescents). The majority of the individuals are young adults (68.3%) between the ages of 20 and 35 years old; this is followed by middle adults (27.8%) aged 36 to 50 years old. There

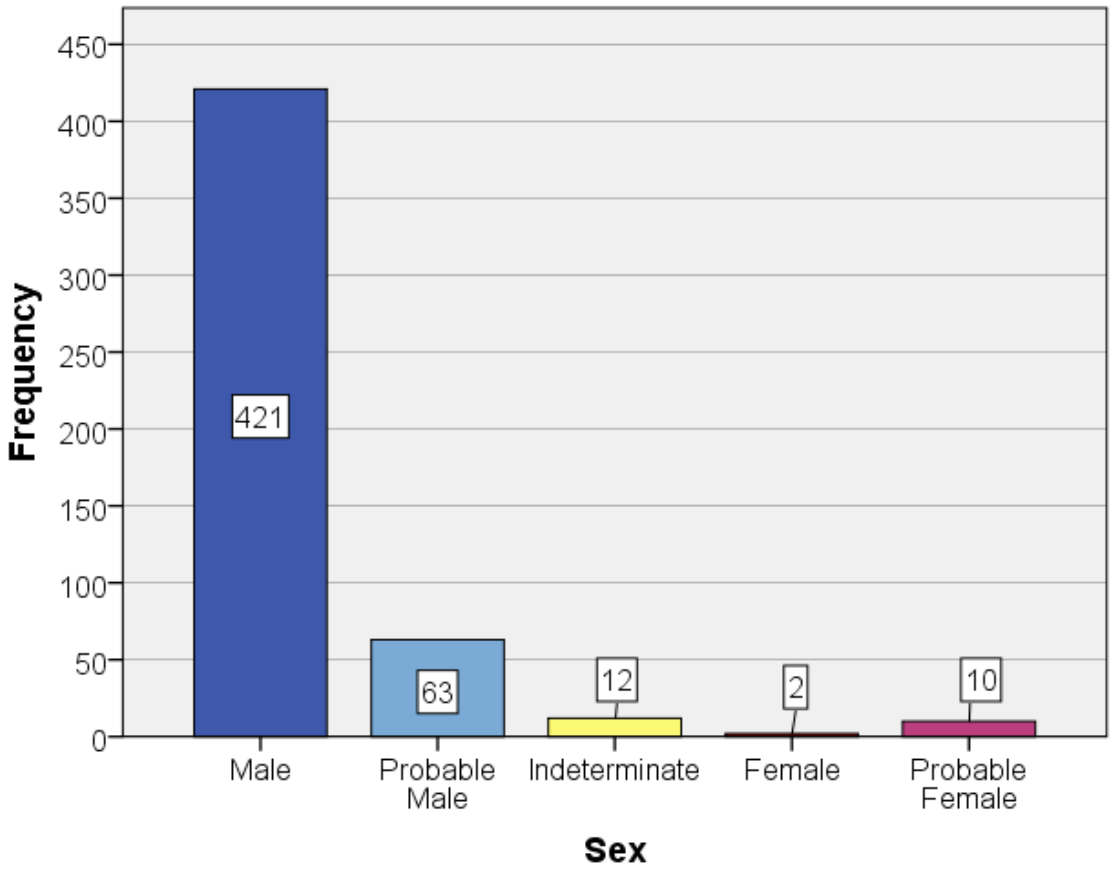

Figure 22. Frequencies of estimated sex for the Choeung Ek crania.

are only 12 older adults. Therefore, the majority of individuals analyzed for this research are young adult males of Asian ancestry (Table 4).

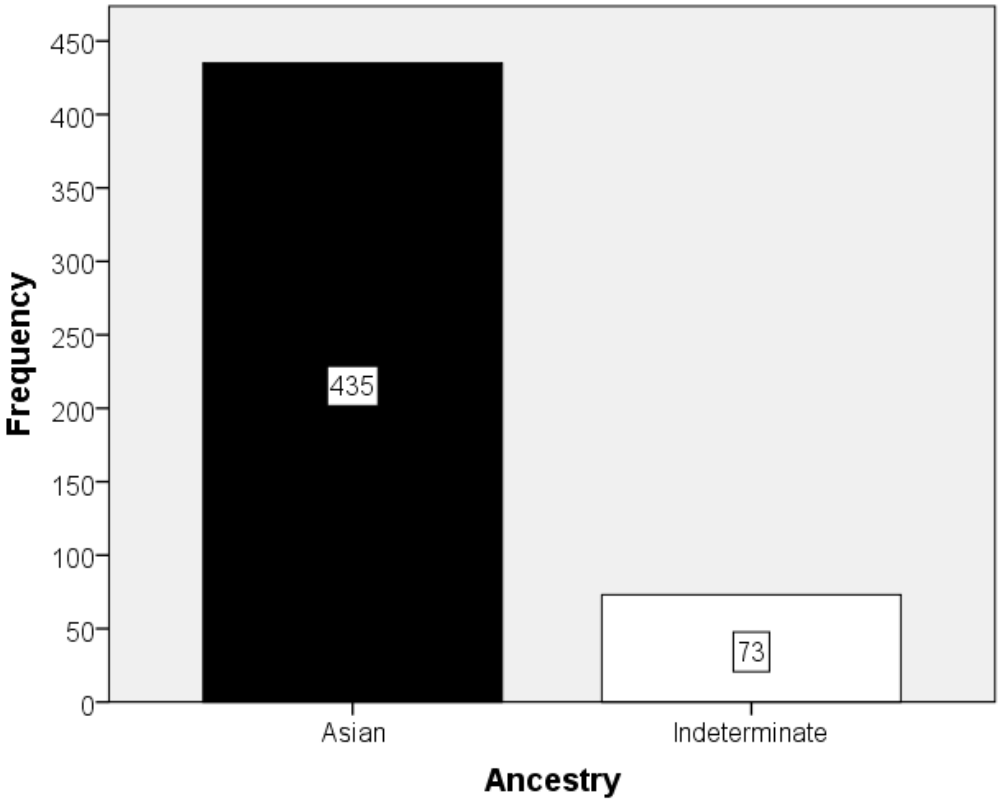

Figure 23. Frequencies of estimated ancestry for the Choeung Ek crania.

Table 3. Choeung Ek skeletal descriptive statistics: Sex and Ancestry.

	Ancestry		**Total**
Sex	Asian	Indeterminate	
Male	377	44	**421**
Probable Male	41	22	**63**
Indeterminate	5	7	**12**
Probable Female	10	0	**10**
Female	2	0	**2**
Total	**435**	**73**	**508**

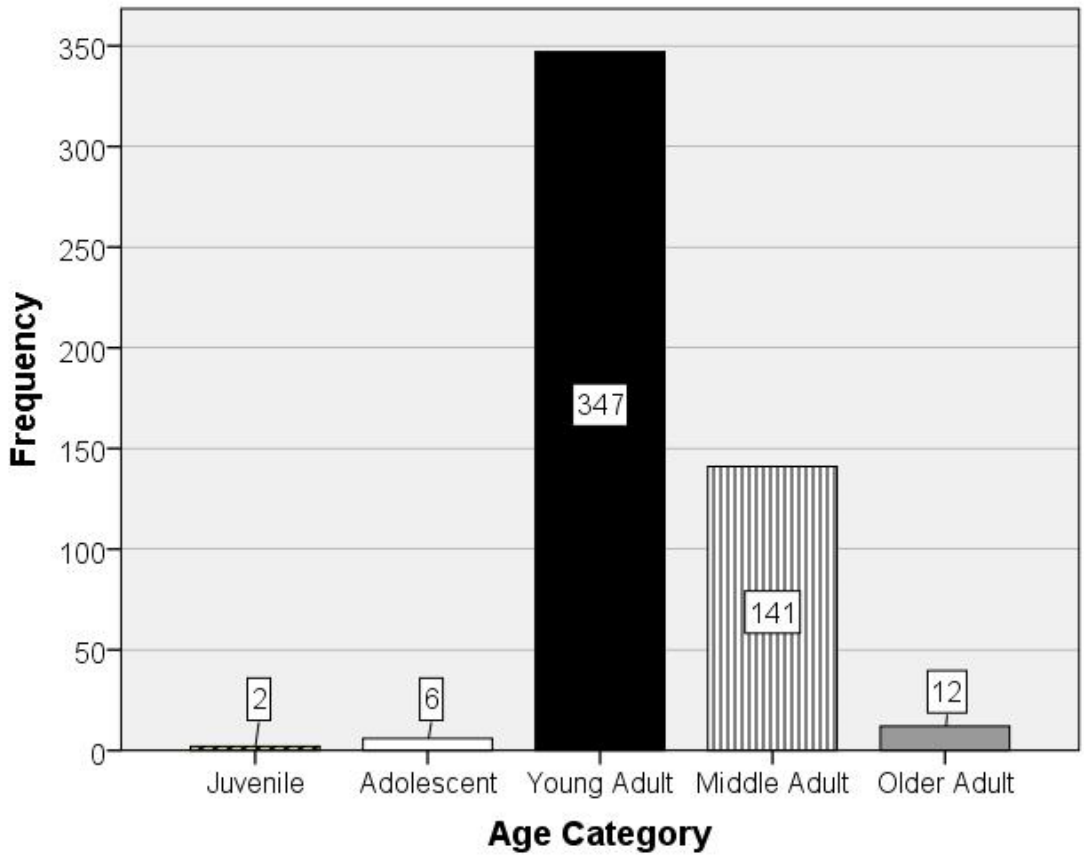

Figure 24. Frequency of estimated age-at-death (by category) for Choeung Ek crania.

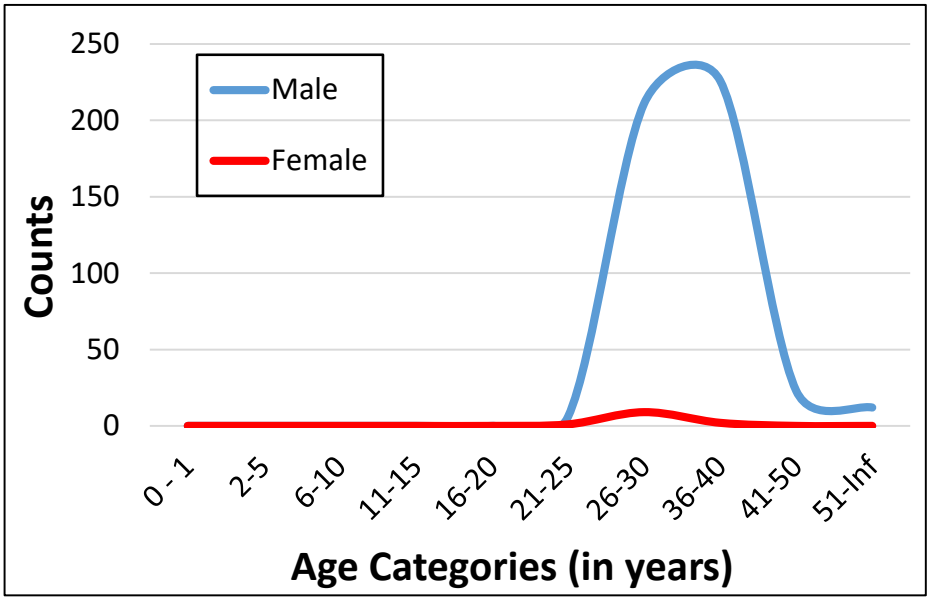

Figure 25. Choeung Ek age distribution by sex. Due to the use of mean ages-at-death, there are no individuals in the 31-35 year category.

Table 4. Choeung Ek skeletal descriptive statistics: Sex and Age-at-death.

	Age-at-Death					**Total**
Sex	Juvenile (0-11 yrs)	Adolescent (12-19 yrs)	Young Adult (20-35 yrs)	Middle Adult (36-50 yrs)	Older Adult (50+ yrs)	
Male	0	4	279	127	11	**421**
Prob. Male	0	2	51	9	1	**63**
Indeterminate	2	0	6	4	0	**12**
Prob. Female	0	0	9	1	0	**10**
Female	0	0	2	0	0	**2**
Total	**2**	**6**	**347**	**141**	**12**	**508**

The calculated sex ratios (normalized to a standard unit of 100 individuals), derived from the pooled sex sample, demonstrate that far fewer females were killed than males. For the entire sample, the normalized sex ratio is 4,033, or 121:3, if using the greatest common divisor; for every three female crania, there were 121 male crania (Table 5). When distributed by age category (with the exclusion of adolescents and older adults as there were no females to compute a ratio) (Figure 26), the young adults have a ratio similar to that of the total sample (3,000) while the middle adults are dramatically skewed towards males with a ratio of 13,600, indicating that for every one female cranium there are 136 male crania estimated to be between the ages of 36 and 50 years old.

Table 5. Sex ratios for Choeung Ek crania (normalized to 100 and using the greatest common divisor).

	Total Sample*	**Adolescent**	**Young Adult**	**Middle Adult**	**Older Adult**
Male	484	6	330	136	12
Female	12	0	11	1	0
Sex Ratio	4,033 (121:3)	0 (1:0)	3,000 (30:1)	13,600 (136:1)	0 (1:0)

**n* = 496; individuals of indeterminate sex were removed

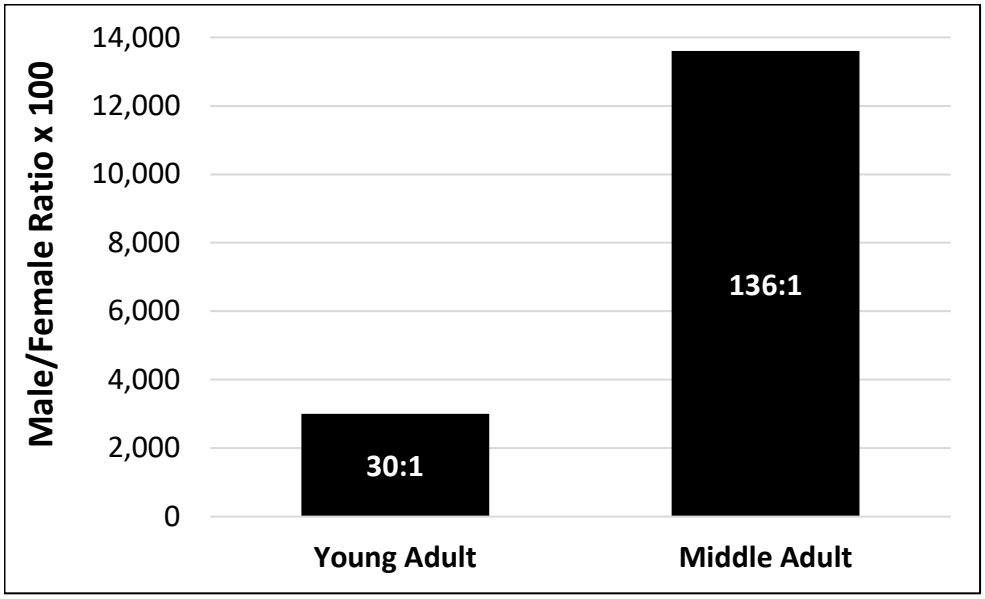

Figure 26. Sex ratios (for age categories with sufficient samples for ratios) for Choeung Ek crania.

Ratios were also calculated between the different age categories, regardless of estimated sex: young adults per all other adults, and adults (20 years and above) per subadults (19 years and below) (Table 6). The ratio of young adults to all other adults was normalized to 227; for every 153 individuals of middle or older adult age there are 347 young adults. The normalized ratio for adults to subadults is far more skewed at 6,250; for every two victims younger than 20 years of age, there are 125 adults.

Table 6. Age category ratios (normalized to 100 and using greatest common divisor) for Choeung Ek crania.

	n		***n***
Young Adults	347	**Adults**	500
All Other Adults	153	**Subadults**	8
Ratio	227 (347:153)	**Ratio**	6,250 (125:2)

The females and males were also compared using the hazard models. As seen in Table 7, the log-likelihood results (which nearly always suggest statistically significant differences) indicate that there are significant differences between the male and female skeletal sample regarding mortality and survivorship. When evaluating the probability of being a particular age at death (*i.e.*, probability density), as Figure 27 demonstrates, females have a higher probability of dying at a younger age than males. The probability within this sample of dying around the age of 30 years is approximately 80% for females, while it is only 30% for males. The peak probability of death for males is around 37 years old.

Table 7. Log-likelihood test for skeletal and archival hazard models.

Comparison	χ^2	***df***	**Log Likelihood Difference**	***p***
Skeletal Males v. Skeletal Females	109.24	2	-54.62	< 0.0001
Archival Males v. Archival Females	2986.56	2	-1493.28	< 0.0001
Total Skeletal v. Total Archival	191.68	2	-95.841	< 0.0001

The probability of mortality for the females and males in the Choeung Ek sample are identical and very low until 20 years of age (Figure 28). This is a byproduct of these data as no individuals less than 21 years of age were included because definitive sex estimates cannot be determined for subadults. At the age of 21 years, the probability of mortality rises dramatically for both sexes, although as discussed above, females have a higher probability of mortality at younger ages than males. Male mortality does not increase rapidly until approximately 33 years old. Therefore, at the age of 40 years, males have a 20% probability of dying, while all females

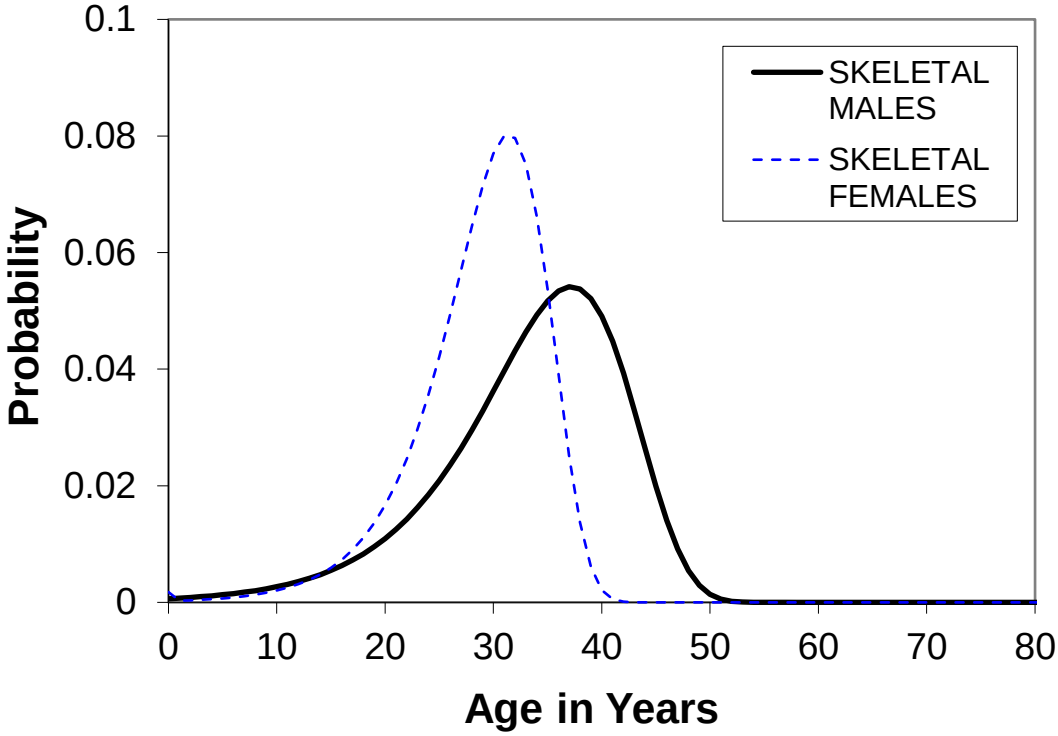

Figure 27. Probability density functions for Choeung Ek, by sex.

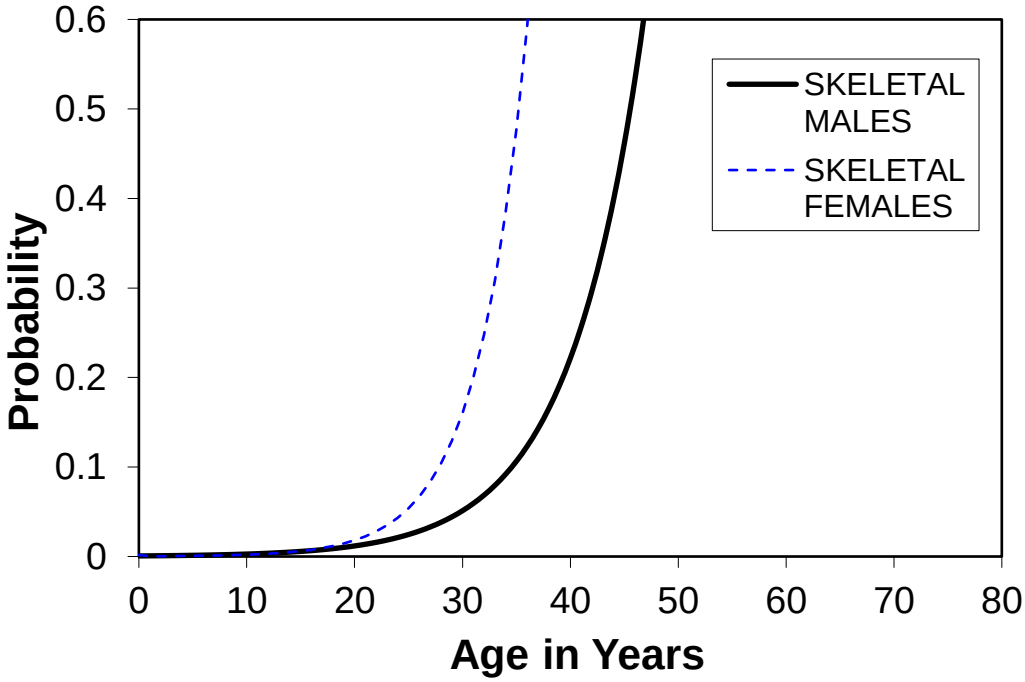

Figure 28. Mortality hazard for Choeung Ek, by sex.

will likely have died by this age. These differences are statistically significant, but the limited number of females in the skeletal sample is likely skewing these results.

As with mortality, the probability of females surviving to the next age interval is generally lower than for males (Figure 29). Around the age of 30 years, the survivorship of females declines more dramatically than that of males; by the age of 35, females have less than a 10% probability of surviving to the next age interval, while males have a 50% probability. Again, these differences are significant, but since there were so few female crania estimated to be over the age of 36 years, the disparity between female and male survivorship is not surprising.

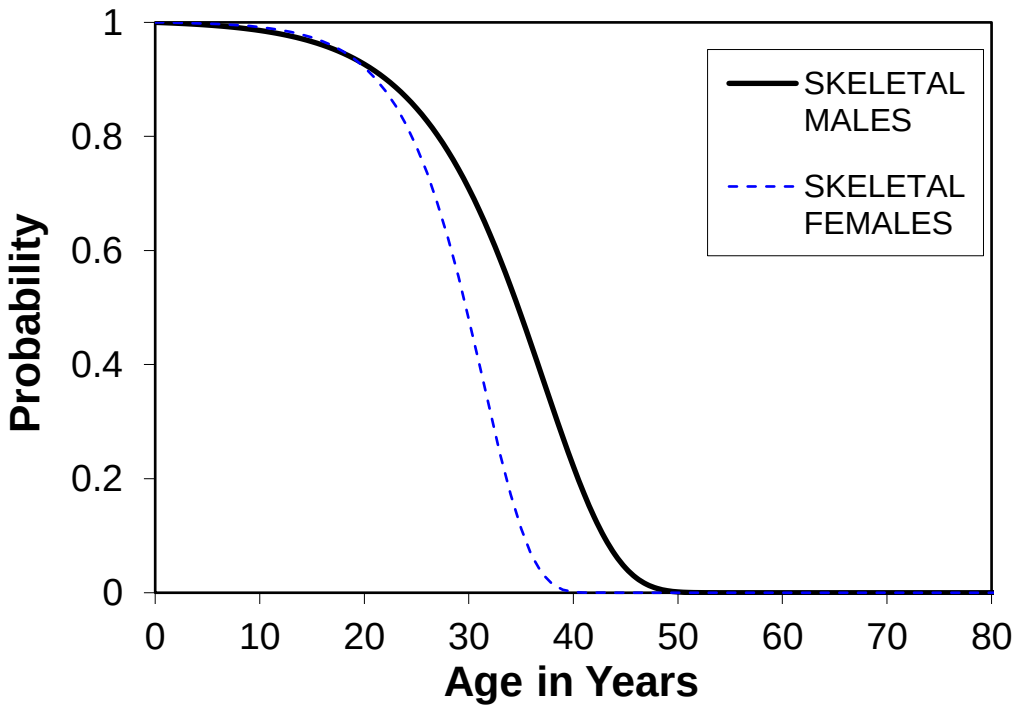

Figure 29. Survivorship for Choeung Ek, by sex.

Evaluation of Traumatic Injuries

Timing of Trauma

Traumatic injury frequencies were generated for all 508 crania. There are 22 antemortem injuries on 19 crania. It was not always possible to determine whether these injuries resulted from a traumatic event (an accident or interpersonal violence) or were the result of disease or surgical intervention. Of the 22 injuries, seven are healed fractures of the nasal bones indicating these individuals had suffered a broken nose prior to death. At least one cranium shows clear signs of surgical intervention: cranium number 0074 has a well-healed craniectomy[10] (Figure 30) spanning the left anterior parietal and the left posterior frontal bone, with four burr (surgical drill) holes but no indication of a bone flap (the replacement of the bone flap after surgery

Figure 30. Antemortem craniectomy on individual 0074. For orientation, F is the frontal bone, and LP is the left parietal, in the image on the right.

[10] The osteological appearance of this craniectomy is consistent with other craniectomies and craniotomies I have seen in the United States. It must be noted, however, that the Cambodian researchers conducting the Choeung Ek Conservation Project have repeatedly stated that this craniectomy is direct evidence of medical torture/experiments conducted by the Khmer Rouge at S-21 (Extraordinary Chambers in the Courts of Cambodia. 2017e). Based exclusively on an osteological analysis of this cranium and the craniectomy, I do not have sufficient evidence to determine the purpose or intention of this surgical intervention.

distinguishes a craniotomy from a craniectomy) (Loring 2015). The mechanisms of the remaining antemortem injuries and/or pathological lesions cannot not be determined.

Perimortem trauma is present on 311 crania (61%). Of the 311 crania with definitive perimortem trauma, 179 (58%) have discernable impact locations, as discussed in the prior chapter. Figure 31 indicates that there are 138 crania with only one impact, 22 crania have a minimum of one impact, 16 crania have two impacts, and three crania have a minimum of two impacts. On these 179 crania, there is a total of 198 discernable impacts documented.

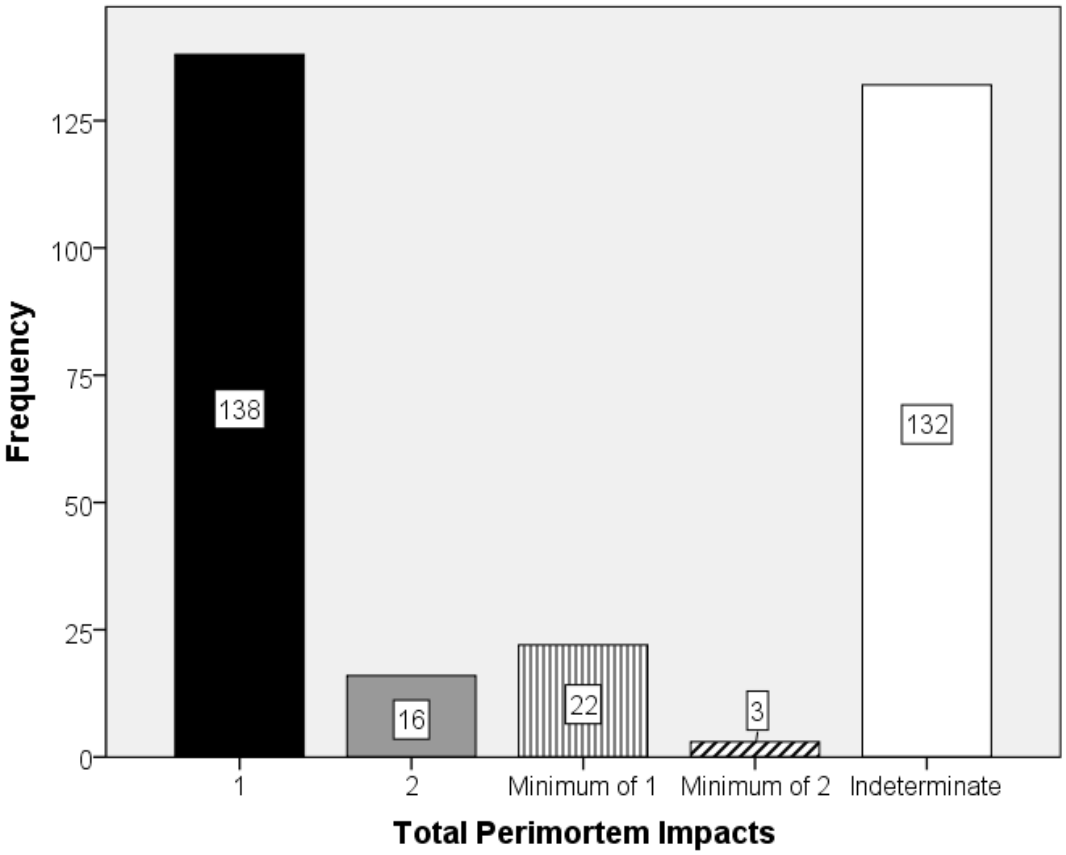

Figure 31. Number of crania with perimortem trauma (*n* = 311). The four bars on the left represent the 179 crania with discernable impacts, plus the 132 crania with indeterminate impact sites.

Trauma by Sex

Among the 311 crania with perimortem trauma, 249 are male, 49 are probable males, six are of indeterminate sex, two are female, and five are probable females (Table 8). Of the crania that have discernable impacts (n = 179), 140 are male, 30 are probable males, five are indeterminate, one is female, and three are probable females.

Table 8. Choeung Ek perimortem traumatic injuries by sex.

	All Perimortem Trauma	**Discernable Impacts**
Male	249	140
Probable Male	49	30
Indeterminate	6	5
Female	2	1
Probable Female	5	3
Total	**311**	**179**

Fisher's exact tests were used to determine whether there was an association between the presence or absence of traumatic injuries and an individual's sex. The results indicate that there is an association, although not very strong, between the five sex categories and the presence or absence of perimortem trauma (p = 0.021). However, when the sexes were pooled into males and females, and individuals of indeterminate sex were removed, there is no longer a relationship between sex and the presence or absence perimortem injuries (p = 1.000). These contrasting results suggest that there is simply too much variation when sex is distributed into five discreet categories to adequately conclude that sex is associated with the presence or absence of perimortem trauma.

To assess the relationship between an individual's sex and the number of perimortem impacts, Fisher's exact tests were run; there are no statistically significant differences found.

Numerous data combinations were tested: pooled sexes and pooled total perimortem impacts (with and without the indeterminate number of impacts included) (both $p = 1.000$) and all five sex categories and all perimortem impact categories ($p = 0.280$). Thus, there are no statistically significant differences between the number of perimortem impacts sustained and an individual's sex. This is also indicated by the Spearman's rank-order test as sex is not found to be significantly correlated with the number of impacts (Table 9).

Table 9. Spearman's correlation coefficients for all study variables.

Variable	Sex	Age	Impact Number	Mechanism	Fracture Type	Fracture Region
Age	-0.013	—				
Impact Number	0.004	0.029	—			
Mechanism	-0.090	0.034	**0.207**	—		
Fracture Type	-0.007	0.138	**0.183**	**0.420**	—	
Fracture Region	0.098	0.021	**0.284**	**0.268**	**0.405**	—
Basilar (SOS) Fx	-0.103	-0.077	0.039	0.094	-0.011	-0.014

Red (bold) values significant at $p < 0.001$

Trauma by Age Categories

When perimortem trauma was assessed by age category, all have evidence of trauma except the juveniles (Figure 32). However, there is only one adolescent with perimortem trauma. The young adults have the highest frequency of traumatic injuries (70%), although this is to be expected since the majority of the crania are estimated to be young adults. There are 85 middle adults (27%) and seven older adults (2%) with perimortem trauma. Among the 179 crania with discernable impacts, again, the majority are young adults (65%) followed by middle and older adults (Figure 33).

To assess whether there was a relationship between an individual's estimated age category and the presence or absence of perimortem trauma, Chi-square or Fisher's exact tests

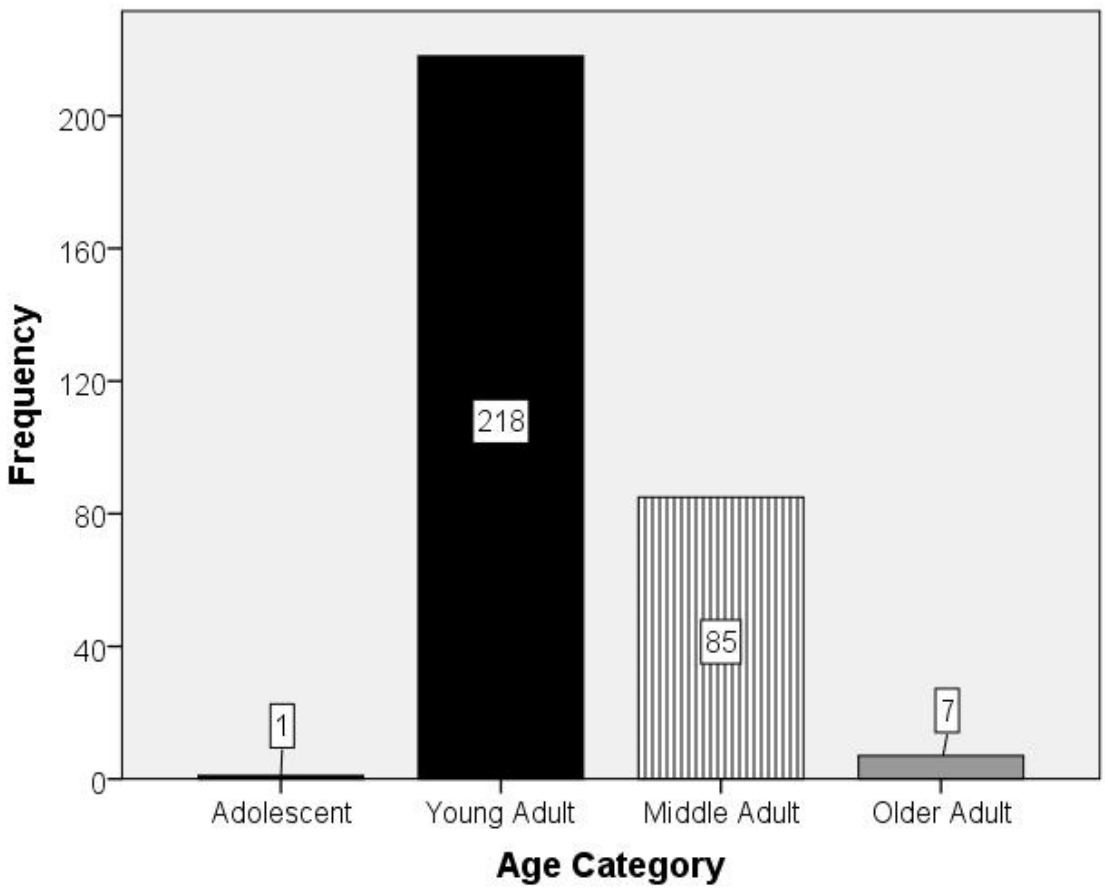

Figure 32. Perimortem trauma by age category (n = 311). No juveniles had perimortem trauma.

were computed. No statistically significant differences are found when all five age categories were assessed for the presence or absence of trauma (p = 0.067, Fisher's exact test). When evaluated for the adult categories only (young adults versus pooled middle and older adults), again, there is no statistically significant difference (χ^2 (1, n = 500) = 0.327, p = 0.617)). However, when the age categories were separated into adults and subadults (*i.e.*, juveniles and adolescents), there is a statistically significant difference between the age categories and the presence or absence of perimortem trauma (p = 0.004, Fisher's exact test) indicating that there is an association between the presence or absence of traumatic injuries and whether an individual is an adult or a subadult.

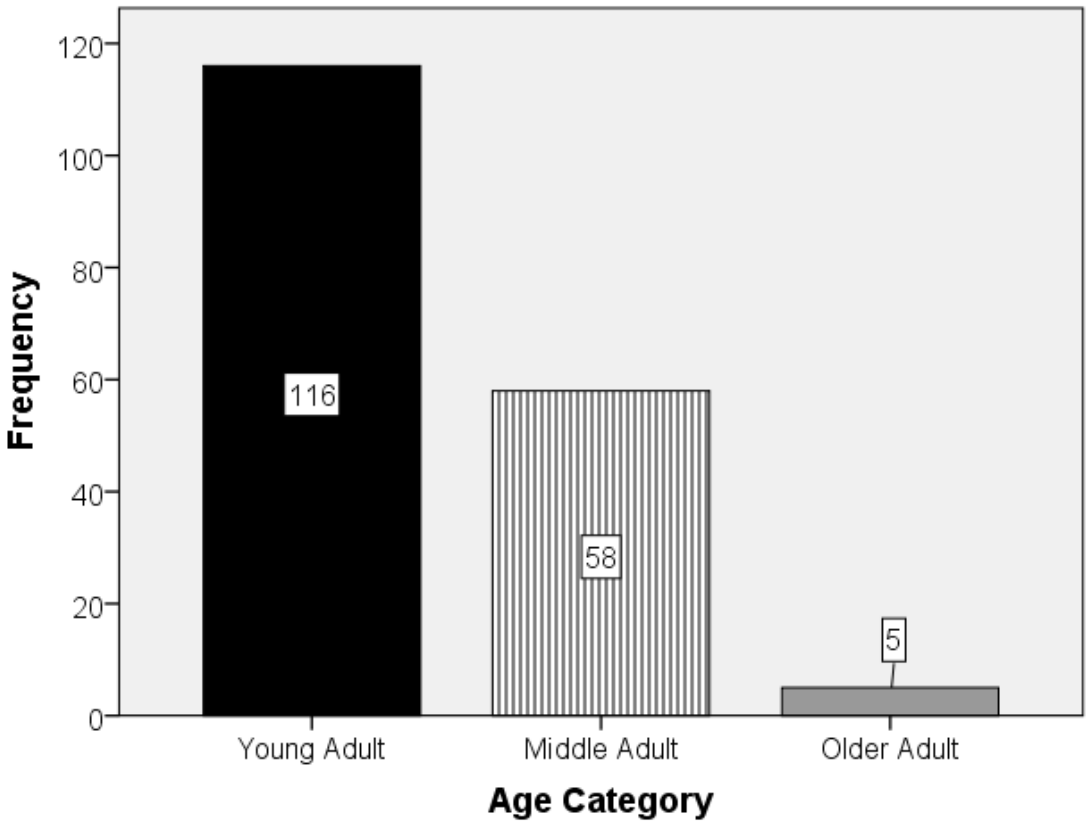

Figure 33. Age distribution for perimortem discernable impact sites (n = 179).

Associations between age categories and the number of perimortem impacts were also evaluated using Fisher's exact tests. When all age categories (excluding juveniles who had no traumatic injuries) were compared to all five perimortem impact categories (*i.e.*, one impact, minimum of one impact, two impacts, minimum of two impacts, and indeterminate number of impacts), there are no statistically significant differences (p = 0.162). Comparing only the adult age categories (young, middle, and older) to the perimortem impact categories (excluding indeterminate) is also not significant (p = 0.518). Finally, a two by two crosstabulation was run in which the middle and older adult categories were pooled, and the total number of impacts

were pooled (one impact and minimum of one impact were pooled, as were two impacts and minimum of two impacts). Again, no statistically significant differences are found (p = 0.179) suggesting that there is no association between an individual's estimated age category and the number of perimortem impacts sustained. Finally, Table 9 demonstrates no statistically significant correlation between an individual's age and the number of impacts.

Trauma Mechanism

Regarding the mechanisms of trauma, the 179 crania with discernable impact sites have evidence of blunt force trauma, sharp force trauma, high velocity projectile/gunshot wounds, and trauma of indeterminate mechanisms (Figure 34). For the 132 crania with perimortem trauma without discernable impacts, only blunt force trauma and indeterminate mechanisms are observed. Nearly all of the crania with discernable impacts have only one mechanism of injury

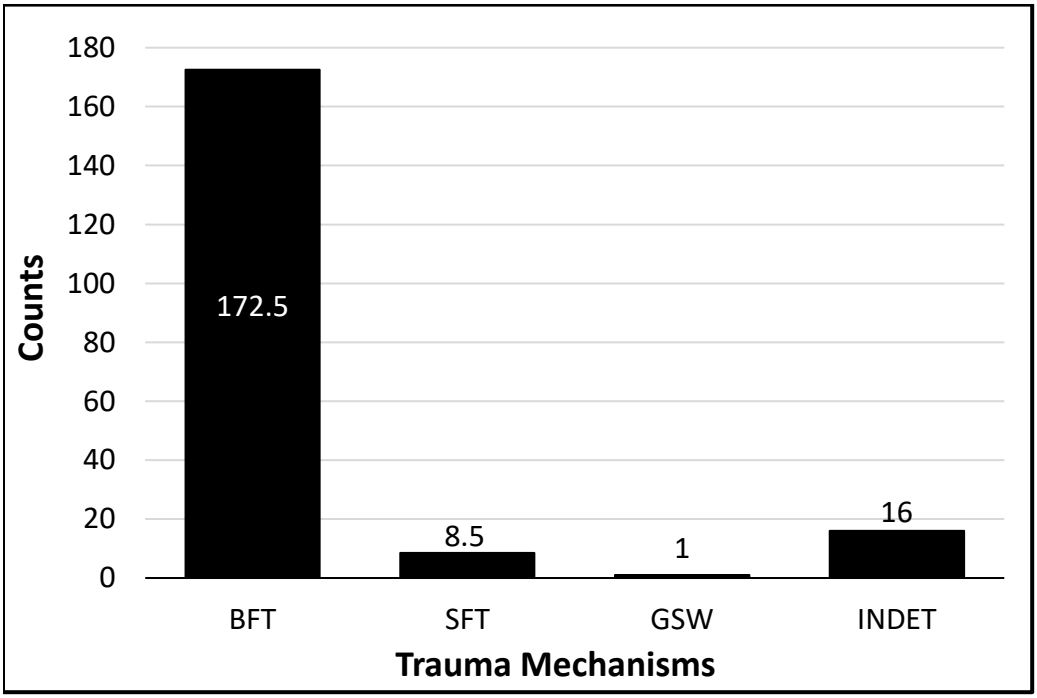

Figure 34. Frequencies of discernable impacts by trauma mechanism (crania = 179; impacts = 198).

(97%). The remaining six crania have mixed mechanisms: three crania have blunt force and sharp force trauma, two crania have blunt force and indeterminate trauma, and one cranium has sharp force and indeterminate trauma.

When the 198 discernable impacts were distributed by mechanism of trauma, there are 172.5 (87%) blunt force injuries, 8.5 sharp force injuries, one gunshot wound, and 16 injuries of an indeterminate mechanism (Figure 34). The 0.5 values for the blunt force and sharp force trauma categories resulted from one cranium that has one discernable impact, but the injury has both blunt and sharp characteristics. In this case, the single impact was divided between the two mechanisms of injury. It is likely that this injury was caused by a blunt and heavy object that had at least one sharp edge. The distributions of the different trauma mechanism, for discernable impacts, by sex and age categories are shown in Figures 35 and 36.

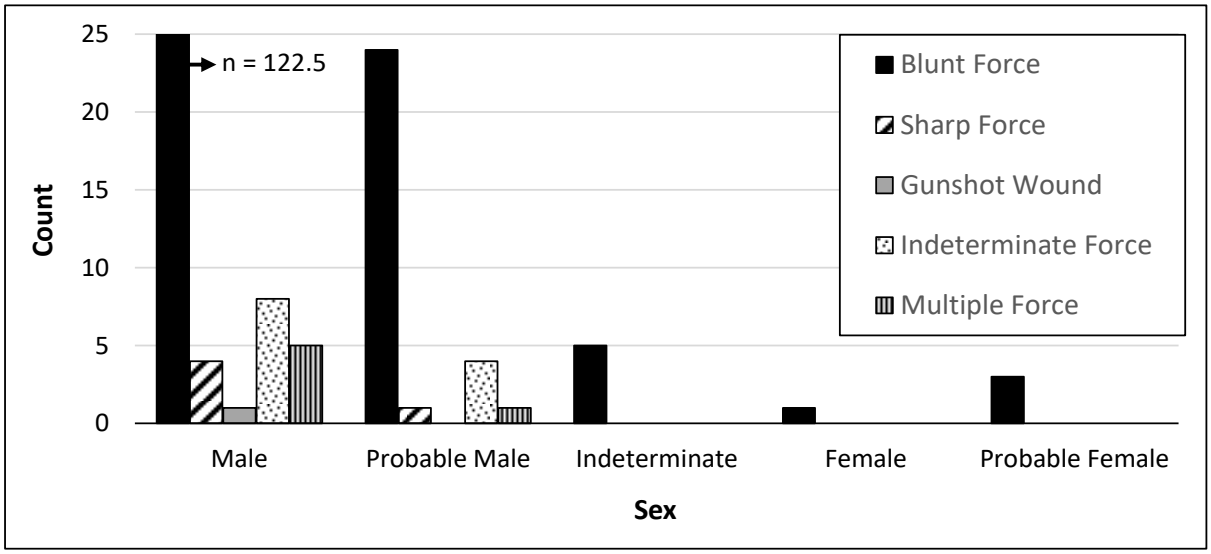

Figure 35. Frequencies of trauma mechanism by sex (crania = 179). Graph truncated to better illustrate lower frequencies of non-male, non-blunt force combinations.

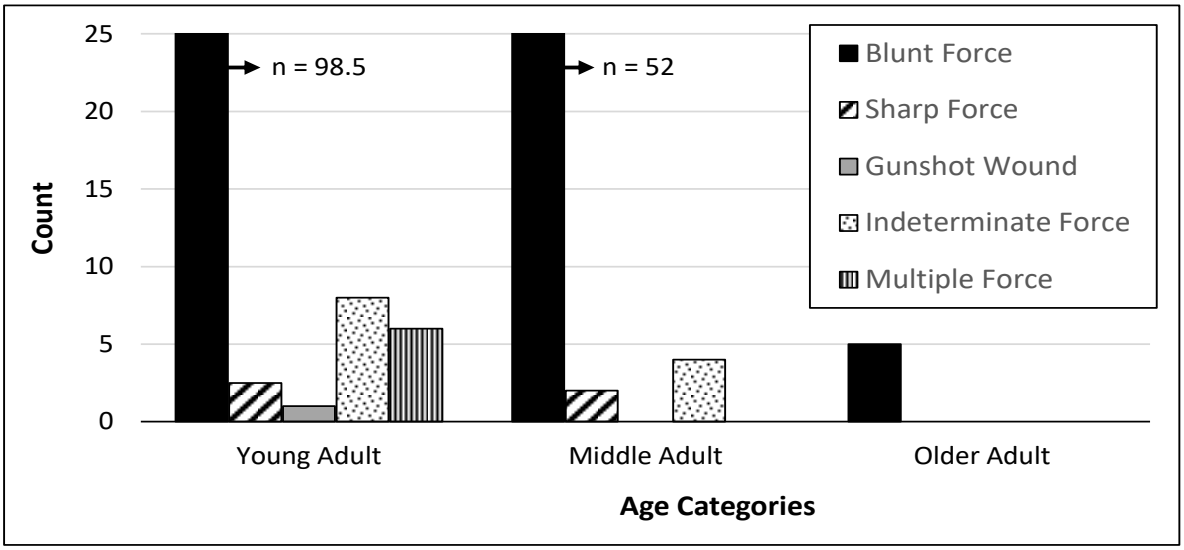

Figure 36. Frequencies of trauma mechanism by age categories (crania = 179). Graph truncated to better illustrate lower frequencies of non-male, non-blunt force combinations.

Blunt Force Trauma

Numerous combinations of data were evaluated via Fisher's exact tests to determine whether there were relationships between an individual's age category or sex and the mechanism of traumatic injury per discernable impacts. For blunt force trauma numerous data iterations were tested regarding an individual's sex and age category (Table 10), none of which are statistically significant. This multitude of assessments therefore indicates that there are no statistically significant differences between an adult individual's age category or sex and the presence of blunt force cranial trauma. All adult males and females, regardless of their age, were equally subjected to blunt force injuries.

Sharp Force Trauma

The same statistical tests were run to determine whether there was an association between sharp force trauma and an individual's age category or sex. Again, multiple iterations of pooled

Table 10. Fisher's exact test *p*-values for various age, sex, and blunt force trauma combinations.

Variable	BFT Present/Absent	1 or 2 BFT Impacts
All 5 Sex Categories	0.635	0.325
Pooled Males and Females	1.000	1.000
All 3 Adult Age Categories	1.000	1.000
Young Adults and Middle/Older Adults	1.000	1.000

No associations significant at $p < 0.05$

and non-pooled data were evaluated. Regarding the association with an individual's sex, all five sex categories ($n = 179$) and pooled sexes ($n = 174$; five individuals of indeterminate sex were removed) were tested against the presence or absence of sharp force trauma. Presence or absence were the only possible categories as no individual had more than one sharp force injury, thus, frequencies of sharp force injuries per individual were only zero and one. Both tests indicated that there are no significant differences between an individual's sex and the presence or absence of sharp force trauma (for both tests $p = 1.000$).

When sharp force trauma was assessed by age categories, again, there are no significant differences. There are no adolescents or juveniles with sharp force trauma so they were removed from these analyses. When all three adult age categories ($n = 178$) were tested against the presence or absence of sharp force trauma using a Fisher's exact test, the difference is not significant ($p = 0.778$). Similarly, when the pooled adult age categories (young adults and middle/older adults) ($n = 178$) were assessed, there is also no significant difference ($p = 0.714$). These results indicate that there is no association between an individual's sex or age cateogry and the presence or absence of sharp force trauma; all individuals were equally subjected to sharp force injuries.

Indeterminate Trauma

For the indeterminate mechanism of trauma, numerous Fisher's exact tests were calculated evaluating an individual's sex and age category (Table 11). As with all other mechanisms of trauma, there are no significant relationships between an individual's sex and age and the presence or number of indeterminate traumatic injuries.

Table 11. Fisher's exact test *p*-values for various age, sex, and indeterminate force trauma combinations.

Variable	Indeterminate Present/Absent	0–2 Indeter. Impacts
All 5 Sex Categories	0.395	0.317
Pooled Males and Females	1.000	1.000
All 3 Adult Age Categories	0.856	0.419
Young Adults and Middle/Older Adults	0.580	0.228

No associations significant at $p < 0.05$

Gunshot Trauma

There is only one perimortem gunshot wound documented for all 508 crania at Choeung Ek. This gunshot wound is on the cranium of a young adult male. As such, the statistical tests were simplified compared to those for the trauma mechanisms above; a two by two crosstabulation was computed for pooled sexes ($n = 174$; five individuals of indeterminate sex were removed) against the presence or absence of a gunshot wound, and a two by two crosstabulation was computed for pooled adult age categories (young adults and middle/older adults) against the presence or absence of a gunshot wound. Fisher's exact tests were run for both crosstabulations and neither is statistically significant with $p = 1.000$. Thus, there is no association between an individual's age or sex and the presence of a gunshot wound.

Although there are no associations between the *mechanisms of trauma* and an individual's age and sex, when the trauma mechanisms were tested against the number of *perimortem impacts*, there are some associations. For these analyses (Table 12), the total number of discernable perimortem impacts were pooled: "one impact" was grouped with "minimum of one impact," and "two impacts" was grouped with "minimum of two impacts." Statistically significant differences are only found for the number of blunt force trauma impacts and the number of sharp force trauma injuries sustained. These results indicate that the total number of impacts sustained by an individual is associated with the frequency of blunt force and sharp force traumatic injuries.

Table 12. Fisher's exact tests for associations between the number of perimortem impacts* and the mechanisms of trauma.

Variables	*n*	*p*
BFT (1 or 2 Impacts)	160	<0.001
BFT (Present/Absent)	179	1.000
SFT (Present/Absent)	178	0.003
Indeterminate (1 or 2 Impacts)	15	1.000

*Perimortem impacts pooled (1/Minimum of 1; 2/Minimum of 2)

Finally, despite the lack of statistically significant differences between sex, age-at-death, and mechanism of trauma, multiple correspondence analysis (mCA) provides some clustering of these variables. Figure 37 shows a bi-plot derived from a mCA of age, sex, and trauma mechanism in the Choeung Ek skeletal sample (Table 13). Tables 14 and 15 provide the associated statistical measures derived from the mCA. The first two principal dimensions, or axes, explain 32% of the variation in the sample. The relative dispersion of the age and sex cohorts in the first dimension demonstrates a separation of young adult males from females of

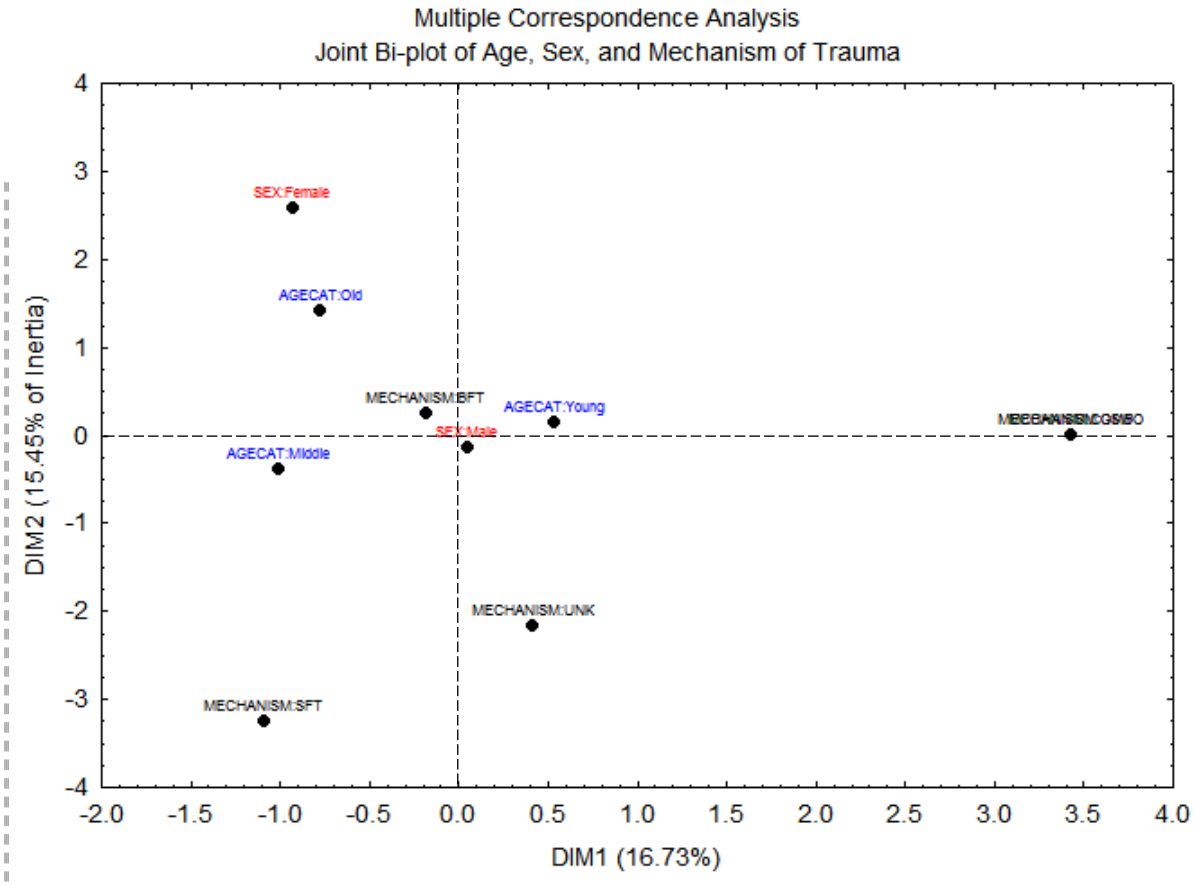

Figure 37. Joint bi-plot derived from the contingency table data (Table 13) showing distribution of age and sex cohorts (columns) and mechanisms of trauma (rows). First two dimensions are plotted.

middle and older age. While the relatively close locations of the points for males and blunt force trauma suggest a possible correspondence, the second dimension separates them. Thus, there is limited correspondence, and no statistically significant correlations (Table 9), between age, sex, and mechanisms of trauma.

To summarize the trauma mechanisms documented on these crania, among the 179 individuals with discernable impact sites, the mechanism is not statistically significantly different based on an individual's sex or age category. Therefore, there are no associations between the mechanisms or forces used to execute individuals at Choeung Ek and their age or sex, indicating

that all victims, with the exclusion of juveniles and adolescents who did not have discernable impact sites, were subjected to the same mechanisms of violence.

Table 13. Frequency distribution of Age, Sex, and Mechanism of Trauma for Choeung Ek.

Sex	**Age**	**BFT**	**Combo**	**UNK**	**GSW**	**SFT**	**Total (Row)**
Male	Middle	49	0	4	0	2	55
	Young	92	7	8	1	2	110
	Old	5	0	0	0	0	5
	Total (Male)	**146**	**7**	**12**	**1**	**4**	**170**
Female	Middle	0	0	0	0	0	0
	Young	4	0	0	0	0	4
	Old	0	0	0	0	0	0
	Total (Female)	4	0	0	0	0	9
TOTAL (Column)		**150**	**7**	**12**	**1**	**4**	**174**

Table 14. Associated statistics and measure of significance for various mCAs.

Variables Compared	**% of Inertia**	**Dimensions**	χ^2	***df***	***p***
Age x Sex x Trauma Mechanism	32.18	1 and 2	1267.57	81	< 0.0001
Age x Sex x Fracture Region	38.55	1 and 2	1447.81	100	< 0.0001
Trauma Mechanism x Basilar (SOS) Fractures	38.18	1 and 2	1090.14	49	< 0.0001

Table 15. Contributions to the multiple correspondence analysis of Age, Sex, and Mechanism of Trauma, in descending order of Mass contribution.

	Mass	Quality	Relative Inertia	Inertia Dim.1	Inertia Dim.2
SEX:Male	0.317	0.400	0.007	0.002	0.016
MECHANISM:BFT	0.289	0.622	0.019	0.024	0.051
AGECAT:Young	0.216	0.567	0.050	0.160	0.011
AGECAT:Middle	0.108	0.563	0.097	0.281	0.047
MECHANISM:UNK	0.022	0.351	0.133	0.010	0.292
SEX:Female	0.017	0.400	0.136	0.037	0.311
MECHANISM:COMBO	0.013	0.478	0.137	0.393	0.000
AGECAT:Old	0.009	0.074	0.139	0.014	0.051
MECHANISM:SFT	0.007	0.270	0.140	0.023	0.220
MECHANISM:GSW	0.002	0.066	0.142	0.056	0.000

Fracture Type

Of the 179 crania with observable impacts, the most frequent fracture type is a radiating (linear) fracture (76%) (Figure 38). Fractures designated as "other" are the second most frequent at 10%. For crania with multiple fracture types (7.8%), the most frequent combination is radiating and other fractures (36%). The high frequency of radiating fractures is not surprising. These fractures are typically associated with blunt force trauma, and this is the most frequent trauma mechanism documented for the Choeung Ek crania, as discussed above. Radiating fractures can occur both at the site of the blunt force impact as well as at locations separate from the impact (Galloway 1999b). When a Fisher's exact test was run to compare demographics and fracture type, there are no significant differences for the type of fractures sustained given an individual's sex (p = 0.216) or age category (p = 0.063). Therefore, the type of fracture resulting from traumatic injuries is not associated with an individual's sex or age.

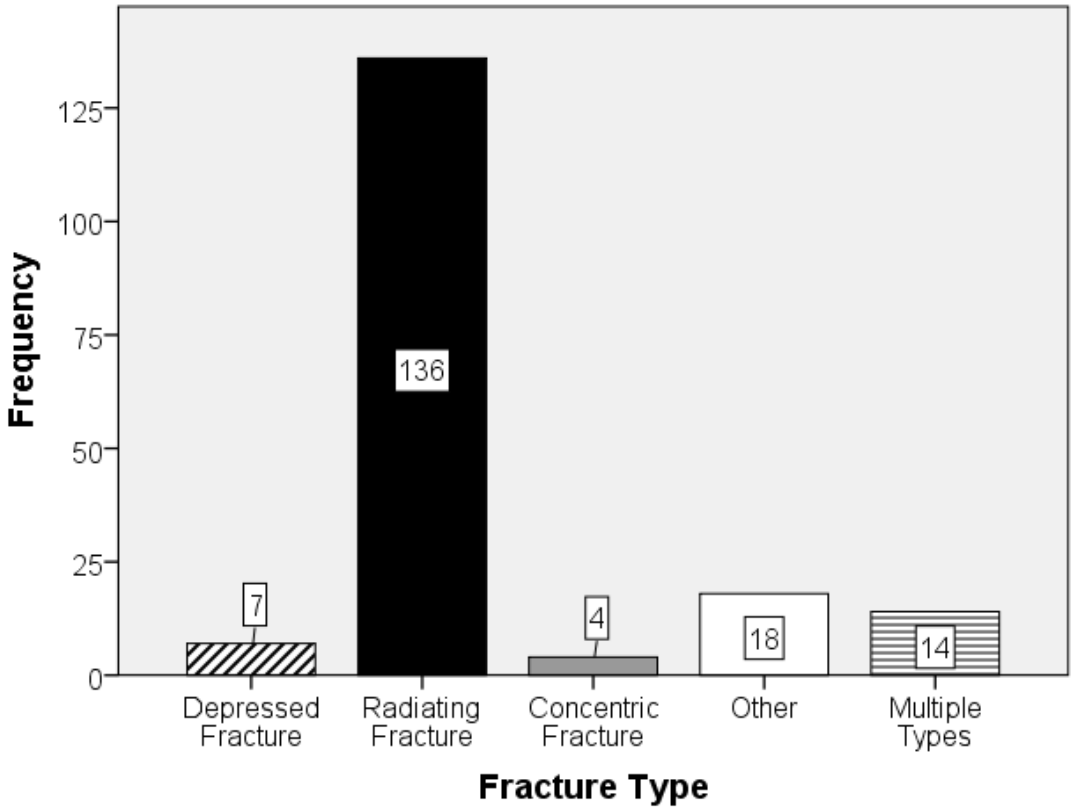

Figure 38. Frequencies of fracture types at Choeung Ek.

Trauma Location

Figure 39 demonstrates the frequencies of the cranial region(s) that are impacted. The basicranium is the region most frequently impacted (53%) followed by impacts to multiple cranial regions (23%). For those with multiple regions impacted, the most common multi-region combination is the vault and basicranium (22%). Using a Fisher's exact test, when impacted cranial regions were evaluated by sex (p = 0.497) and by adult age category (p = 0.974), there are no significant differences. As indicated above for fracture type, the region of the cranium targeted by the perpetrators was similar for all sexes and all adult ages.

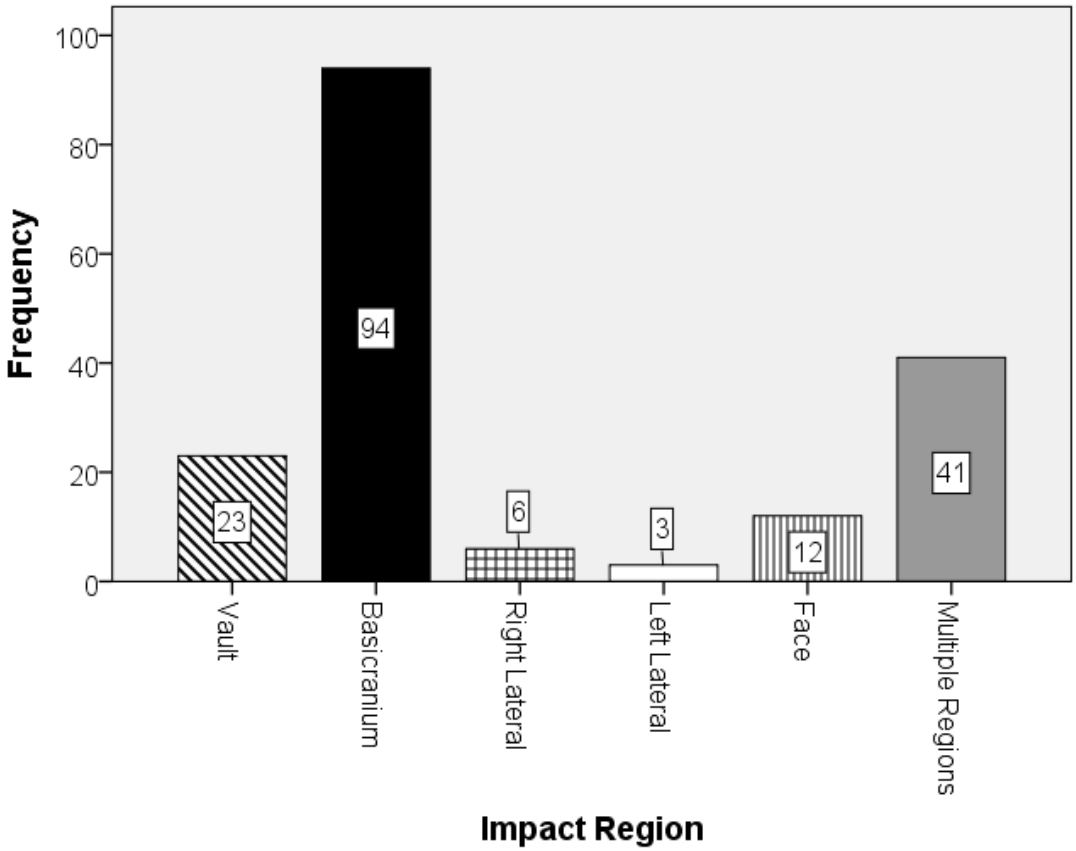

Figure 39. Frequencies of impacted cranial regions at Choeung Ek.

Although not significant, some of the age, sex, and fracture region variables do show correspondence. Figure 40 provides a joint polar bi-plot derived from a mCA of age, sex, and fracture region in the Choeung Ek sample. Tables 14 and 16 provide the associated statistical measures, and Table 9 provides the associated correlations derived. The first two dimensions explain nearly 40% of the variation in the sample. The first dimension separates young and older adult males with fractures to the basicranium, lateral sides of the cranium, and multiple cranial regions from middle adult females with fractures to the face and vault. The second dimension also separates the sexes and young adults from middle and older adults. The relative dispersion of the points suggests a close relationship between males and basicranial trauma which fits these

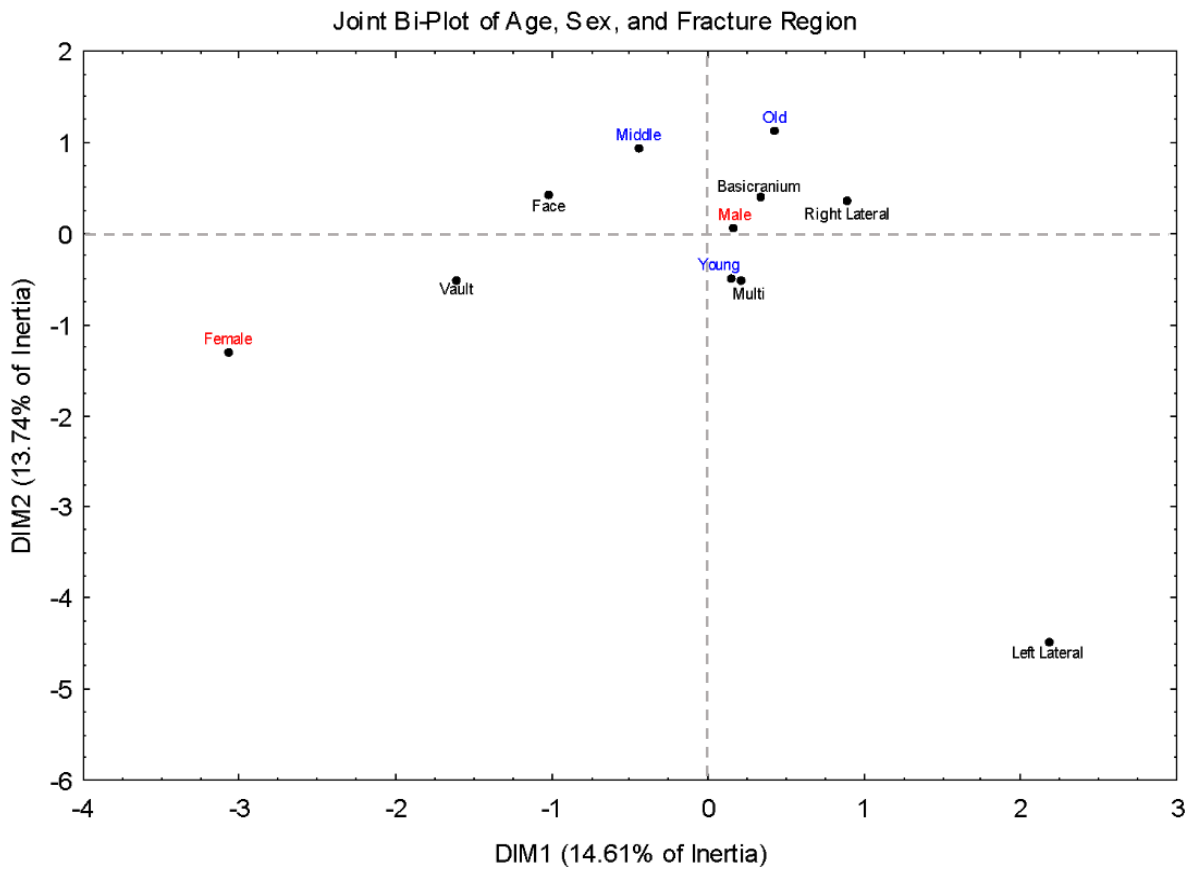

Figure 40. Joint bi-plot derived from the contingency table data (Table 17) showing distribution of age and sex cohorts (columns) and mechanisms of trauma (rows). First two dimensions are plotted.

data appropriately as males and basicranial impacts are the most common at Choeung Ek. The plot also shows how little correspondence there is between females and all other variables.

While there are no relationships between the region of the cranium impacted and an individual's age or sex, there are some associations between cranial regions and the mechanisms of trauma (Table 18). For both blunt force trauma and sharp force trauma there are statistically significant associations. Indeterminate mechanisms of trauma, however, are not significantly different based on the impacted region of the cranium, with one minor exception. When the presence or absence of indeterminate mechanism was tested against all regions of the cranium

Table 16. Contributions to the multiple correspondence analysis of Age, Sex, and Fracture Region, in descending order of Mass contribution.

	Mass	Quality	Relative Inertia	Inertia Dim.1	Inertia Dim.2
SEX:Male	0.317	0.589	0.006	0.021	0.004
AGECAT:Young	0.216	0.559	0.044	0.023	0.154
FXREGION:Basicranium	0.175	0.304	0.059	0.050	0.078
AGECAT:Middle	0.108	0.506	0.084	0.055	0.253
FXREGION:Multi	0.076	0.079	0.096	0.004	0.051
FXREGION:Vault	0.043	0.419	0.109	0.284	0.030
FXREGION:Face	0.022	0.089	0.117	0.060	0.011
SEX:Female	0.017	0.589	0.119	0.406	0.077
FXREGION:RLateral	0.011	0.032	0.121	0.023	0.004
AGECAT:Old	0.009	0.041	0.122	0.004	0.032
FXREGION:Llateral	0.006	0.423	0.123	0.068	0.306

Table 17. Frequency distribution of Age, Sex, and Impact Region for Choeung Ek.

Sex	Age	Vault	Basicran.	R Lateral	L Lateral	Face	Multi	Total (Row)
Male	Middle	7	31	2	0	4	11	55
	Young	12	57	4	3	7	27	110
	Old	1	3	0	0	0	1	5
	Total (Male)	**20**	**91**	**6**	**3**	**11**	**39**	**170**
Female	Middle	0	0	0	0	0	0	0
	Young	2	1	0	0	0	1	4
	Old	0	0	0	0	0	0	0
	Total (Female)	2	1	0	0	0	1	4
TOTAL (Column)		**22**	**92**	**6**	**3**	**11**	**40**	**174**

using Fisher's exact tests, there is a slight association (Table 18). However, this significance disappears when the presence/absence of indeterminate trauma was tested against the pooled cranial regions (Table 19). Thus, there are no strong correlations between the region of the cranium impacted and indeterminate mechanisms of trauma which is a departure from the associations between blunt force and sharp force trauma.

Table 18. Fisher's exact tests associations between all six cranial regions impacted and the mechanisms of trauma

Variables	*n*	*p*
BFT (1 or 2 Impacts)	160	<0.001
SFT (Present/Absent)	178	0.005
Indeterminate (Present/Absent)	15	0.043

Table 19. Fisher's exact tests associations between pooled* cranial regions impacted and the mechanisms of trauma

Variables	*n*	*p*
BFT (1 or 2 Impacts)	160	<0.001
SFT (Present/Absent)	178	0.002
Indeterminate (Present/Absent)	15	0.056

* Pooled (Basicranium/All other regions)

Finally, fractures of the basilar portion of the occipital around the spheno-occipital synchondrosis are not infrequent at Choeung Ek. Twenty-two percent of the sample (n = 110) have perimortem basilar fractures (Figure 41). In order to run the Chi-square and Fisher's exact tests, the following data manipulations were necessary: 1) the postmortem and absent basilar fractures were pooled, and those that could not be recorded because the basilar portion was

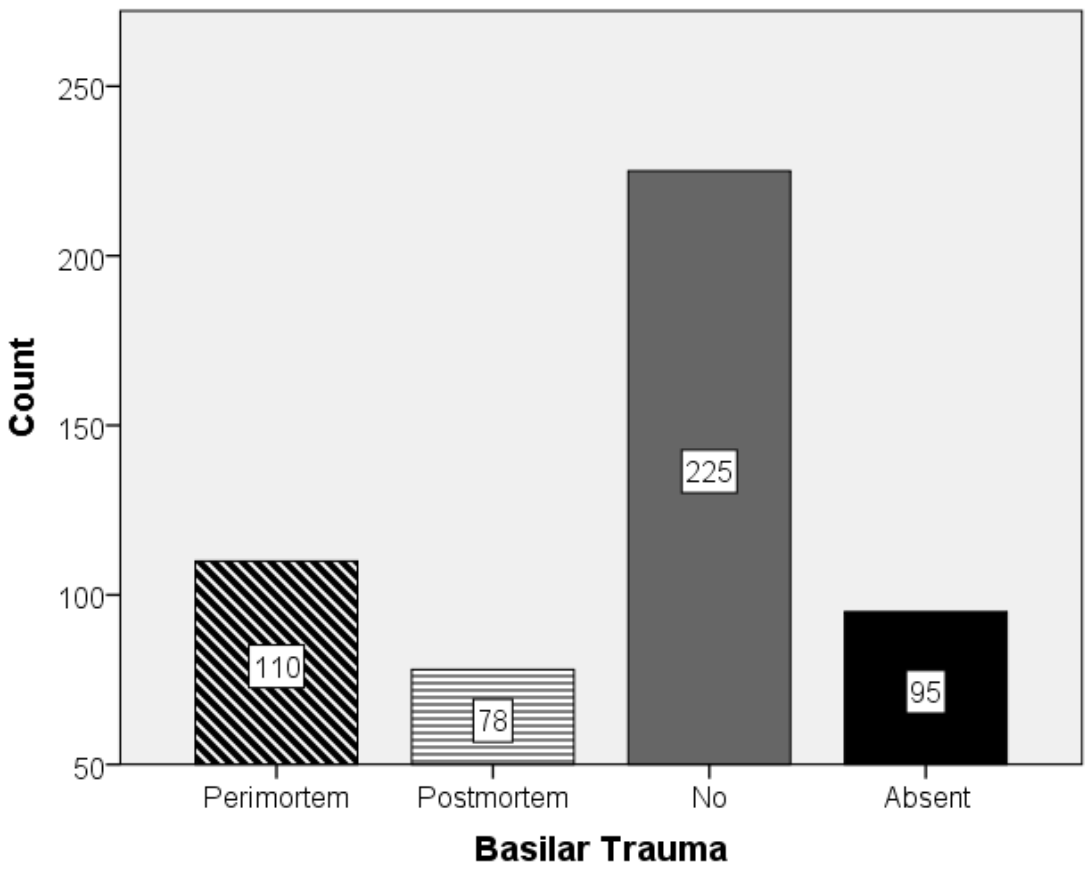

Figure 41. Frequencies of fractures, and timing, of the basilar portion of the occipital.

missing were removed from the analysis, resulting in perimortem fractures and no fractures; 2) the sexes were pooled into males and females and indeterminate sexes were removed; 3) the age-at-death categories were pooled in two ways: adults/subadults and young adults and middle/older

Table 20. Association test for fractures of the basilar portion of the occipital.**

Variables	*n*	χ^2	*df*	*p*
Age (Young Adults/Middle and Older Adults)	410	8.214	1	0.004
BFT (Present/Absent)	413	5.198	1	0.028
Sex (Males/Females)*	407	–		0.495
Age (Adults/Subadults)*	413	–		1.000

*Fisher's exact test
**Basilar fractures pooled (Perimortem/None); absent fractures dropped

adults; and 4) blunt force trauma was pooled as present/absent. Table 20 shows the results of these tests. Statistically significant differences are found between the presence of perimortem basilar fractures and whether the individual is a young adult or a middle/older adult and the presence or absence of blunt force trauma. This indicates that there is a relationship between adult age and blunt force trauma and the presence of perimortem basilar fractures.

Additionally, a mCA was computed for basilar (spheno-occipital synchondrosis (SOS)/clivus) fractures and mechanism of trauma in the Choeung Ek skeletal sample (Figure 42). Tables 14 and 22 provide the associated statistical measures, and Table 9 provides the associated

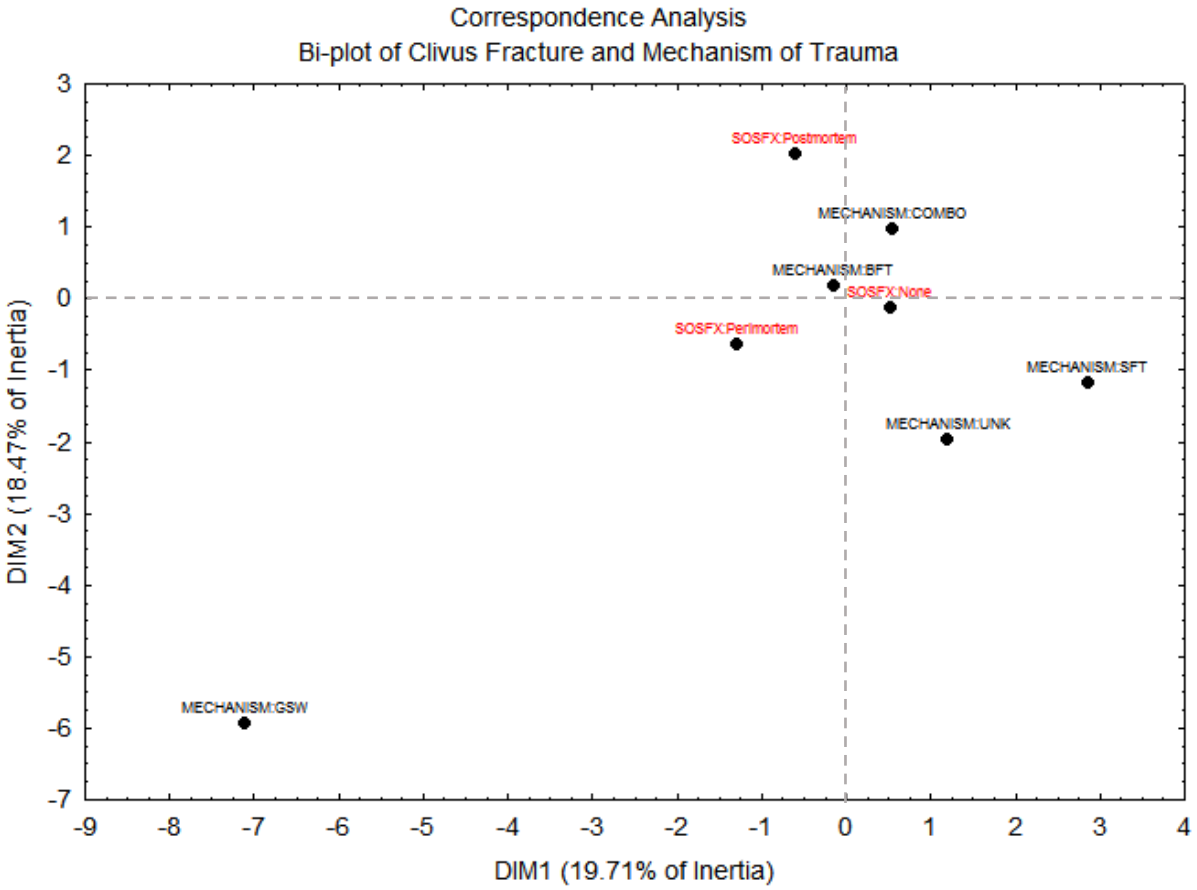

Figure 42. Joint bi-plot of the row and column profiles derived from the contingency table data (Table 21) showing distribution of basilar fractures (columns) and mechanisms of trauma (rows). Profiles are plotted with respect to the existing principal axes.

correlations derived from the mCA. The first two principal axes explain 38% of the variation in the sample. The first axis delineates perimortem and postmortem fractures with blunt force trauma, from all other mechanisms—with the exception of the one gunshot wound that is so far removed from the other variables it can be considered an outlier. Interestingly, the dispersion of the variables suggests that blunt force trauma is more closely related to no basilar fractures than the presence of perimortem fractures. The relative distance between sharp force trauma and trauma of unknown mechanisms and the presence of perimortem fractures suggests the relationship is very limited.

Table 21. Frequency distribution of basilar (spheno-occipital synchondrosis; SOS) fractures and Mechanism of Trauma for Choeung Ek.

Basilar Portion Fracture	BFT	Combo	UNK	GSW	SFT	Total (Row)
Perimortem	35	1	2	1	0	39
Postmortem	19	1	0	0	0	20
Absent	101	5	10	0	4	120
TOTAL (Column)	**155**	**7**	**12**	**1**	**4**	**179**

Table 22. Contributions to the multiple correspondence analysis of basilar fractures and Mechanism of Trauma, in descending order of Mass contribution.

	Mass	Quality	Relative Inertia	Inertia Dim.1	Inertia Dim.2
MECHANISM:BFT	0.433	0.341	0.022	0.016	0.025
SOSFX:None	0.335	0.589	0.055	0.155	0.010
SOSFX:Perimortem	0.109	0.584	0.130	0.310	0.081
SOSFX:Postmortem	0.056	0.557	0.148	0.035	0.409
MECHANISM:UNK	0.034	0.383	0.155	0.082	0.236
MECHANISM:COMBO	0.020	0.051	0.160	0.010	0.034
MECHANISM:SFT	0.011	0.219	0.163	0.155	0.028
MECHANISM:GSW	0.003	0.481	0.166	0.238	0.178

Intra-observer Error

Cohen's kappa was calculated using SPSS (version 24) to assess the error rates of analyses. All crosstabulations between the original data and the error test data are positive, have a κ (kappa) value higher than 0.500, and are statistically significant at $p < 0.0005$, with the exception of sharp force trauma frequencies (Table 23). Antemortem trauma has perfect intra-observer agreement ($\kappa = 1.000$; $p < 0.0001$) indicating no error, and ancestry (*i.e.*, the morphological assessment of Asian ancestry both times) has the second highest strength of agreement ($\kappa = 0.884$; $p < 0.0001$) indicating little error. Total perimortem impacts have the lowest positive intra-observer agreement ($\kappa = 0.562$; $p < 0.0001$) signifying moderate agreement strength and the highest error. However, sharp force trauma has a negative statistic ($\kappa = -0.027$; $p = 0.837$) indicating no agreement, although this was not statistically significant. There were too few crania scored as having indeterminate trauma to run a Cohen's kappa test.

Table 23. Cohen's kappa measure of agreement for intra-observer error.

Variables	κ	SE	p
Sex	0.658	0.319	<0.001
Ancestry	0.884	0.080	<0.001
Age Categories	0.727	0.111	<0.001
Trauma Present/Absent	0.841	0.088	<0.001
Total Perimortem Impacts	0.562	0.085	<0.001
Blunt Force Trauma	0.616	0.109	<0.001
Sharp Force Trauma	-0.027	0.020	0.837
Antemortem Trauma	1.000	0.000	<0.001
Basilar (SOS) Fractures	0.769	0.203	<0.001

$n = 50$

Archival Data

Demographics

When the 97 definitive execution lists were evaluated, there were 6,285 individuals recorded, however some of the lists were partial as pages were missing (Table 24). The minimum number of individuals per list was one, and the maximum number was 306. Of these 6,285 individuals, 5,783 had their sexes documented and 4,510 had their ages recorded.

Among the individuals with their sexes documented and legible, the majority (82.1%) were male. The remaining 876 individuals (14.7%) were female. Of the 4,510 individuals with documented ages, the minimum age was 11 years and the maximum age was 77 years (Figure 43). The average age was 29.1 years while the mode of the sample was 25 years (384 individuals). The average age for the 4,907 males was 23.2 years and the average age for the females was 19.8 years old at death.

Table 24. Tuol Sleng archive execution lists demographic data.

	Sex*		**Age-at-Death****				**List Totals** (with and without age/sex)
	Males	**Females**	**Min.**	**Max.**	**Mean**	**Mode**	
97 Definitive Execution Lists	4907 (82.1%)	876 (14.7%)	11	77	29.1	25	6,285
100 Probable Execution Lists	4966 (82.2%)	884 (14.6%)	8	77	29.2	25	6,352

**n*=5,783 for 97 Lists; 5,850 for 100 Lists
***n*=4,510 for 97 Lists; 4,572 for 100 Lists

Ratios were calculated for the individuals on the 97 execution lists to assess differences between the sexes and age categories. The sex ratio for those with documented sex (n = 5,783) is

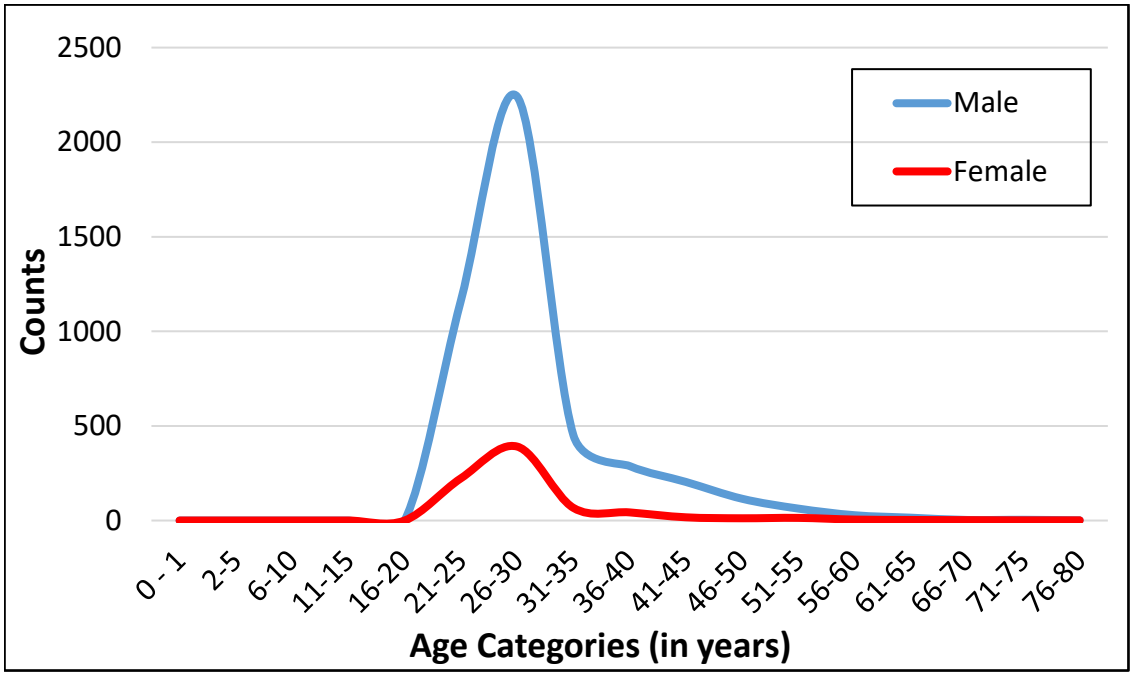

Figure 43. Tuol Sleng 97 definitive execution list ages distributed by sex.

560 (normalized to 100 individuals) or 4,907:876 (greatest common divisor) which indicates that for every 876 females on an execution list there were 4,907 males (Table 25 and Figure 44). When distributed by age categories the middle adults have the highest sex ratio (607:72) followed by the young adults, older adults, and adolescents. There are no female juveniles so a sex ratio could not be calculated.

Table 25. Sex ratios for the 97 Tuol Sleng execution lists (normalized to 100 and using the greatest common divisor).

	Total Sample*	Juvenile	Adolesc.	Young Adult	Middle Adult	Older Adult
Male	4,907	1	184	2,984	607	114
Female	876	0	55	466	72	26
Sex Ratio	560 (4,907:876)	0 (1:0)	330 (184:55)	640 (1492:233)	840 (607:72)	440 (57:13)

*n = 5,783

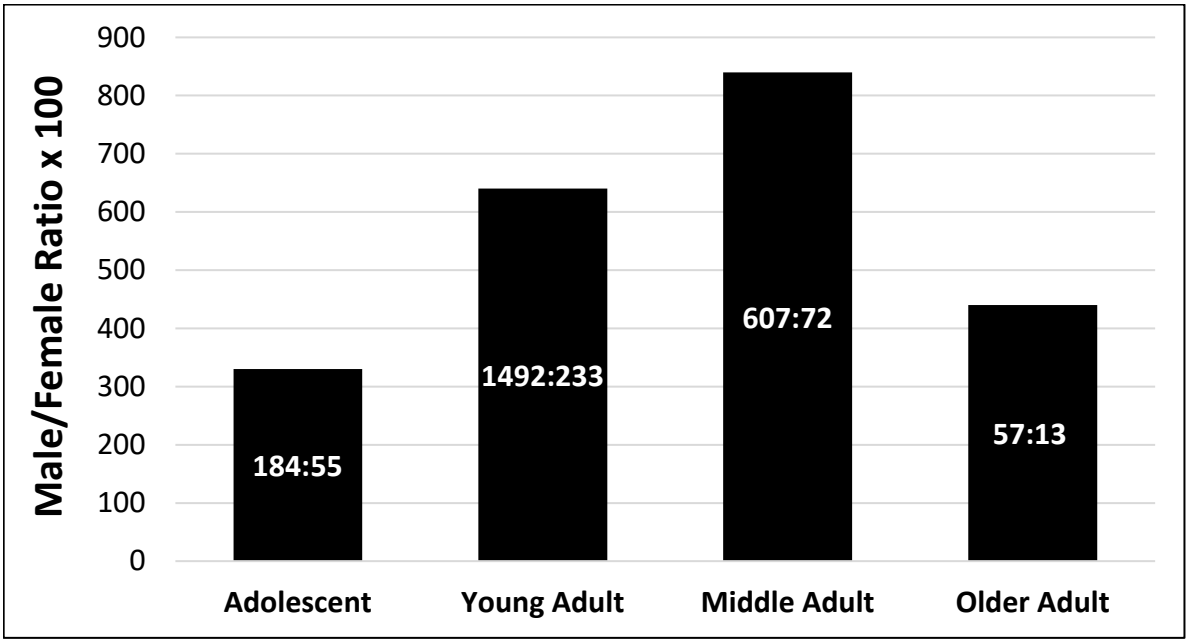

Figure 44. Sex ratios for the 97 Tuol Sleng execution lists.

Ratios were also calculated for the different age categories (*n* = 4,510), regardless of sex: young adults per all other adults, and adults per subadults (Table 26). The ratio of young adults to all other adults is 493:117 indicating for every 117 individuals of middle or older adult age there are 493 young adults. The ratio for adults to subadults is far more skewed at 427:24; for every 24 victims younger than 20 years of age there were 427 adults.

The archival sample was also assessed using hazard models to discern the differences between the sexes regarding mortality and survivorship. As Table 7 shows, the log-likelihood

Table 26. Age category ratios (normalized to 100 and using greatest common divisor) for 97 Tuol Sleng execution lists.

	n		***n***
Young Adults	3,451	**Adults**	4,270
All Other Adults	819	**Subadults**	240
Ratio	420 (493:117)	**Ratio**	1,780 (427:24)

results indicate that there are statistically significant differences between the sexes. Figure 45 demonstrates that females have a slightly higher probability of dying at a younger age, until 22 years old, than males; this trend reverses after age 22 when males have a higher probability of dying than females until the age of 45 years, when females again have a higher probability of death.

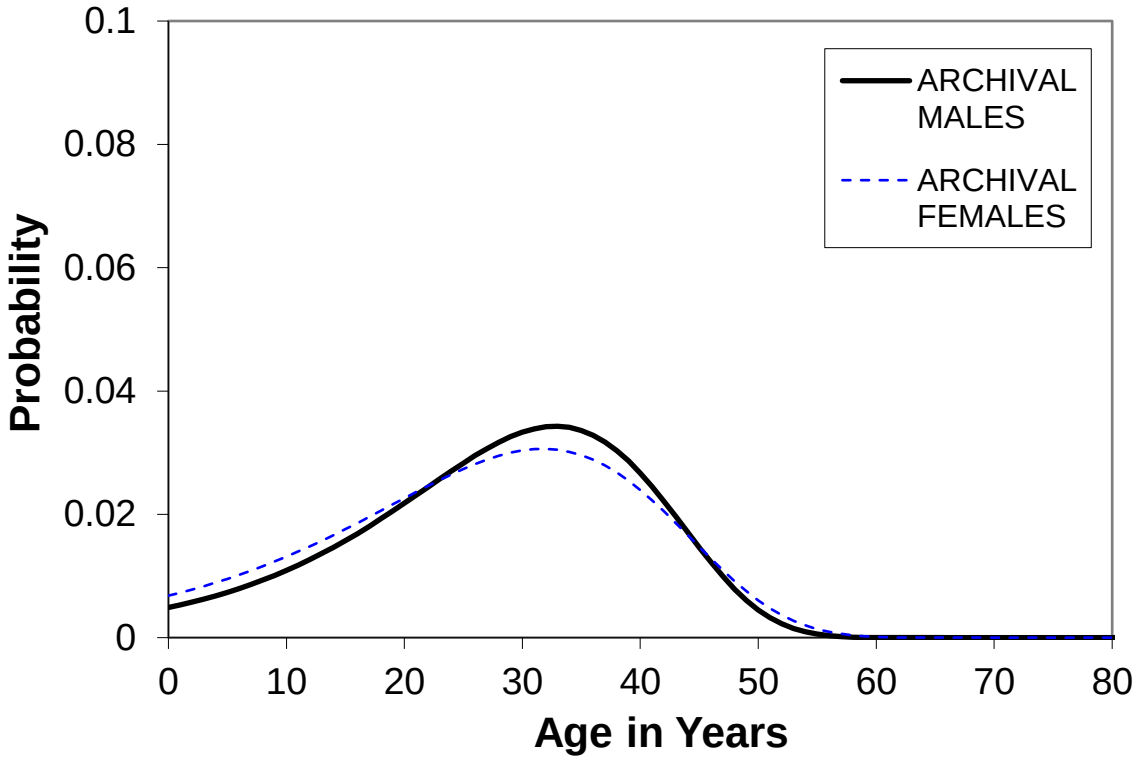

Figure 45. Probability density function for Tuol Sleng execution lists, by sex.

The probability of mortality for females is significantly higher than for males until approximately 30 years old (Figure 46). After 30 years of age, the probability of mortality rises dramatically for both sexes, although more so for males. Therefore, at the age of 50 years, males have nearly 40% probability of dying, while females have close to 30% probability of death. These differences are statistically significant.

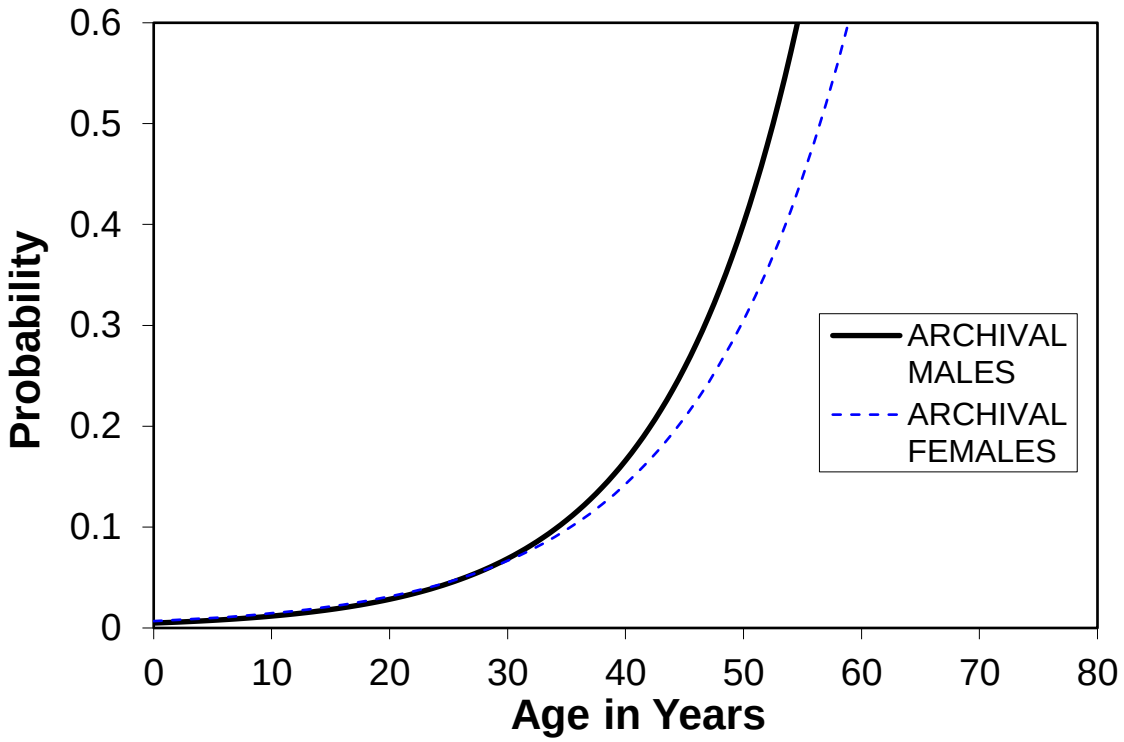

Figure 46. Mortality hazard for Tuol Sleng execution lists (97), by sex.

Figure 47 shows the probability of survivorship, and while the graphical representation makes it appear that males and females have very similar probability of survivorship, the slight variations are statistically significantly different. Until the age of 37 years, females have a slightly lower probability of survival compared to males, but after 37 years there is a reversal, with males having a lower probability of survivorship.

These execution list data document the demographic reality of Khmer Rouge violence at S-21. Both sexes were targeted, although the vast majority were males (82%), as well as all ages. The oldest individual recorded was 77, and the youngest was 11 years old. While these lists are certainly not a complete record of all individuals who were executed by the Khmer Rouge after being detained at S-21, they are likely a representative sample documenting the holistic nature of Khmer Rouge violence.

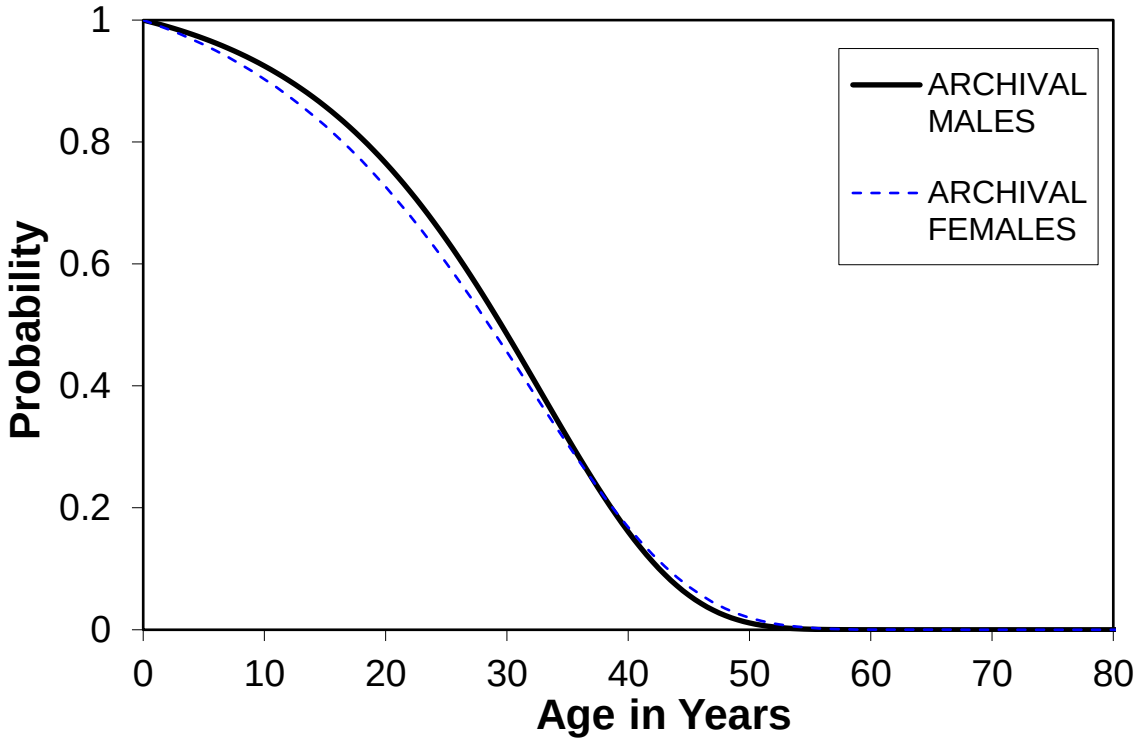

Figure 47. Survivorship for Tuol Sleng execution lists (97), by sex.

Comparison of Osteological and Archival Demographics

Probability density functions, mortality-hazards, and survivorship graphs were plotted. These graphs permit a visual comparison of mortality and survivorship between the Choeung Ek (osteological) and Tuol Sleng (archival) samples.

The probability models for the samples are visually distinct (Figure 48). The curve for the archival sample is more evenly distributed, which is to be expected given that there are more young and old individuals in this sample compared to the Choeung Ek crania. The log-likelihood test indicates that these differences are statistically significant (Table 7), although as already discussed, one of the limitations of this test is that it nearly always finds significant differences. Two biases may explain the differences between the samples. First, the age estimations for the Choeung Ek crania demonstrate systematic bias (overestimation or

underestimation of age) which occurs when chronological ages are condensed into age categories, as is necessary and unavoidable with osteological aging techniques. Second, the sample sizes are dramatically different between the two groups; the limited number of crania are therefore not fully representative of the age variation that is to be expected and seen with the archival data.

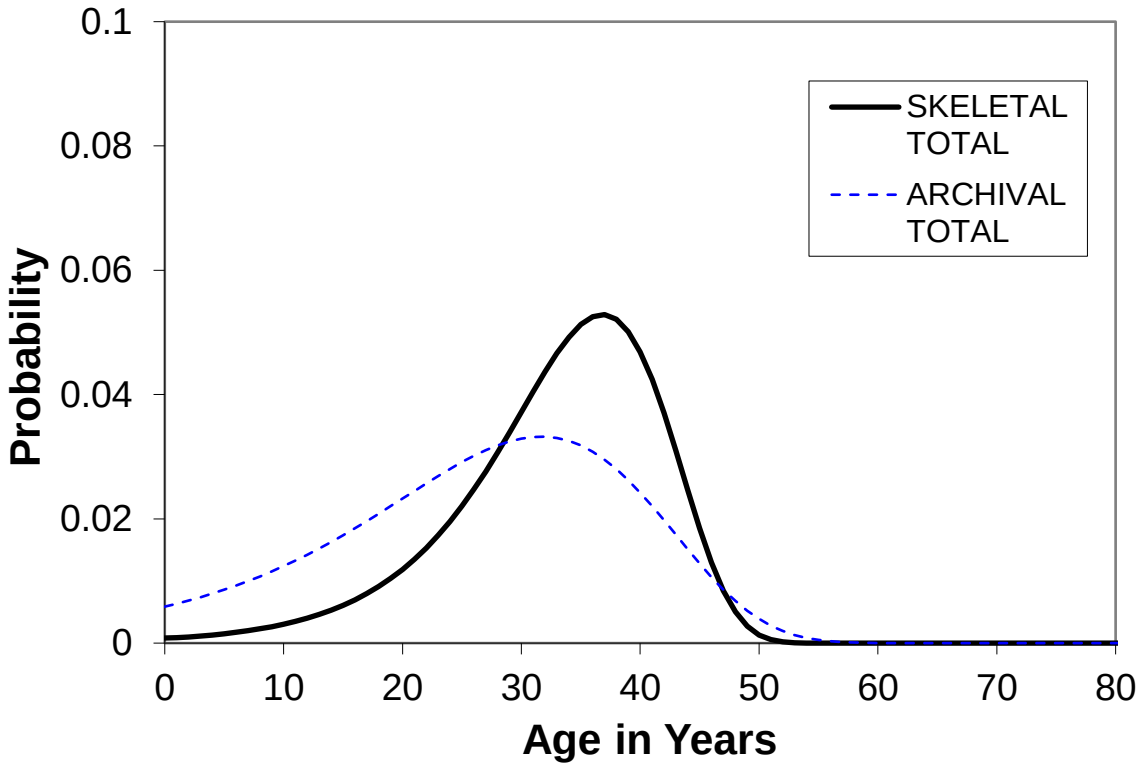

Figure 48. Probability density functions for age, by sample.

Examination of mortality between the samples (Figure 49) indicates subadults and young adults have a higher probability of mortality in the archival sample until age 35 years, when the mortality of the osteological sample rises dramatically and overtakes the archival sample. The mortality probability for the archival sample is more gradual with increasing age. Again, the log-likelihood ratio test found that these probabilities are statistically significantly different

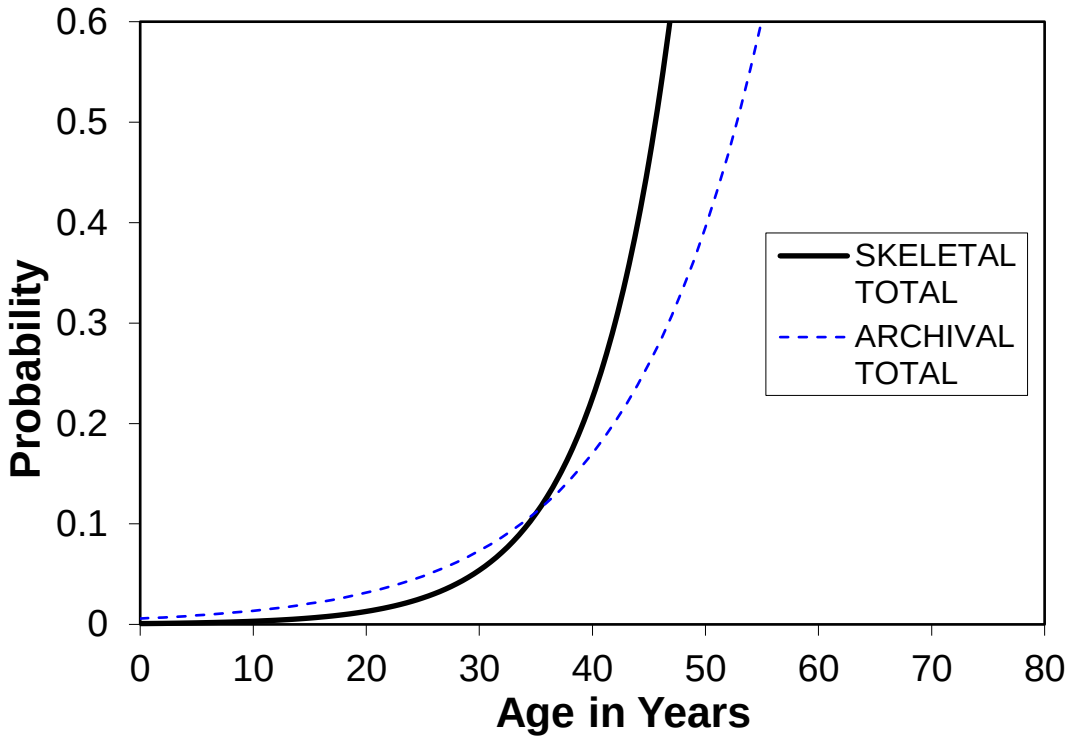

Figure 49. Mortality hazard for age, by sample.

(Table 7), although the higher probability of mortality in the younger age categories for the archival sample is likely an artifact of the sample size and age distribution.

Evaluation of the probability of survivorship reveals that individuals from the archival sample have lower survivorship than the skeletal individuals until approximately 45 years of age (Figure 50). Between 25 and 30 years of age, the survivorship of the osteological sample declines dramatically and rapidly. This pattern for the skeletal sample likely reflects the tendency for osteological age estimation methods to overestimate the age of young individuals and underestimate the age of older individuals. Thus, females in the osteological sample have a higher probability of mortality compared to the archival sample, and males in the osteological sample also have higher probability of survivorship at all ages compared to the archival sample, although this is probably due to the age skeletal age estimation bias.

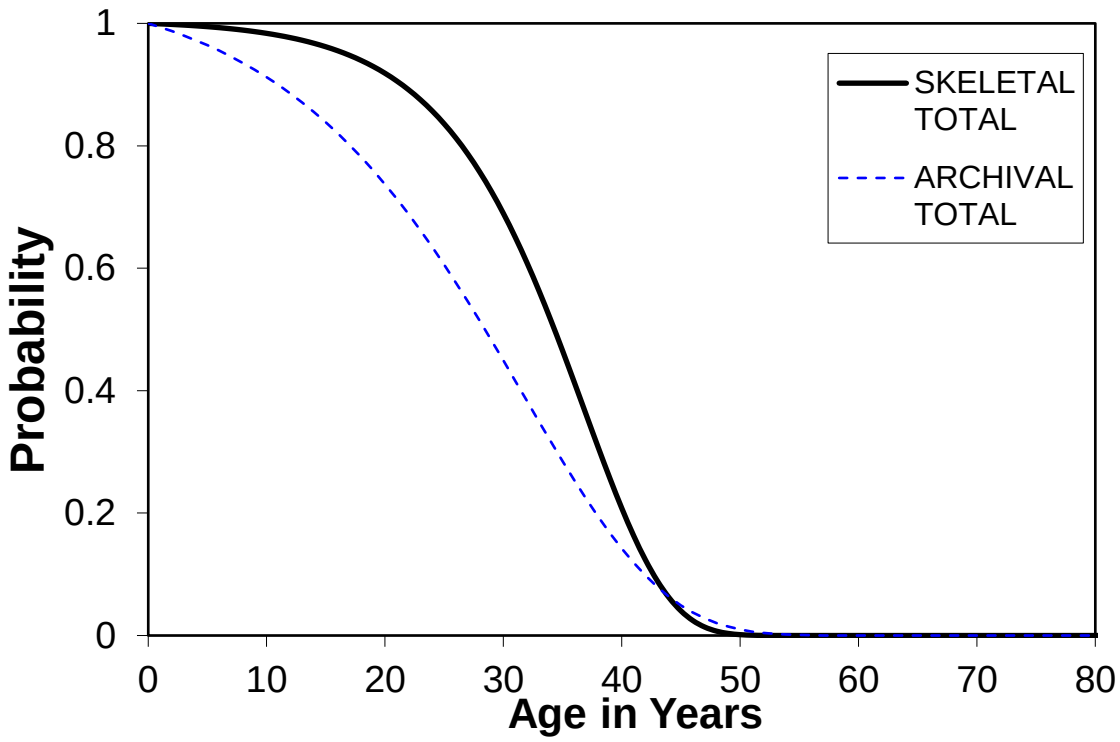

Figure 50. Survivorship model for age, by sample.

Memorial and Interview Data

Memorial and Osteological Observations

The memorials visited during this research are highly variable with regards to size, style, location, ease of access, and level of care. The only truly unifying theme among these memorials is that they contained human remains from the Khmer Rouge period. In many cases, such as Wat Thmei, Kraing Ta Chan, Wat Snguon Pich, Wat Samdech, Wat Samrong Knong, Wat Kiri Bopharahm, and Wat Chhoung Leap Preah Sihanouk Reach (Figures 51-57), the *stupa* are clearly identifiable as memorials with visible remains inside of large structures, often painted with bright colors. In fact, the memorial at Wat Snguon Pich is nearly identical in architecture and style to the national memorial at Choeung Ek (Figure 54). Other memorials—Wat Bo

Knong, Trapeang Sva, Wat Phnom Baseth Trae Troung, Wat Roka Kaong, and Wat Ang Serei Sour Sdei (Figures 58-62)—are challenging to locate and are not instantly recognizable as memorials. The remains are not directly visible as they are enclosed behind doors or incomplete brick walls or are highly fragmented and covered by colored paper from a previous religious ceremony.

Figure 51. Wat Thmei memorial in Siem Reap. The red arrow indicates a perimortem depressed fracture. Money is placed into the memorial by visitors (numerous international currencies) as seen in the bottom left image.

Figure 52. Wat Samdech memorial in Battambang. The bottom image shows traditional urns (with cremains) that have been placed in the lower half of the memorial.

Figure 53. Kraing Ta Chan memorial in Takeo.

Figure 54. Wat Snguon Pich memorial in Kandal. Notice the architectural resemblance to the *stupa* at Choeung Ek.

Figure 55. Wat Samrong Knong memorial in Battambang. Around the base of the memorial are two levels of concrete-sculpted panels depicting the history of the Khmer Rouge regime in Battambang. The top right image shows the artist's rendition of mass execution.

Figure 56. Wat Kiri Bopharahm memorial in Kampong Cham. These remains are not behind glass, and they are not frequently cleaned.

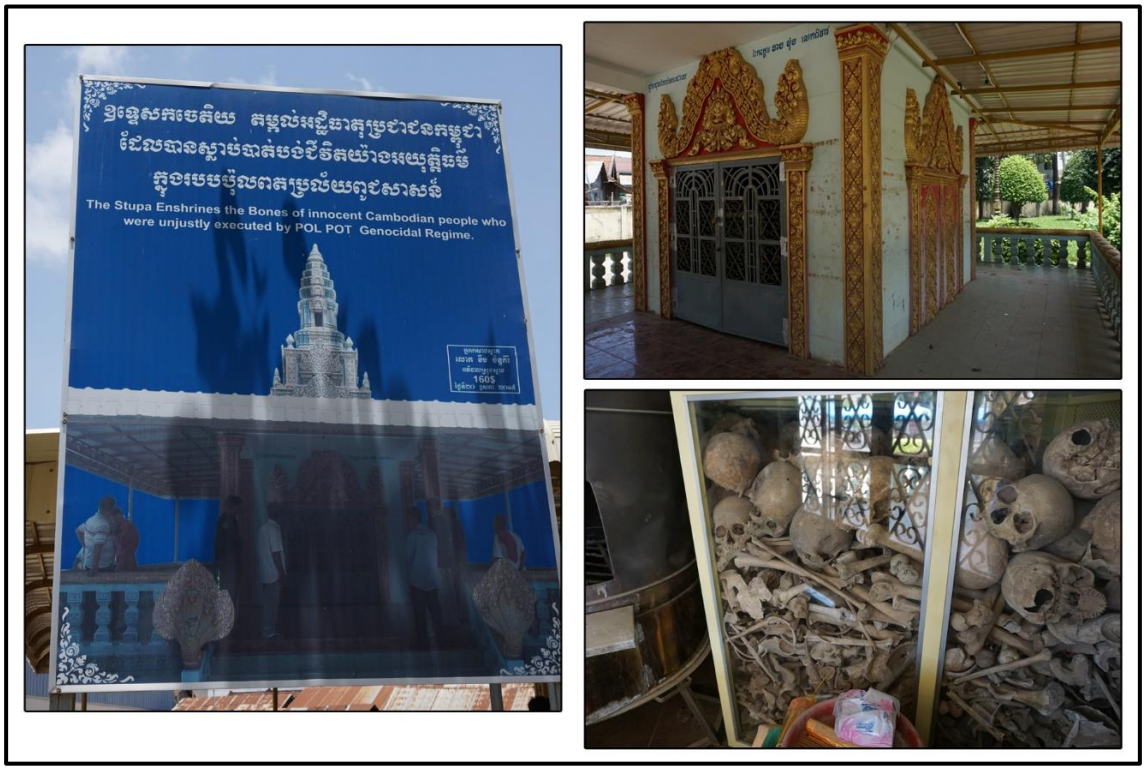

Figure 57. Wat Chhoung Leap Preah Sihanouk Reach memorial in Kandal.

Figure 58. Trapeang Sva memorial in Kandal. Permission was needed to open the metal door (in the middle image) to really see the remains.

Figure 59. Wat Bo Knong memorial in Battambang. Permission was needed to unlock the memorial. The remains are not readily visible to the public.

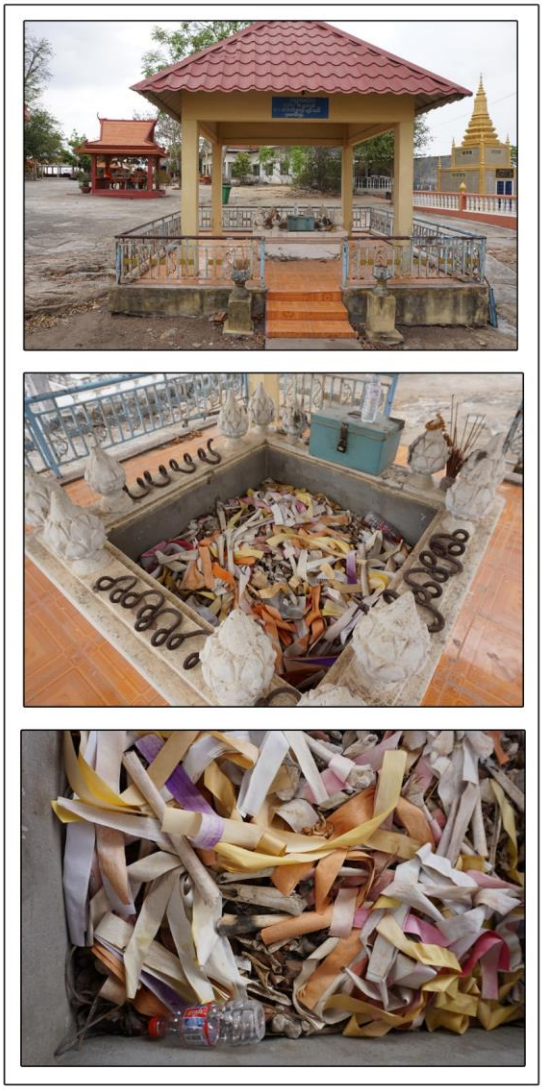

Figure 60. Wat Phnom Baseth Trae Troung memorial in Kandal. The bones are barely visible beneath the colored paper and debris. The u-shaped items surrounding the bones (middle image) are leg shackles that were found in/near the graves.

Figure 61. Wat Roka Kaong memorial in Kandal. The remains are in the red oval in the top image; they are surrounded by trash and graffiti. The remains are in poor condition, as is the memorial.

Figure 62. Wat Ang Serei Sour Sdei memorial in Kandal. The memorial and remains are in poor condition. The remains in good condition had been sent to another memorial at Phnom Oudong in Kamong Speu Province.

Figure 63. Lakhoan Cave memorial at Wat Kirirom in Battambang.

All of these memorials, with the exceptions of Wat Thmei and the Lakhoan (Killing) Cave at Wat Kirirom (Figure 63) because they are tourist destinations, were quiet and there were only a few local individuals nearby. When the memorials were located within the complex of a wat, only a few monks or perhaps laymen were present, and it was always quiet. I never witnessed the memorials or the remains being tended to, although this does occur during holidays in which the dead are remembered such as *pchum ben* (see below for a more detailed discussion of this festival). At most memorials, the bones are neatly stacked, often with the crania being the primary focal point. While highly variable, the memorials all serve to protect the remains from direct environmental exposure and to commemorate those who died during the Khmer Rouge.

After the 13 memorial *stupa* were observed and thoroughly documented, observational patterns were assessed (Table 27). Regarding the preservation conditions of the remains, placing them within a *stupa*, often behind glass, is a form of preservation. Limiting the exposure of the remains to water, sunlight, humidity, and animal scavenging certainly protects the remains from further degradation. Beyond transferring the remains from the ground, as far as I could discern, none of the remains had been formally preserved (*i.e.*, no chemical or polymer sealants had been used to coat the bones to prevent them from deteriorating). Some of the remains were minimally cleaned before they were placed in the memorials, but there are still some crania—at Kraing Ta Chan and Wat Thmei, for instance—with soil in the eye orbits and nasal apertures indicating the remains had never been thoroughly cleaned. At the Lakhoan (Killing) Cave, there is soft tissue still adhering to some of the remains, and a segment of a mummified torso. Nearly all of the remains are covered in cobwebs, and dead insects—in addition to bird/bat feces in the case of Wat Kiri Bopharahm (central image in Figure 56)—indicating the remains themselves are not

regularly cleaned. The remains in more than half of the memorials have extensive taphonomic damage indicating exposure to the elements and damage from handling or excavation.

Table 27. Observations of the remains within the memorials.

Memorial Name	Preservation	Skeletal Elements	Number of Individuals*	Traumatic Injuries
Wat Chhoung Leap Preah Sihanouk Reach	No preservation. Remains are dirty but in new glass cases	Crania; cranial fragments; mandibles; vertebrae; humeri; ulnae; scapulae; ribs; os coxae; femora; fibulae	100-200	Too difficult to see
Trapeang Sva	No preservation. Many fragments and extensive taphanomic damage. Ligature present on long bone	Crania; cranial fragments; mandibles; humeri; ulnae; femora; tibiae; fibulae	20 (crania); 100+ (long bones)	Too much taphonomic damage to tell
Wat Ang Serei Sour Sdei	No preservation. Extensive taphanomic damage	Cranial fragments; vertebrae; ulnae; os coxae; tibiae, fibulae	20	Too much taphonomic damage to tell
Wat Phnom Baseth Trae Troung	No preservation. Extensive taphanomic damage. Remains covered by leaves, trash. Some bones charred from ceremonial burning of money for the dead	Cranial fragments; humeri; scapulae; os coxae; femora; tibiae	Too difficult to count	Too much taphonomic damage to tell
Wat Roka Kaong	No preservation. Extensive taphanomic damage	Crania; cranial fragments; radii, femora; tibiae	20-30	Too much taphonomic damage to tell
Wat Snguon Pich	No preservation. Extensive taphonomic damage. Remains covered in cobwebs, insects	Crania; cranial fragments; mandibles; humeri; radii, ulnae; os coxae; femora; tibiae; fibulae; phalanx; non-human bone	15-30	Too much taphonomic damage to tell

*All counts are approximate based on what was visible.

Table 27 (cont'd).

Memorial Name	Preservation	Skeletal Elements	Number of Individuals*	Traumatic Injuries
Kraing Ta Chan	No preservation. Taphonomic damage. Remains covered in cobwebs. Soil in orbits and nasal apertures	Crania; cranial fragments; mandibles; humeri, radii, ulnae; ribs; os coxae; sacra; femora; tibiae; fibulae	2,000	BFT to cranial base, right lower lateral sides; possible SFT
Wat Kiri Bopharahm	No preservation. Remains covered in cobwebs and bird or bat feces	Crania; cranial fragments; mandibles; humeri; radii; ulnae; ribs; os coxae; femora; tibiae, fibulae	400 (crania); 800 (long bones)	BFT to all aspects of the crania
Wat Bo Knong	No preservation. Remains fairly clean	Crania; cranial fragments; mandibles; humeri; femora; tibiae	50 (crania); 80-100 (long bones)	SFT; BFT to front and lateral vaults
Lakhoan (Killing) Cave	No preservation. Some adhering soft tissue and segments of a mummified torso	Crania; cranial fragments; vertebrae; humeri; scapulae; ribs; os coxae; sacra; femora; tibiae, fibulae	50 (crania); 100-200 (long bones)	BFT to crania
Wat Samdech	No preservation. Extensive taphonomic damage. Remains covered in cobwebs and snake skin	Crania; cranial fragments; vertebrae; clavicles; ribs; os coxae; sacra; femora; tibiae; fibulae; tarsals	50	BFT to crania
Wat Samrong Knong	No preservation. Extensive taphonomic damage. Remains covered in cobwebs	Crania; cranial fragments; mandibles; humeri; radii; ribs; os coxae; sacra; femora; tibiae; fibulae	150-200	BFT to face and cranial base
Wat Thmei	No preservation. Soil in orbits and nasal apertures	Crania; cranial fragments; mandibles; vertebrae; humeri, radii; ulnae; scapulae; ribs; os coxae; femora; tibiae; fibulae	360-400	BFT to vault and cranial base

*All counts are approximate based on what was visible.

Documenting which skeletal elements were present within each *stupa* was challenging as not all remains could be seen due to the placement and/or stacking of the remains. The only consistent skeletal elements present at all 13 memorials are crania or cranial fragments. All of the memorials have long bones present, with femora and tibiae visible at all but one memorial (no femora discernable at Wat Ang Serei Sour Sdei and no tibiae present at Wat Chhoung Leap Preah Sihanouk Reach). Of the more common skeletal elements present, humeri, fibulae, and os coxae are visible at 10 of the 13 memorials (77%) and 62% of the memorials have visible mandibles. Ribs are visible at seven of the memorials (54%) and vertebrae are visible at five memorials (38%). In the *stupa* at Wat Snguon Pich, one phalanx is present, as is a non-human bone from a large animal, likely a cow. Wat Samdech is the only memorial with tarsals (one calcaneus and one talus) visible.

These disparate assortment of skeletal elements indicate that the excavations of the mass graves from which the remains came were not conducted systematically, and the remains that were placed in the memorials were not intended to be representative of an entire individual. Based on the presence of crania or cranial fragments in all memorials, it is my hypothesis that crania were easily recognizable as human and were an effective method for counting the number of individuals within each grave: one crania represented one individual. Other than the skull (if the mandible is included), the only other non-paired or non-consecutive[11] bones in the human body are the hyoid, sternum, and sacrum which are not inherently recognizable by non-experts as being representative of one individual. After the graves were exhumed at Choeung Ek, for example, the crania were laid in rows along the edges of the graves in order to count the number

[11] The vertebrae, for example, could be described as consecutive in the sense that while each of the 24 bones in the column are unique, they look similar and are not the most effective for determining how many individuals are present. The ribs are another example, although the ribs are paired; they have similar shapes, although each rib from the first to the twelfth is slightly different.

of victims, while the remaining bones of the body were piled together (Figure 64). Thus, it seems likely that this method for sorting and counting the remains would have occurred at other locations.

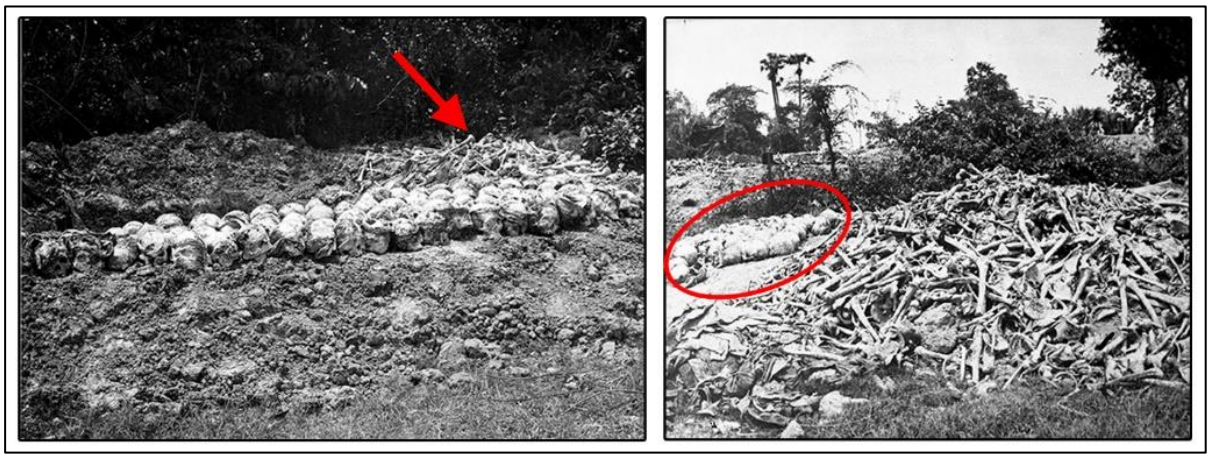

Figure 64. Images of exhumed mass graves at Choeung Ek. The crania are clearly separated from the postcranial elements. The red arrow points to a pile of postcranial elements; the red oval indicates the crania distinctly set apart from the remainder of the bones (images courtesy of the Tuol Sleng Genocide Museum).

Counting the number of individuals within each memorial was particularly difficult given that the bones were often stacked vertically as well as horizontally. This limited the number of skeletal elements I could view. Time also precluded an accurate count of individuals. Thus, all counts are approximations based on the remains that are visible. In many cases, long bones are far more numerous than crania—which is not surprising as each individual has 12 long bones for every cranium—so approximations were calculated for the number of individuals represented by the number of crania and/or by the number of long bones visible. For example, at Wat Kiri Bopharahm, I counted approximately 400 crania, but the vast quantity of long bones may be representative of approximately 800 individuals. The minimum approximate number of individuals is around 20 at Wat Ang Serei Sour Sdei, Wat Roka Kaong, and Wat Snguon Pich, and the maximum approximate number is 2,000 individuals at Kraing Ta Chan.

When I was able to see potential perimortem trauma on the remains within the *stupa*, which again was difficult due to the stacking of the bones and how they were displayed, blunt force trauma (Figure 51) and sharp force trauma to the crania were noted; I documented blunt force trauma to all regions of the cranium. There were no apparent gunshot wounds, but this does not mean they were not present. The majority of the remains within the memorials were too taphonoically damaged to accurately assess perimortem traumatic injuries without removing them and examining each bone individually. Despite these challenges, the variety of skeletal elements, the various preservation conditions, and the presence of visible traumatic injuries were all valuable information gathered from across the country.

Interview Content

As discussed in the previous chapter, the translated informants' responses were categorized into the following themes: identification, religion, care of remains, nationalism/politics, knowledge/teaching, history of the remains, and memory. While most responses could be subjectively distributed among these themes, they were not mutually exclusive. For example, there were many responses in which identification and religion were invoked simultaneously. For example, when the informant at Kraing Ta Chan was asked "will the individuals within the memorial *stupa* ever be identified?" he stated that the Kraing Ta Chan caretakers do not know who the bones belong to and they do not know their names; all of the bones are now mixed together so relatives can come to celebrate and pray. Thus, not knowing the identity of the human remains does not impede religious commemoration of the dead. What follows are summaries of the informant's responses by theme.[12]

[12] Verbatim translations, with the exception of a few comments made by informants in English, were not possible as most statements were conveyed to me by the translators. Thus, the use of quotation marks to indicate verbatim

Identification

Regarding the personal identification of individual remains, all informants were unanimous: they do not know who the bones belong to, the remains cannot be identified, and the remains belong to individuals who came from disparate locations so it is not possible to determine who is who. More than half of the informants—those at Wat Kiri Bopharahm, Wat Phnom Baseth Trae Troung, Wat Ang Serei Sour Sdei, Wat Roka Kaong, and Kraing Ta Chan—indicated that surviving family members often know or assume that their relatives died at a particular location so they go to visit that specific memorial to "see" their relatives and pay their respects. For example, at Wat Phnom Baseth Trae Troung, the informant stated that the "Khmer Rouge killed many people but we do not know their identities. Even the families who think their family members died here cannot know for sure. There is no way to identify them, if a person says their family died in the vicinity, they come to pay their respects here."

From a forensic science perspective, comments made by the informants at Wat Kiri Bopharahm, Wat Roka Kaong, and Wat Samdech, were particularly interesting. They stated that in the past, surviving relatives took the remains of their family members from the site and/or the memorial. In the case of Wat Kiri Bopharahm, the informant said that families took small pieces of bone (as a representation of the entire body) from the memorial and placed them into one of two new *chedey* that had been built by community funds inside the temple complex, near the memorial. Scientifically, human remains cannot be individually identified based upon a visual assessment. However, individual scientific identification was clearly not what this practice represented. Possessing physical skeletal remains, whether or not the bones did in fact belong to

quotes are limited, but are used in cases of short statements to represent a comment espoused by an informant. Where quotations marks are not used, I have included the location of the interview and an indication that what follows is a comment by that informant.

their deceased love one, was important for the families so that customary funeral rituals could be performed. Symbolically, the ability to conduct funerary rituals and properly care for and respect the deceased was more important than the "true" identity, or even the body of, the deceased. This has also been noted by Guillou (2012) in her ethnographic research with Cambodian peasants. At Wat Kiri Bopharahm, transferring small bone and teeth fragments into a new *chedey* was symbolic for surviving family members. They did not take whole crania, and they did not know whether these fragments actually belonged to their loved one, but they chose to care for their loved ones by placing their remains in a new shrine. In general, the anonymity of the victims and the remains did not seem to influence how the deceased are remembered and did not affect the survivors' recovery from the Khmer Rouge period.

As mentioned above, there were numerous responses that included information relevant to the themes of identification and religion. In these cases, the informants noted that although the individual bones or bodies cannot be identified, surviving family members and others come to these memorials to pay their respects to the deceased. For example, at Wat Phnom Baseth Trae Troung, the informant stated that "if you bury or cremate, you don't know who it is or their names. If the bones are here, families can come and recognize their family members." One informant at Wat Roka Kaong noted that although families and others cannot recognize the bones, they perform the Buddhist practice of *bangsokol*[13] (បង្សុកូល) because they believe that

[13] The word *bangsokol* (បង្សុកូល) has two primary meanings in Khmer, according to Davis (2016). The first is the shroud that is placed on the coffin prior to a funeral which is later presented to a Buddhist monk as a monastic robe. The second, and more dominant meaning in Cambodia, is the chanting that is performed by monks during a funeral. Laypeople as well as Buddhists who follow more traditional practices, also suggest that performing *bangsokol* helps to manage and control the spirits of the dead. The *bangsokol* chant can be performed as an individual is dying, prior to moving the corpse from the home, during the funeral procession, prior to and during the cremation ceremony, and while the cremains are being placed in an urn or grave. *Bangsokol* "is a chant of death that promises new life. Most important, the [*bangsokol*] is a monastic ritual performance that controls potentially negative and impure aspects of the deceased during moments when the corpse itself experiences transition" (Davis

the souls can be reborn and move to another world. Similarly, the informant at Wat Ang Serei Sour Sdei said "we do not know the victims' identities. For people who know their family died in the area, they come to carry out the rites and say their names. For those whose names are not known, they call out general names so the spirits can come and gather."

At Wat Samdech, for example, one of the informants described a six-day ceremony that took place in the late 1980s in which the head monk cremated many of the bones that had been recovered in and around the temple. The informant stated that this ceremony was not for specific individuals, but for the surviving families in general. The families did not take bones, nor identify which bones belonged to their relatives, the bones were collectively cremated; however, some bones were retained, and these are what now reside in the memorial *stupa*. Informants at both Wat Samdech and Wat Roka Kaong said that surviving family members have taken earth/soil from the mass gravesites as a representation of the body or their loved one, rather than the bones. At Wat Samdech the informant noted that "families took earth from the mass grave at the wat and shaped it into a model of a person; then they took this earth with them." Creating an anthropomorphic shape as part of a religious ceremony is not an uncommon practice in Khmer Buddhism; in the *Pre Rup* ceremony of a traditional funeral, the ashes are shaped into the form of a human, and it may be a component of the *Hau Pralung* (Calling of the Souls) ceremony to harness the spirits (Davis 2016). Again, anonymity of the remains and the victims does not seem to preclude religious practices and the performance of modified funerary rites for the deceased.

2016). According to Davis (2016), both laypeople and ritual specialists identified the performance of *bangsokol* as the most important element of the funeral. During the funeral, the *bangsokol* is to be chanted by an even number of Buddhist monks, with four being the most common. This ritual tends to be most important when there are transformations or transfers of the human being or the corpse, particularly when the corpse is moved during the funeral or the post-cremation remains are collected and moved. Khmer believe that these moments of transition or transfer can result in spirits becoming free and they may return to cause trouble for the living (Davis 2016).

Religion

Within the theme of religion, there were three prominent sub-themes that were frequently discussed by the informants as follows: appropriateness of displaying the remains, honoring or respecting the dead, and Cambodians visiting memorials for holidays. All informants discussed the appropriateness of displaying the bones because they were asked "At this memorial, why are the remains visible to the public? How does the display of human remains fit within Cambodian or Buddhist beliefs?" These questions were asked in an attempt to ascertain whether the display of bones is "right" or "wrong" for the beliefs of Cambodian people and for Buddhism.

Before proceeding with the analysis of the informant's responses, a discussion about common death rituals in Cambodia is warranted. According to Davis (2016) and Guillou (2012), as well as some of my informants, there are four types of funerals or methods for disposal of a decedent in Buddhism: depositing the body in the forest, depositing the body in water, cremation, or burial. Modern Cambodians tend to favor cremation or burial, with the choice usually dependent upon ethnic affiliation. Cremation is preferred by most Khmer while burial is favored by Chinese or Sino-Khmer (Davis 2016). This ethnic division relates to the preferred conditions for the body after death. For those of Chinese descent, they prefer the body to remain in a cool environment rather than a hot one, hence burial within the cool ground as opposed to cremation in a hot fire (Dr. Anne Guillou and Mr. Thol, personal communications).

During my visits to various *wats* and memorials, the ethnic division for the treatment of the dead became particularly apparent. Ethnicity is present in the disposition of the physical body either via cremation or burial, as well as the structures or "grave marker" created by families to commemorate their ancestor: Khmer construct *chedey* (ចេតិ៍យ) while those of Chinese ethnicity bury the body and erect a tombstone and sometimes a large mound of soil or

cement over the grave. For Khmer, after the body is burned at a funeral ceremony, the ashes and bone fragments are collected into an urn which is placed within the *chedey* (see Figure 52, bottom image, as an example of these urns). In some cases only one individual is enshrined in a *chedey*, but some are the repositories for multiple individuals. What is particularly visually striking is that these displays of ethnicity through death are all located within a single Buddhist *wat*. Chinese tombstones and *chedey* are interspersed creating a visually intriguing presentation (Figure 65).

Figure 65. Panoramic photo of "grave" markers at Wat Thmei in Siem Reap. Within the grounds of a single Buddhist *wat* there are different displays of ethnicity after death. An ethnically Chinese grave is in the center (blue and red) with a mound of soil behind the tombstone. On either side are traditional Khmer *chedey*, which presumably contain the urn(s) of cremated individual(s).

Even more interesting was the combination of ethnic practices in one structure. The predominately Chinese practice of cleaning and decorating graves during the *Qingming* Festival (also called *Qingming Jie*) is common in Cambodia. During the *Qingming* (meaning clear and bright) period of the Chinese lunar calendar, this festival pays homage to ancestors. Chinese families visit ancestor's tombs, the tomb is swept or cleaned, offerings are left, and faux money

is burned. In some cases, a strip of red paper is placed atop the tomb as a form of commemoration (Thompson 2005; Yuan 2009). In Cambodia, it seems that the red strip of paper traditionally used in China has been replaced by multicolored strips of paper. This colored paper was seen at, or in, many of the Khmer Rouge memorials. In some cases, these strips of paper were adhered to (Khmer) *chedey* (Figure 66; see also the colored paper among the remains in Figures 59 and 61). Thus, ethnicity is not necessarily segregated in the commemoration of the dead, although the physical grave/memorial structures tend to follow ethnic patterns.

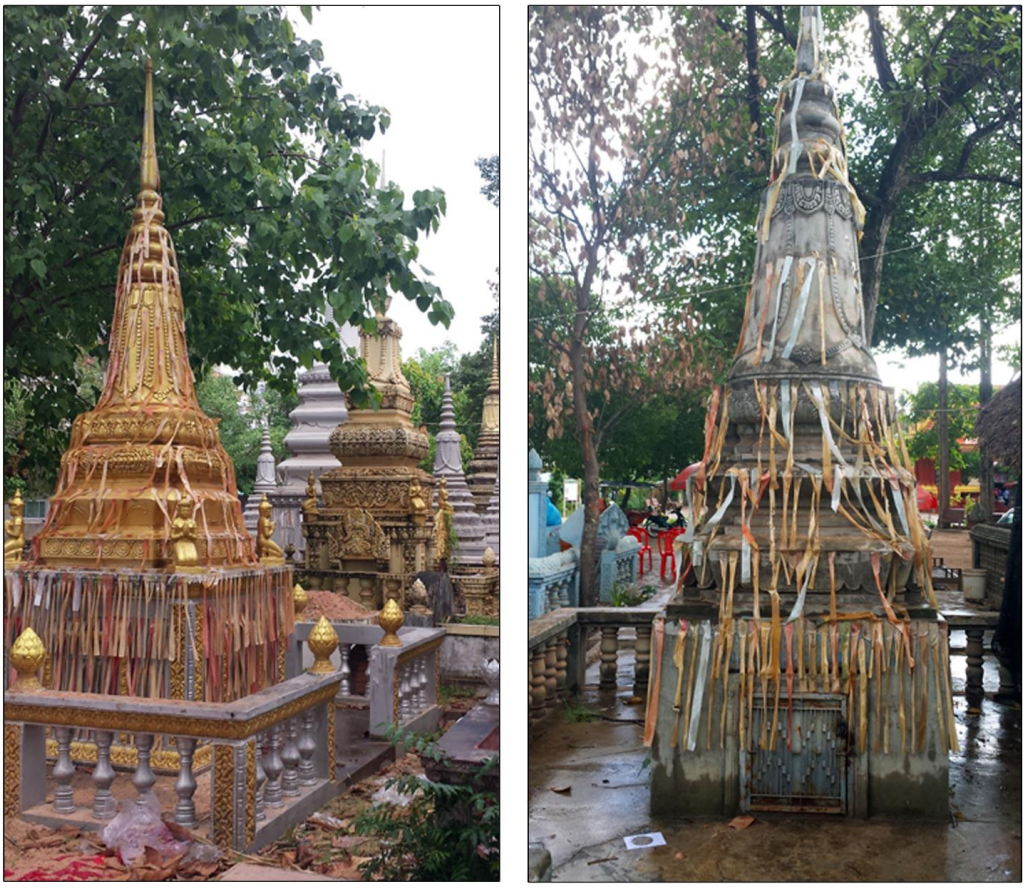

Figure 66. Khmer *chedey* at Wat Thmei in Siem Reap decorated with colored strips of paper used during the Chinese *Qingming* festival. Ethnicity and funerary traditions can be blended.

Returning to the disposition of the corpse in Buddhist tradition, I sought the knowledge of a Buddhist monk to provide clarification. I interviewed a monk at Wat Botumvatey (វត្តបុទុមវ៉ាតី) in Phnom Penh to discuss common Buddhist traditions and Cambodian cultural practices. When asked in English "What is the most common practice of body disposal of the dead," he responded that there are four options: cremation, burial, placing the body in the forest or in the water. He elaborated further about three of these practices. He said that cremation of the body makes merit for the spirit through the ceremony that is performed. Regarding burial, he noted that the body is placed in the ground, but in some cases it is later exhumed and a ceremony takes place and the remains may be cremated. As for placing the body in the forest, he said that the dead body is thought to have karma, so when the birds or animals eat the flesh, the karma goes back to nature.

He later provided additional information about the teachings of the Buddha in relation to the "elements" or "powers" contained within the human body. According to the Buddha, the body is composed of four elements: fire, water, air, and earth. Thus, the four methods for disposing of a corpse are represented—the body can be burned (fire), it can be placed in the water, in or on the ground (earth), and left for animals to carry away (presumably air; this element was less clear from his discussion). This same information was provided by one of the informants at Wat Bo Knong. He said that Buddhism (or the teachings of Buddha) does not require cremation, only commemoration of the dead. "In Buddhism, the body is made up of four elements (wind, water, fire, and earth). After death we are just earth, so it does not matter what happens to the physical body. Buddha taught that you have to decide what is right and what is wrong." Presumably the informant meant that a decision must be made regarding the disposition

of the deceased; cremation is one decision, but as long as the body/remains and the ancestor are respected and remembered, the disposition is a decision made by the living.

As for the interview questions, the 10 informants were unanimous in their responses: the display of human remains in the current manner is acceptable for Cambodian culture and Buddhism. For example, at Wat Samdech, one of the informants stated that "keeping the remains like this is not wrong in Buddhism. The bones are displayed as a model of what is bad, and of a bad time." One of the informants at Trapeang Sva said that "the bones were gathered so people can come to pay their respects. It is not acceptable to leave them lying in the fields. The display of the bones is not a contradiction with the religion." The informant at Kraing Ta Chan provided a more personal answer; he said that "as a Cambodian who believes in Buddhism, it is alright for the bones to be like this because relatives can come to respect and remember the dead." At Wat Samrong Knong, the informant noted that the display of bones is acceptable in Buddhism. It is the best representation for Buddhism: it is a reminder that when we are bones we are nothing, and when we die we are nothing—life is limited. People must be good to one another. The informant at Wat Kiri Bopharahm also stated that "to display the bones is not wrong in Buddhism or for Cambodian people."

However, some informants specified that the remains must be cared for. At Wat Bo Knong, for example, one of the informants stated that "this display of remains is correct for Buddhism. The bones are celebrated in religious ceremonies and homage is paid to the spirits. They can be displayed as long as they are taken care of and prayed for." Similarly, one of the informants at Wat Roka Kaong noted that it is "not wrong, but you have to build a museum to protect the bones and have someone look after the bones. If there is no one to look after them then that is wrong, if no one takes care of them then it is wrong. It is not wrong in Buddhism."

The next most common discussion regarding religion centered on honoring and respecting the deceased, generally by holding religious ceremonies. Ninety percent of informants noted that families and community members visit the memorials to pay respect to the dead and to honor their ancestors. At Wat Snguon Pich, one informant stated that the memorial was specifically built for the "respect of the deceased." One of the informants at Wat Roka Kaong explained this cultural practice succinctly: Cambodian relatives believe that if their relatives were killed here, they come to pay their respects here. They believe in giving good wishes to spirits of those who passed away, and that they will be reborn in a better life. Cambodians believe that when someone dies, you take the bones and the names with gratitude, they want their ancestors to help them and they want to pay gratitude to their ancestors. At Wat Ang Serei Sour Sdei, the informant described that families will come to hold ceremonies and *bangsokol* "to pay respect and give offerings. Some families were entirely wiped out during that period, so there is no one to come and *bangsokol* or conduct the ceremonies so the monks, one or two or three, will conduct a ceremony in lieu of these families." "When people come to visit this place," as one of the informants at Trapeang Sva stated, "they will often say the names of their loved ones, but it is a monument to everyone. During *bangsokol*, *pchum ben* (see below), and other ceremonies, visitors come to pay their respects to people in general, and children and grandchildren will often say prayers for their family members who were lost." Finally, the informant at Kraing Ta Chan stated that many children, parents, and people died here so now children and grandchildren can come here to see the bones. All of the bones of the people who were killed here are in the *stupa*, so relatives can come and celebrate and respect the dead. Survivors who know their relatives are here, after they celebrate ceremonies here, the survivors feel better and their anger is reduced. They feel that they have their relatives.

The final subtheme within religion was that Cambodians usually visit these memorials during local holidays. When asked "How many people visit the memorial each month and why do they come to visit?," 60% of informants noted that Cambodians generally visit twice each year for *pchum ben* and Khmer New Year. The informants at Kraing Ta Chan and Trapeang Sva both stated that thousands of Cambodians come to visit their respective memorials during these holidays.

Pchum ben (ភ្ជុំបិណ្ឌ), the Festival of Hungry Ghosts, is an annual 15-day festival in which the dead return to the living world to receive offerings presented by their descendants (Davis 2016). The words *pchum ben* mean "gathering of rice balls;" balls of rice are what the living provide to the ghosts of their ancestors (Guillou 2012). According to Davis (2016), this holiday is a "form of obligatory reciprocity with the dead, mediated by Buddhist monks." During this festival, urban residents return to their natal villages to provide gifts to their ancestral ghosts ("hungry ghosts"). Giving these gifts, through a Buddhist monk, transforms the dead from "pitiable states into powerful and beneficent ancestors," and in return, the living are provided with blessing for the upcoming year (Davis 2016). The gifts to the ghosts must follow specific rituals of transfer; the offerings must be made first to a Buddhist monk at appropriate times. Giving gifts directly to the dead or "merely mourning their loss—mere remembrance—will not help the dead" (Davis 2016). Second to the Khmer New Year, *pchum ben* is the "most significant and popular ritual in the Cambodian calendar…and the most important ritual within the Buddhist calendar" (Davis 2016). However, it is not a common festival in Theravada Buddhist countries, as Laos is the only other country with a similar ritual. As for Khmer New Year, the start of a new year in Buddhist cultures is often associated with the need for ritual

purity, and invoking the ancestors and making merit by presenting offerings for deceased relatives is a common practice (Erik Davis, personal communication).

In addition to these major holidays, informants at Wat Kiri Bopharahm, Wat Bo Knong, and Wat Samdech stated that Cambodians also come to visit these memorials during other holidays such as Chinese New Year, *Qingming* (as discussed above), and May 20th "when hundreds of monks come for the ceremony," said one of the informants at Wat Bo Knong.

The twentieth of May as a day to commemorate the victims of the Khmer Rouge was established in 1983 by the PRK government. May 20 was chosen since this was the date in 1976 when DK formally collectivized Cambodian life (Chandler 2008; Sion 2011). The day was named ទិវាចងកំហឹង, variously transliterated and translated as *t'veer chong kamheang* (Day for Tying Anger) (Jarvis 2015) or *tvea chong komhung* (Anniversaries for Holding on to Anger) (Chandler 2008). While in English the day is often referred to as "Day of Hatred" or "Day of Anger," Jarvis (2015) notes that the Khmer meaning is most accurately translated as "Day of Maintaining Rage." On this day each year, survivors and PRK government officials would recount the sufferings of the Khmer Rouge period and publically condemn the crimes of the Khmer Rouge. As Chandler (2008) and Sion (2011) discuss, this day was used as propaganda to reinforce the legitimacy of the PRK by reminding the public that Cambodians, with the assistance of Vietnam, had overrun the Khmer Rouge and all must be vigilant to prevent their return. Annually, Buddhist monks, community members, survivors, and school children visited sites of Khmer Rouge atrocity such as Choeung Ek, Tuol Sleng, or other "killing fields" throughout the country (Chandler 2008; Jarvis 2015).

This practice continues today. At Choeung Ek in particular, an official ceremony is organized each year by the Phnom Penh Municipality and the Governor of Phnom Penh

generally presides (Jarvis 2015). At this ceremony, as I witnessed in 2016, prayers by Buddhist monks, speeches, and songs are given as well as a dramatic reenactment of the Khmer Rouge period and the violence that was inflicted. At the conclusion of this reenactment, the actors depict the overthrow of the Khmer Rouge by the Cambodian army; flags are waved, songs are sung, and nationalism is on full display.

Following the signing of the Paris Peace Agreements in 1991, the Day of Anger was suspended. It was resumed in 1999, although the name was changed to a more demure "Day of Paying Tribute to the Spirits of the Deceased" (Jarvis 2015). In 2001 is was renamed the "Day of Remembrance," which is still in use today, although in 2003 and 2004 the name was briefly altered to "Day of Victory over the Genocidal Regime." In 2013, in response to a request by the Civil Parties at the ECCC, the government approved a National Day of Remembrance, a public holiday to be held every May 20 (Jarvis 2015).

When religion is concerned, the informants were generally in agreement: it is appropriate and acceptable to publicly display the human remains from the Khmer Rouge period, the remains are on display for families and communities to honor and respect the deceased, and that Cambodians most frequently visit the memorials during the Khmer New Year and *pchum ben* holidays when ancestors are traditionally and religiously cared for. One of the informants at Wat Snguon Pich eloquently summarized the religious theme of the memorials: Displaying the bones to the public is acceptable in Buddhism. Displaying the bones is meant to show respect to the many people that died in the Pol Pot regime. If someone lost their family members or friends in the region during the Pol Pot regime, they can come to this *stupa* and make a ceremony to respect the spirits. The Governor of the region wanted to make a place where people can come to visit, respect the remains, and be reminded.

Care of the Remains

When informants were asked about caring for the remains, their responses included caring for both the bones and the memorial structures. In all cases, there was no formal preservation of the remains in the form of chemical sealants to protect the bones from decaying. However, 80% of informants indicated that removing the scattered remains from the ground (where they were exposed to the elements and animal scavenging) and placing them in the memorials was a means of protecting and preserving them. One informant at Wat Snguon Pich, for example stated that nothing has been put on the bones. The only means of protection is that they are enclosed behind the glass of the *stupa*. Similarly at Wat Bo Knong, one informant noted that they have no special way to maintain or preserve the bones, but they have collected them and put them in the *stupa* to protect them. And at Trapeang Sva, one informant stated that the bones have not been preserved. Placing them in the memorial was a means of preserving them from being eaten by cows. The fact that bones were being eaten by cows was not an uncommon statement from informants, which I found surprising.

An interesting discussion occurred at Wat Ang Serei Sour Sdei about the protection and preservation of the remains. The informant, a monk, had built the *stupa* in 1995 "so that people can come and worship and so that the bones are not exposed. When the bones were scattered all over the fields it was an offense to the eyes. Those that were killed needed to be respected because it was not their fault. There were so many remains on the ground that it was preventing cultivation of the land" so the bones were collected into a pile although there was no preservation. However, many of the bones were later transferred to a larger and more formal memorial at Phnom Oudong, the former Cambodian capital and a religious site with numerous *stupa* of former kings. Initially the informant said that he did not want people to take any of the

bones, but they needed to be preserved. He let them take the bones that were in better condition and kept the ones that were in poor condition, the ones that were brittle and broken. He feels regret that they had to send the bones away, but he could not take care of them. In the future, the informant stated that there needs to be someone who takes care of the bones because families may come. If anyone ever finds any bones, he wants them to bring the bones here. In the future, they need someone who will focus on continual upkeep of the memorial.

What was surprising about this discussion was that most of the bones had been relocated to Phnom Oudong for better care. Apparently it is not necessary to retain the bones at or near the location where the individuals were killed. The informant was not pleased that the bones had been moved, but he did not seem to think it was an affront to history, truth, or facts. This was an interesting revelation that I had not heard from other informants. However, Jarvis (2015) and Guillou (2012) mention that bones were relocated from memorials to *wats* after Buddhism was reinstated, and how bones were "borrowed" from some memorials to create large displays for the May 20 celebration under the PRK government.

In contrast, the informant at Kraing Ta Chan described the interplay between caring for the remains and politics. He said that "when tourists come to visit, they ask him how the bones can be preserved for the future, but he does not know how to prevent them from decaying." All decisions regarding this memorial and the remains "depend on the government because this has become national property. He said he was nominated by the authorities as the responsible person to preserve and protect the skeletons here. "Any decisions will depend on the government and authorities as well as the community." If the remains are to be moved to another location, "that will depend on the government." Personally, he wants to keep the bones here at this location. He wants to keep them here, because there are people from the whole country who have relatives

who were killed here; these relatives come here to celebrate ceremonies and follow the Buddhist way. If they move the bones, not everyone will agree. It is important for the families, children, and parents who had people die here. Therefore, in contrast to what occurred at Wat Ang Serei Sour Sdei, the informant at Kraing Ta Chan feels that the bones need to remain where they were found and should not be moved.

A very different perspective regarding caring for the remains was provided by the informant at Wat Phnom Baseth Trae Troung. Here, the memorial is covered by a roof, but the bones are contained in a recessed cement structure exposed to the air, rain, and sun (Figure 60). The informant noted that the donor who built this memorial did so out of "respect for his parents who died. This individual was not thinking about preservation of the bones—it was about worship. If he had wanted to build the glass around the memorial he could have." The informant stated that at larger memorials, they have large glass to protect it. There has been no care of the bones [here] because if you display it like this there is nothing to protect it. He continued by noting that before they built this *stupa*, it was just a pile of bones. The bones had softened and deteriorated from the rain. The skulls that used to be here were big, but now they have deteriorated and are lost. For people with families here, whose families may have been killed here, they do not worry so much about the deterioration. (Foreign) visitors who come are more worried about the deterioration. Sooner or later all of the bones will be gone, so when people come, it will not have the quality of having the bones here. People of future generations will not know what happened anymore because they do not see it. There will only be a sign and the chains [iron leg shackles] left because that does not fade away.

Thus, caring for the human remains and the memorials varies by location and by the desires of the caretakers, the government, and the community. The one similarity across all

memorials was that the remains had not been formally preserved to prevent them from decaying.[14] The style of the memorial—whether the remains were behind glass or exposed to the elements—varied, as did the removal of remains from their original geographic location to be placed in a more well-tended memorial. And in the case of Wat Phnom Baseth Trae Troung, it was considered acceptable for the bones to decay completely. This notion of accepting deterioration of the physical body echoes what the informant at Wat Bo Kong and the Buddhist monk described about the teachings of Buddha, as well as what Guillou (2012; 2015) has discussed with her informants.

Nationalism/Politics

Throughout the interviews, informants frequently provided statements that touched on political or nationalistic themes. In some interviews, these statements were overt and the government was mentioned directly (as was stated above at Kraing Ta Chan); in others, the informants did not discuss the government or its policies, but provided remarks that had political undertones. Three sub-themes could be discerned, although many responses addressed more than one: retention of the remains to visually document what transpired and to prevent this period from being forgotten, the remains as "evidence," and governmental involvement with the remains.

The first sub-theme of displaying the remains so individuals are aware of what happened and so that people do not forget overlaps slightly with the knowledge/teaching theme. And while not inherently political, these statements can be interpreted as perpetuating the governmental

[14] The one exception is Kraing Ta Chan. After this interview, all of the remains were removed from the memorial, cleaned, scientifically analyzed, and chemically preserved by Mr. Voeun Vuthy and his team of Cambodian researchers from Choeung Ek. I helped fund this conservation and analysis project and was therefore involved in the process.

discourse, developed by the PRK, of preserving the remains to "prove" and demonize the violence of the Khmer Rouge regime (Chandler 2008). At Wat Kiri Bopharahm, for example, the informant noted that it was best to keep the bones rather than to cremate them "to show the people and tell the story of the past." Similarly, one of the informants at Wat Snguon Pich stated that "they do not want to cremate or bury the bones because they want to keep them in the *stupa* to show and remind people about the past and that people died." At two additional sites, Wat Samdech and Wat Bo Knong, this visual presentation of the remains as a reminder of the past was directed specifically at the next generation of Cambodians. One informant at Wat Samdech, for example, stated that he thinks the bones should be kept, not cremated, because he wants the next generation and relatives to see and know what happened. He wants people to come every year to make a ceremony for their ancestors. Another informant at the same site noted that visitors feel sad, but also happy that there are some bones left to represent history and they [presumably he and the other monks] are proud it is used for this purpose. At Wat Bo Knong, one informant said that they want to keep the bones safe so future generations can see them and so people do not forget. Thus, these informants seem to suggest that the remains are being retained and displayed as visual representations of history and as reminders to prevent this type of violence from occurring again in the future.

Whether or not the informants were consciously aware of the nature of their statements, invoking the next generation is inherently political since this language was used in a Government Circular addressing the preservation of the human remains from the Khmer Rouge period (Royal Government of Cambodia 2001). This circular states "In order to preserve the remains as *evidence* of these historic crimes and as the basis for remembrance and education by the Cambodian people as a whole, *especially future generations*, of the painful and terrible history

brought about by the Democratic Kampuchea regime…" (emphases added) (Royal Government of Cambodia 2001). This rhetoric of preservation and display has become part of the Cambodian national discourse and continues to be perpetuated by individuals and non-governmental entities.

This national rhetoric is overtly present when informants discussed the human remains as "evidence." As the quotation from the Circular above states, the human remains are direct evidence of the violent crimes committed by the Khmer Rouge regime. The first sentence of the same Circular states "Following the liberation of 7 January 1979, numerous graves were left behind throughout the entire territory of Cambodia as *physical testimony* of the crimes committed against the innocent Cambodian people by the genocidal Pol Pot regime" (emphasis added). However, this discourse of the remains as evidence is not a recent development within Cambodian politics.

As Hinton (2013a) and Ledgerwood (1997) argue, the People's Republic of Kampuchea codified and perpetuated Khmer Rouge violence to establish their legitimacy, and ultimately this representation of the Khmer Rouge period became the official state narrative of the past. The national narrative defined the Khmer Rouge regime as synonymous with death, brutality, and destruction, and that all measures should be taken to prevent the return of Pol Pot and his "genocidal clique." At the time, Choeung Ek and Tuol Sleng, as well as other memorials around the country containing human remains, were used as evidence or proof of the violence and death committed by the Khmer Rouge (Hinton 2013). For example, as Vietnamese General Mai Lam, the designer of the Tuol Sleng Genocide Museum said, it is important for Cambodians to preserve the bones from the Khmer Rouge period because "it's the proof" (Ledgerwood 1997). The 2001 Circular quoted above simply perpetuated this national discourse since documenting and displaying Khmer Rouge violence was already a well-established practice. This state-level

narrative of Khmer Rouge brutality is an ingrained component of Cambodian history that persists as a culturally relevant ideology today.

It was therefore not surprising that informants at various memorials discussed the human remains in terms of "evidence" or "proof" of the Khmer Rouge's violence. At three memorials (Wat Samdech, Trapeang Sva, and Kraing Ta Chan), the informants used the word ភស្តុតាង (*phoahtang*) meaning "evidence" or "proof" when discussing the remains. One of the informants at Wat Samdech said that "they are keeping the bones as evidence to show people." During his discussion about why the bones should be maintained—primarily for religious purposes, so families can perform ceremonies for their ancestors, but also "so foreigners know what happened during the Khmer Rouge"—one of the other informants at the same site stated that "if the bones are cremated, evidence will be burned, and then people will not know that individuals died here. [I] want to keep them as evidence." At Wat Bo Knong, when one informant was describing why he wants to preserve the remains, he stated in English that the bones are "evidence of history." A subsequent English statement by the same informant blended numerous themes together:

> It is *not important to identify* who is here, of the dead people, we just kept it, to, as *evidence* for a *new generation* to understand…just as *evidence* to know, that…how cruel that they do to, that they did to their own people, to let the *new generation* understand about the government, of that leader, especially to understand, just know that, in that period they killed many, many people. This is some part, a small part, of the *evidence* that we collect around this area, in the rice field, in, on the street, in the building, in the different sections of the pagoda, we just collect it all (emphases added).

In these statements, the informant touched on the themes of identification, knowledge or teaching, care of the remains, and politics. Particularly addressing the political nature of these comments, his repeated references to evidence and the new generations of Cambodians suggests how imbedded this long-standing governmental discourse has become.

At Kraing Ta Chan, the informant described the bones as evidence when discussing the common religious practice of cremation in Cambodian Buddhism. As discussed above, it is important to know the identity of the body or remains that are being cremated so the appropriate family can mourn for the dead and conduct ceremonies for this ancestor. This informant was therefore indicating that it would be a challenge to cremate the remains within the *stupa*: all of the bones are people who were killed by Khmer Rouge. If we burn the bones and put the bones in a pagoda or *stupa*, no one knows which bones belong to which family. This statement was followed by a manifestation of political rhetoric: if we burn the bones, we destroy the *evidence* so the *young generations* will not know what happened during the Khmer Rouge and will not know that the Khmer Rouge killed people and families. He said he "wants to keep the bones like this and does not want to burn them. If we burn, we destroy *evidence*" (emphases added). When the informant was asked "What do you want visitors to learn from these remains?," he responded that he wants visitors to know that the Khmer Rouge killed Khmer people here. The bones are important for Khmer and foreigners—it is proof [the translator used the word "proof" in English, when the informant used ភ័ស្តុតាង] to show how Pol Pot killed people and the reason why they have this kind of area. It is to stop the coming back of the regime. When we have the bones, we can describe the history of the Pol Pot regime and link it to the remains here.

The informant at Wat Ang Serei Sour Sdei said that sites with human remains are common, and he believes the bones are "*evidence* that Cambodians committed genocide to their own population" (emphasis added). However, after listening to the recorded interview numerous times I could not detect the word ភ័ស្តុតាង, although "evidence" was the word provided by the translator. Finally, the informant stated that it is important to preserve the bones for the future so

people can come and *bangsokol* and read out the names. So the children and grandchildren and the future can come here as a place of worship and a place to pay respect and conduct ceremonies. He therefore combined the political notion of preserving the remains for future generations with the need for religious ceremonies for the dead.

Knowledge/Teaching

Two sub-themes arose when evaluating informants' statements that referenced the sharing of knowledge or teaching. First, tourists and foreigners who visit the memorials generally come to learn about the history of the Khmer Rouge and to see the remains. Second, the remains are displayed as a form of visual history and are used as a reminder to not forget the tragedy that happened in Cambodia.

Eighty percent of informants noted that visitors often come to these sites to learn, particularly about the Khmer Rouge period. At Trapeang Sva, for example, one of the informants stated that visitors come to learn about the Khmer Rouge. [Visitors] want to know about the meaning of genocide. [Visitors] come to sites of genocide to experience it. When the foreigners come, they ask around for information; they usually have a translator or guide with them. Sometimes they ask the locals to show them the locations of the mass graves.

This visitation of sites of death, particularly by foreigners, has become popular in recent decades and has been given various names by scholars: dark tourism, death tourism, thanatourism, trauma tourism, or grief tourism (Sion 2015b). This variety of tourism, which I will refer to as dark tourism, is focused on death or tragedy and can include numerous categories, as outlined by Seaton (1996): traveling to witness death or be present at the location of a tragedy; visiting mass or individual murder sites; travel to interment sites or memorials for the dead;

visiting symbolic or actual representations of death in locations not associated with death, such as visiting Vladimir Lenin's body; and watching reenactments of death such as battle reenactments (Sion 2015). Examples of sites encompassing some of these categories include Holocaust memorials, war memorials, torture museums, former death camps or sites of mass graves, battlefields, Ground Zero in New York, or the ruined neighborhoods in New Orleans after Hurricane Katrina (Sion 2015b; Stone 2006).

While this type of macabre voyeurism is not new, as cultures have visited graveyards, watched public executions and visited memorials for the dead since the Middle Ages, it can be argued that the motivations of visitors have changed as travel and tourism have become more international. In many cases tourism to such dark locales—particularly those in non-Western countries—is often undertaken by Westerners as a form of "witnessing," or to fulfill occidental society's fascination with death, as Stone (2006) and Williams (2004b) argue. Elaborating further on memorial museums, not necessarily sites of death, Williams (2007) argues that in general, visitors are commonly motivated by the opportunity to learn about an event and to understand historical information. However, there are tourists who visit such locations less for education or remembrance than to fulfill a morbid curiosity associated with the suffering of others. In his article specifically addressing Cambodia, Williams (2004) posits that two of Cambodia's top tourist destinations, the Tuol Sleng Museum and the Choeung Ek Genocidal Center, are dark tourism sites. He notes that for visitors, particularly foreigners, the sites are locations to bear witness to history, experience death, and to say "I was there." Unlike many of the Holocaust memorials where survivors and their relatives visit collectively to pay respects to the deceased or to understand their family's history, it is less probable that international visitors to Tuol Sleng and Choeung Ek have a personal connection to the site or this period in history

(Williams 2004). Thus, while the development of dark tourism does not correspond with the mass violence of the 20th century, it can certainly be argued that sites of genocide or mass graves are locations where tourists come to learn as well as to experience death and tragedy. The mass graves and memorial sites in Cambodia are no exception.

Returning to the interviews, when asked "What do you want visitors (foreign and Cambodian) to learn from these remains?," one informant at Wat Roka Kaong succinctly stated that "for Cambodians it is about belief and for foreigners it is about learning." At Wat Samdech, one informant noted that he wants to retain the bones at the site for foreigners who come to do research or to learn about the past and what happened. He wants visitors to see the bones and to know the history. He also stated that a few foreigners come every few months, mostly to look and to take pictures. This act of viewing and photographing a site of mass death and remains of the dead without embracing the educational aspect can certainly be considered dark tourism.

Another informant at the same location said that when foreigners come they ask him questions and he tells them information about the *stupa* and about the time when people died here. Some foreigners come to do research. Similarly at Wat Sngoun Pich, one informant stated that for foreign visitors, the memorial is to show that people died in Cambodia during the Pol Pot regime, which was a very bad regime; to show that Cambodians killed Cambodians. So people do not forget what happened here. However, the informant does not converse directly with foreigners because he only speaks Khmer. The informant continued by saying that the people that live in the area and come to visit already know what happened—they know the story. But they tell other visitors about the Pol Pot regime: everyone worked hard, there was not enough food, no medical treatment, and everyone was always accused of betraying *Angkar*. Finally, at Wat Kiri Boparahm, the informant noted that it is good to have the bones here to show what

happened in the past, how bad and cruel it was. To show history. Tourists come often with a tour guide to tell them about history. Tourists are happy to know about what happened in Cambodia. Sometimes tourists come in groups, and sometimes researchers come. People come to learn about the Pol Pot regime and to see the skeletons. Thus, visitors (who are generally foreign) come to these sites to learn about the Khmer Rouge period. However, the undertone of dark tourism and gawking at human remains resulting from mass murder also seems apparent.

Shifting again to a more political narrative, at Wat Samrong Knong and at Kraing Ta Chan, the informants' responses were tinged with governmental rhetoric and political challenges. The informant at Wat Samrong Knong stated that the bones are displayed to show the suffering and the memory of the people who died here. He said it is for the new generation so they know what happened in the past and that they can avoid this type of event in the future. He wants to make this a historical and memorial site, because if the bones are not here, people will not know about it. Again, this concept of preserving and displaying the human remains so the next generation will not forget what happened is part of the discourse used by the former (and current) government. He said that most of the visitors are foreign—10 to 15 foreign tourists each day during high tourist season—noting that foreigners like to learn about what happened and to understand. Conversely, he said that for Khmer people, the government or the authorities do not encourage them to learn about the past and about this history so they do not know. The Ministry of Education does not care much about the history. However, some young and old Khmer people (around 50) come, maybe four times each year, to participate in a Youth for Peace program to learn. When Khmer people come and they know what this place is, they are sad; but if they do not know what this place is, they do not want to come to learn about the past or to remember because it is too painful. It is just bones and they are not interested. While the

teaching of the history of the Khmer Rouge period is slowly being introduced into school curriculum—textbooks addressing this era were developed by the Documentation Center of Cambodia in 2007 and high school teacher trainings began in 2009 (Documentation Center of Cambodia, Genocide Education n.d.)—it is not widespread. Thus, unless family members/survivors share their stories, children born after the Khmer Rouge regime have little knowledge about this period in their country's history and how it has shaped the nation they know today.

As a representative of Youth for Peace (YFP), the informant Wat Samrong Knong discussed the goals of the organization at this particular location. "First they want people to know this was a Killing Field where people died and were treated badly. Second, they tell people what happened at that time, to prevent it from happening again—to avoid this bad thing happening again in the future." Within the boundaries of the *wat*, separate from the memorial, there is a "Torture Museum" which was the original building the Khmer Rouge purportedly used to torture prisoners. In this museum there are paintings on the walls depicting the types of torture inflicted and the daily routines under the Khmer Rouge including communal dining, labor, etc.

Youth for Peace also has a presence at Kraing Ta Chan, again with the intention of teaching people about the history of the Khmer Rouge. During my interview, the informant at Kraing Ta Chan noted that most people who visit are Cambodian. Foreigners do not know this place, the road is difficult, and it is far from Phnom Penh. Mostly Cambodians come here to visit and to celebrate. He also stated that as part of the YFP programming, Cambodian youth are brought to this location to learn about the Khmer Rouge regime, how they killed people, and about this area. When asked "What do you want visitors (foreign and Cambodian) to learn from

these remains?," he said: that the Khmer Rouge killed Khmer people here. The bones are important for Khmer and foreigners—it is proof to show how Pol Pot killed people and the reason why they have this kind of area. Once again, the discourse of the bones as "evidence" or "proof" of mass violence and mass death is drawn directly from governmental propaganda from the PRK period.

History of the Remains

To gather further information about each memorial site and its history, all informants were asked the following questions: "Where did the bones come from?" and "How many people's remains are in the *stupa*?" In response to the first question, all informants said that the remains originated from either the location where the memorial sits today, or from the region nearby. In many cases, the remains were exhumed from mass graves within the *wat* grounds or graves just beyond the *wat*. In other cases, informants stated that the remains were collected from nearby mountains, roads, or caves and were placed at their memorial for safekeeping.

Some informants provided additional details about the remains at their site. At Wat Roka Kaong, for example, one of the informants said that the remains had come from graves surrounding the *vihear* (វិហារ), the main sanctuary in a Buddhist temple complex, and an island in the Mekong River that can be seen from the temple. He said that the "bones were buried a little bit, but not properly." The informants at Trapeang Sva provided rather extensive information. They said that the remains at this *stupa* had come from mass graves located near a former prison approximately 400 meters to the east. In total, they said there were 30 mass graves, but only three were excavated. While the graves have since been covered over for agricultural or development purposes, the informants gave precise details about the original

graves: they were usually 4 x 4 meters and were two to three meters deep. Some of the small graves contained 50 people and the large graves may have had about 100 people. Sometimes there were graves with only a few people inside; these graves were often along the road. If the prisoners were too weak to continue walking, the Khmer Rouge would kill them along the way and bury them along the road. The informants continued by explaining that after the collapse of the regime, some of the upper-level (perhaps administrative) Khmer Rouge cadre who had committed the executions "were forced to excavate some of the graves in 1979. There was still skin and hair, but they only wanted the bones. When these former Khmer Rouge were brought in to do the excavations, they had to be protected from the villagers who were threatening to kill them with knives. After the excavations, these Khmer Rouge officials ran away." However, the number of individuals exhumed from these graves was a source of debate between the two informants. One said that the remains of 20,000 individuals were exhumed while the other said perhaps only a few thousand because only a small number of graves had been excavated.

At Wat Samdech, the origin of the human remains was less clear. One of the monks said that "the bones came from all over, not just the mass grave here" at the *wat* while the layman noted that "the bones came from the three graves at this *wat*." While the precise location of the remains was unclear, the older layman provided further information about the graves that had been found within the temple. He said he did not excavate the graves, because he arrived after people who were looting the graves for gold had exhumed parts of the grave. He said these looters did not re-cover the graves with soil, so he was able to see inside. He said the people buried within the graves were laid with their legs overlapping (heads facing opposite directions with their legs/feet crossing). After some follow-up questions, he said the bodies were neat and orderly within the graves, not haphazardly throw in. He does not know how many people were

in each grave, but he said there were at least four (but likely more) layers of bodies. He said the Khmer Rouge would put a layer of bodies in the grave and then cover them with salt to reduce the smell (one of the monks described this salt covering as well) and then they would place another layer of bodies. He said the bodies had their wrists and ankles bound, but he was unsure about whether or not the individuals had blindfolds. He said that there were three graves at this *wat* and that mothers and children would be buried together while boys were in a separate grave. He said this *wat* was used as a prison, not a torture center, and that at night, they would take victims from the *wat* to kill them. Although only a few informants provided such detailed information about the graves, the exhumations, or the practices of the Khmer Rouge, these data were particularly interesting and enlightening. There are many possible reasons why the other informants did not share this type of information; they may not have known the precise history of the site (*e.g.*, some informants had only come to reside at/take care of the site recently and had not been present in the region when the graves were found and the remains exhumed) or not feeling inclined to divulge this information without being specifically asked.

Regarding the number of individuals within the *stupa*, all informants, with the exception of Kraing Ta Chan, were unsure how many individuals were represented by the bones. Sixty percent of the informants simply stated that they did not know how many people were inside. At Wat Samrong Knong, for example, the informant noted that he did not know how many bones or individuals were in the *stupa* because "no one had ever counted them." The other 40% of the informants provided approximations. At Trapeang Sva, one of the informants stated that "there were 10,000 people inside," but the other said "that was impossible and maybe there were 3,000." The informant at Wat Ang Serei Sour Sdei said that before the majority of the remains were transferred to Phnom Oudong, perhaps there were 200 to 300. Interestingly, no one

counted how many crania were transferred; the informant simply said "the heads that were whole were sent away but there is no exact number." Today there are very few remains, "they only have bone fragments." At Wat Snguon Pich, one of the informants estimated that there were more than 100 individuals. However, in my visual assessment of the remains within this memorial, I determined there were approximately 15 to 30 individuals represented. Finally there was Kraing Ta Chan. The informant stated that he thought there were "maybe around 1,770 skulls" in the memorial. This number was based on an assessment the District's Culture and Fine Arts Department conducted in 2013; the informant assisted with this assessment and noted that the Department had counted 1,770[15] crania.

It was striking that there was not a formal count of any of the remains at any of the memorials visited. From a Western, scientific perspective—in which accurately documenting the precise number of deceased individuals is of paramount concern after mass violence—it seemed highly unusual that the remains had not been counted. This desire to tally and record the dead in Cambodia was seemingly not as profound. There are likely numerous explanations for why the remains have not been counted, one of which is that until recently, there were no skeletal specialists in Cambodia who could adequately categorize and assess the remains. However, a complete human cranium is recognizable as one individual and crania have been used to count the number of victims at other mass gravesites such as Choeung Ek. As the comment by the informant at Wat Ang Serei Sour Sdei above demonstrates, whole heads were recognized and transferred to another location, although they were not counted. Other possible

[15] As discussed in the previous footnote, all of the remains were removed from this memorial as part of a conservation project. The crania were counted and numbered before being cleaned, analyzed, and preserved. This recent and systematic documentation of the remains resulted in a final count of 1,904 complete crania and 105 cranial fragments within this memorial. The District's Culture and Fine Arts Department, as well as the informant, were remarkably close with their count of 1,770 crania.

explanations are that the remains (particularly the crania) have been counted, but the informants who were interviewed did not know this information or were unaware of its existence. At Wat Kiri Bopharam, for example, the informant stated that he could not tell how many individuals were represented by the remains, however, a statement painted on the wall of the memorial informs visitors that "The remains of 8,500 skulls were collected here by the monks at Wat Kiri Bopharam and placed in this building in 1980 constructed by holy teacher ប៉ិន ប៊ុន head of the Bateay District" (អដ្ឋិធាតុទាំងអស់នេះមានចំនួន៨៥០០លលាដ៍ បានរើសរៀបចំទុកដាក់ ដោយព្រះសង្ឆក្នុងវត្តគិរីបុប្ផារាម កាលពីឆ្នាំ១៩៨០ ដឹកនាំ កសាងរៀបចំទុកដាដក់ដោយ ព្រះគ្រូបញ្ញាបទីពោ ប៉ិន ប៊ុន អនុគណ ស្រុកបាធាយ). Finally, in some cases, it may not have been considered important or necessary to count the number of individuals exhumed from mass graves or other locations; there were numerous deceased individuals and that was simply enough information.

<u>Memory</u>

The final theme of memory was less specific than those already discussed and encompasses many of the same themes. Remembering the dead was usually associated with religious practices and caring for the remains. Many of the informants mentioned the emotions of the visitors; for those who survived the Khmer Rouge regime the remains bring back memories, and for those who did not experience the regime, there is an emotional weight upon seeing the remains of this tragedy. Thus, this theme is not necessarily distinct from the others, but there were a few prominent statements that specifically addressed memory, remembrance, or emotion.

Religion and memory were intertwined at Wat Snguon Pich and Wat Samdech. One of the informants at Wat Snguon Pich stated that the reason the bones are retained at this site is for "remembrance ceremonies (បុណ្យ, *bun*); visitors, both foreign and Khmer, come to remember." For Khmers, the bones are there to "remind them about the people who died in the Pol Pot regime, and to respect the dead." At Wat Samdech, one informant indicated that the bones will likely remain at this location so the relatives who live far away can come here to hold a ceremony. If people know their mother or father was killed here, they cannot recognize the individual bones, but they can come anyway.

At Wat Ang Serei Sour Sdei, I asked the informant a follow-up question about visitor's reactions to the remains. I asked "Does coming here to *bangsokol* help people to feel better?" He responded by saying that when people come here their responses are usually emotional. For those who do not have anyone it still makes them sad. For those who can recall the names of their family members who died here, they come and light incense and cry and think that this should not have happened. One of the informants at Wat Bo Knong shared a similar perspective. He said that Khmer visitors feel sorrow because they all experienced losing their family and relatives. At Kraing Ta Chan, the informant said visitors feel upset. They ask "'Why do Khmer kill Khmer?' They feel pity and sorrow about this kind of bad thing. Some of them feel anger towards the regime. 'Why is the regime so cruel to kill all of these people?' Some people cry." The informants at Wat Samrong Knong and Wat Snguon Pich also discussed emotions. "All visitors feel bad, feel sorry to see the bones of people who died. They are angry with the regime," said one informant at Wat Snguon Pich. The informant at Wat Samrong Knong stated that showing the bones affects people and makes them feel, and it is impactful. It is to show

what happened. If people know their relatives are here they feel suffering and sorrow about what happened to them.

Remembering the dead, physically and religiously caring for their remains and the spirits, and experiencing emotions were common themes shared by the informants across these memorial sites. While the informant's responses have been subjectively distributed into thematic categories, they are not mutually exclusive. Religion plays a large role in daily Khmer life, particularly surrounding the death of a family member, and was therefore a prominent theme throughout these interviews. The questions that the informants were asked certainly influenced the responses provided, and many of the questions were focused on religious practices, memory/memorialization, care of the remains, and learning or understanding the history of the Khmer Rouge period. Regardless of the themes that were distilled, it was clear that all of the informants were willing to discuss the human remains at their memorial site and to help an outside observer understand why the remains are present, what purpose they serve, and how they are incorporated into modern Cambodian culture.

CHAPTER 8: DISCUSSION

Osteological Data

Demographic Patterns

The demographic distributions of the 508 Choeung Ek crania were both expected and unexpected. When evaluated by sex, the majority of the crania, nearly 83%, were estimated to be those of males. Given the archival records from S-21, discussed in more detail below, this overrepresentation of males was not unexpected. The ancestral origins of the individuals at Choeung Ek were more expected than the sex distributions. All crania for which ancestry could be estimated were of Asian origin. While it is known that some foreigners were detained, tortured, and executed by the Khmer Rouge at S-21, the likelihood was small that their remains would be among this sample given the vast number of individuals executed at Choeung Ek. However, the ancestral category of Asian is of limited value in this context since this violent atrocity occurred in a Southeast Asian country. It would be particularly beneficial if the ancestral analysis could tease apart those of Cambodian, Vietnamese, or Chinese descent to provide a more nuanced understanding of which national or ethnic groups were targeted and killed at Choeung Ek. Unfortunately, this level of analysis is not feasible given the challenges associated with ancestry estimation from human remains and the limited reference samples available for Southeast Asia, particularly Cambodia.

The age-at-death distribution for the 508 crania was slightly less skewed than the sex distribution, although there were few subadults and older adults. More than half of the individuals (68%) were estimated to be young adults between the ages of 20 and 35 years old, which was expected, as discussed below. The distributions between male and female crania

regarding the probability of mortality and survivorship were significantly different, and the log-likelihood test revealed that females at Choeung Ek had a higher probability of mortality and a lower probability of survivorship than males. Again, these results are likely biased given the paucity of female crania and the fairly conservative nature of the *mle* method.

Traumatic Injury Patterns

The crania at Choeung Ek had evidence of antemortem, perimortem, and postmortem trauma. There were 19 individuals with antemortem trauma and more than half of the sample (61%) had evidence of perimortem trauma. All crania had some evidence of postmortem or taphonomic damage. The remainder of this discussion will therefore focus on the perimortem trauma.

The majority of perimortem injuries, whether the impacts were discernable or not, were the result of blunt force trauma. Sharp force trauma and gunshot wound injuries were also documented, as was trauma of an indeterminate mechanism. Sharp force trauma was present as both non-penetrating (incised) wounds as well as penetrating wounds (Figures 67 and 68). This

Figure 67. Non-penetrating (incised) sharp force trauma at Choeung Ek.

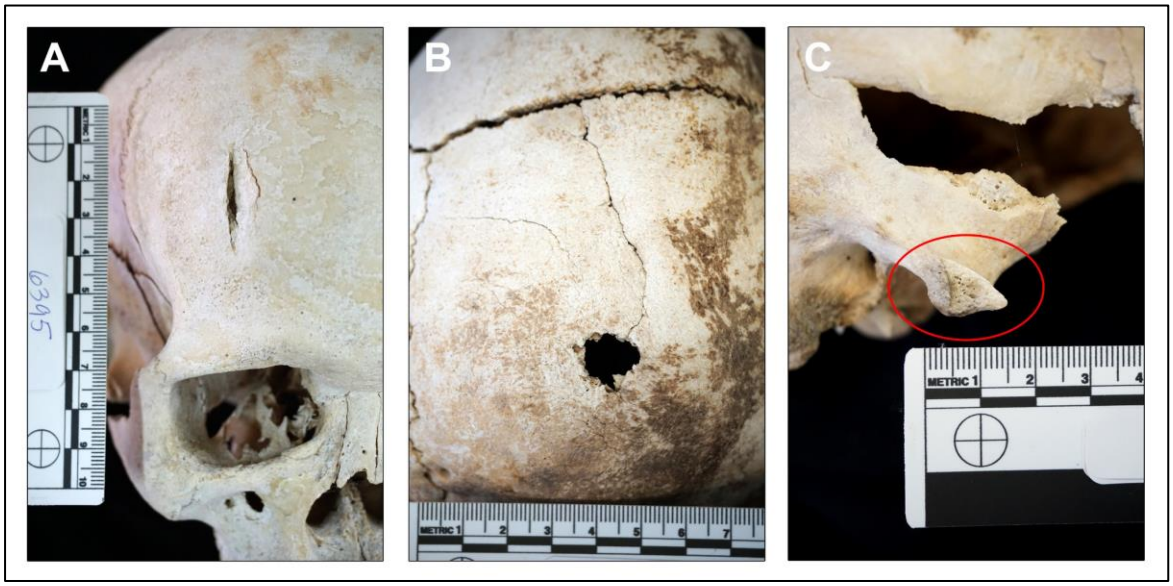

Figure 68. Penetrating sharp force trauma at Choeung Ek: A) penetrating incised wound with plastic deformation on the medial edge; B) sharp force with irregular edges and radiating fracture; C) sharp force removal of anterior aspect of right temporal arch.

information answers one aspect of research question number two: blunt force trauma was the primary mechanism of violence employed at Choeung Ek to execute victims. For crania with discernable impacts, nearly all had one, or a minimum of one, impact site(s). Some crania did have more than one impact site which resulted in the total number of 198 discernable impacts on 179 crania.

Continuing with research question number two, the results demonstrate that there were no statistically significant associations or correlations between the mechanism of trauma, the number of impacts, the cranial region fractured, the fracture type, and an individual's age-at-death or sex (Table 9). This indicates that males and females of all ages were subjected to the same violence and manner of execution at Choeung Ek. Thus, the Khmer Rouge did not vary their method of execution or their treatment of individuals based on age or sex. With that said, there are historical accounts and eyewitness testimony that infants were executed by being struck

against a tree (Extraordinary Chambers in the Courts of Cambodia 2010a) (Figure 84 below). This method of execution would certainly result in blunt force trauma, but it may not have presented in the same pattern documented in this research. I was unable to analyze any infants at Choeung Ek—I am not sure if their remains were exhumed, or whether they survived interment since infants are not present in the *stupa* as far as I was able to ascertain—so I cannot confirm (osteologically) whether the Khmer Rouge treated infants differently than children and adults.

When the mCA results for age, sex, and trauma mechanism are considered, the first dimension separates young adult males from the females of older ages while the second dimension separates blunt force trauma from all other mechanisms. Although the relative distances between the variables are not statistically significant, the dispersion of age and sex cohorts around the various mechanisms suggests that blunt force trauma is more closely related to all age categories and both sexes (although females are quite distant) than any other mechanism of trauma. Interestingly, combination mechanisms and gunshot wounds are in nearly the same position on the mCA bi-plot (Figure 37) suggesting these two mechanisms may be expressed similarly in osseous tissue and that their infrequent occurrence in the sample is similarly distributed among the age and sex cohorts. For the age categories available and for those crania for which sex could be estimated, I cannot fail to reject one element of hypothesis two: there were no statistically significant differences in cranial traumatic injuries between the demographic groups.

To complete research question and hypothesis two, dividing each cranium into six regions—vault, basicranium, right lateral, left lateral, face, and multiple regions—permitted a more comprehensive analysis than evaluating each of the cranial bones individually. The basicranium was the most frequently impacted region of the head. The dispersion of the age and

sex cohorts around the various regions of traumatic injury (Figure 40) suggests males, particularly young and older age adults have a strong relationship with traumatic injuries to the basicranium, multiple cranial regions, and the right side of the cranium. This correspondence is expected as basicranial fractures are the most common in this sample, as is the abundance of young males. Females do not have a strong correspondence to trauma on any particular region of the cranium. As with the mechanisms of traumatic injuries, there were no significant associations found between the region of the cranium impacted and an individual's age-at-death or sex (Table 9).

There were, however, significant relationships and correlations between the effected cranial region and the mechanism of trauma, particularly blunt force impacts and sharp force impacts. These results indicate the partial rejection of hypothesis two as there were statistically significant differences between the mechanism of trauma and the cranial regions impacted, including the basilar portion of the occipital. The region of the cranium affected by trauma is independent of age and sex, suggesting that all individuals were treated equally, yet dependent on the presence of blunt force and sharp force trauma. Additionally, there were associations and correlations between the mechanism of trauma and the number of perimortem impacts. Statistically significant differences were found between the number of blunt force impacts per individual and the total number of perimortem impacts, as well as between the presence or absence of sharp force trauma and the total number of discernable impact sites. Thus, the total number of impacts sustained by an individual is correlated with the frequencies of blunt force and sharp force traumatic injuries.

Finally, the most frequent type of fracture was radiating, which is frequently associated with blunt force trauma. However, these fractures were not significantly associated with an

individual's age or sex. While accidental trauma cannot be ruled out, the vast majority of the traumatic injuries and fracture patterns observed on the Choeung Ek crania are indicative of violent blows to the head. The fracturing is often extensive, elements of the cranium were dislodged or disarticulated during the perimortem interval, and the location of the injuries is patterned across the sample suggesting that the trauma was purposefully inflicted rather than accidental.

Defining the Choeung Ek Pattern of Traumatic Injuries

Taking a biocultural, population-level approach, when the most frequent mechanism of trauma, region of trauma, and type of fracture were combined, a traumatic injury pattern was identifiable: blunt force trauma to the basicranium resulting in numerous radiating fractures. When Ta'ala et al. (2006; 2008) analyzed 85 crania at Choeung Ek in the early 2000s, they found that 10 (12%) of the crania had perimortem blunt force trauma to the occipital. The majority of this trauma to the occipital was located between the level of the external occipital protuberance and the foramen magnum; the injuries were focused both centrally and laterally. On 40% of the crania, the fractures were posterior to the occipital condyles, while the other 60% had fractures more anteriorly, and the entire basilar portion of the occipital was missing. They also noted that the fractures may propagate anteriorly and/or laterally affecting the lesser wings of the sphenoid and the petrous portion of the temporal bones. Finally, they noted the presence of internal or external beveling at the fracture margins and the general shapes of the defects (Ta'ala et al. 2006).

In order to differentially diagnose this pattern of traumatic injury, Ta'ala et al. discuss the generally recognized types of fractures to the basilar portion of the cranium. Depending on the

location of the impacting force as well as the direction and speed of the force, basilar fractures can be grouped into three types: longitudinal, transverse, and ring fractures (Spitz 2006). Longitudinal fractures separate the right and left halves of the cranium when a blunt force impact is directed at the back of the head, face, or forehead. Transverse fractures, or hinge fractures, separate the cranium into anterior and posterior sections, and often occur from a blunt impact to the side of the head or a blow to the chin. Ring fractures separate the rim of bone around the foramen magnum from the rest of the basilar portion of the occipital bone; this type of fracture is usually associated with a fall from a height when the individual lands on his/her feet or buttock driving the vertebral column into the base of the cranium (Spitz 2006).

While Ta'ala et al. (2006) noted that the fractures on the 10 Choeung Ek crania were similar in appearance to ring fractures—the base of the cranium around the foramen magnum was often missing in a circular-type pattern—they argue that the trauma pattern they documented is not consistent with ring fractures, particularly because it was extremely unlikely that these individuals all fell from great heights. As such, they summarized the Choeung Ek pattern of trauma as follows: 1) Blunt force trauma to the squamous portion of the occipital; 2) Internal beveling of the fracture margins is common although external beveling may also be present; and 3) "Radiating fractures may terminate at the foramen magnum, or encircle it, resulting in severe fracturing and, possibly, partial detachment of the cranial base. Radiating fractures may split such strong bony structures as occipital protuberances and the petrous portion of the temporal" (Ta'ala et al. 2008).

Correspondence of Research Data to the Choeung Ek Pattern

Of the 179 crania with discernable impacts, 94 (53%) had blunt force injuries to the basicranium with associated radiating fractures. Forty-six (49%) of the 94 crania had blunt force injuries to the squamosal portion of the occipital corresponding to the pattern described by Ta'ala et al. (2006; 2008). All 46 crania were either missing bone adjacent to the foramen magnum, or the entire basilar and/or lateral portions of the occipital were absent, as indicated in the Ta'ala et al. cases (Figures 69-71). The majority of the fractures and associated missing bone were located *inferior* to the superior nuchal line and the external occipital protuberance (the section of the squamosal portion known as the nuchal planum), although 10 (21%) crania had fractures *superior* to the superior nuchal line (the section of the squamosal portion known as the occipital

Figure 69. Fracture pattern corresponding to Ta'ala et al. Bone missing posterior to foramen magnum. Notice radiating fractures of lateral and basilar portions of occipital and across the palate.

Figure 70. Fracture pattern corresponding to Ta'ala et al. Notice the missing right petrous portion of the temporal bone.

planum) often resulting in missing bone from both the nuchal and occipital plana (White and Folkens 2005). Of the crania with intact basilar portions, or at least remnants of it, five had transverse perimortem fractures of the anterior basilar portion of the occipital (Figure 72) (these are the basilar or spheno-occipital synchondrosis fractures discussed throughout this research) and two had longitudinal fractures of the basilar portion, splitting it into right and left halves. Eleven crania had associated fractures affecting the inferior sphenoid, six had associated fractures of the petrous portions of the right and left temporals, and three had fractures of the left mandibular fossae of the temporal with no associated fractures of the petrous portion.

Figure 71. Fracture pattern corresponding to Ta'ala et al. Note crushing and radiating fractures at posterior margin of occipital fracture.

Figure 72. Transverse perimortem fracture of anterior basilar portion of the occipital associated with trauma to squamosal portion.

There were 22 crania (23%) that had fracture patterns similar to that described by Ta'ala et al., although these impact sites and the resulting damage were more focal. In all but two

individuals, the perimortem missing bone is minimal compared to the 46 crania above, and bounded by the fractures from the impact (Figures 73); for the two individuals with large segments of the basilar portion of the occipital missing, this occurred postmortem. The majority of these impacts (68%) were focused on the left side of the nuchal planum/foramen magnum.

Figure 73. Focal fracture postero-lateral to foramen magnum. Limited missing bone. Note transverse radiating fracture of the basilar portion.

Four were focused on the right side of the nuchal planum/foramen magnum, two to the central nuchal planum, and one impact spanned both the right and left sides of the foramen magnum. Radiating fractures affecting the basilar portion of the occipital and/or the inferior sphenoid were present on 16 of these 22 crania. Finally, two crania have associated fractures of the external auditory meatus and the petrous portion of the left temporal, resembling partial hinge fractures.

Among the 94 crania, 19 (20%) only had evidence of radiating fractures across the occipital with little or no displaced/absent bone (Figures 74). With the exception of one individual, at least one radiating fracture on each of these crania intersected with the foramen magnum. There were no readily distinguishable patterns to these fracture as they were found on all sides of the foramen magnum and both superior and inferior to the superior nuchal line. In addition to the fractures surrounding the foramen magnum, seven crania had associated fractures radiating anteriorly across the spheno-occipital suture.

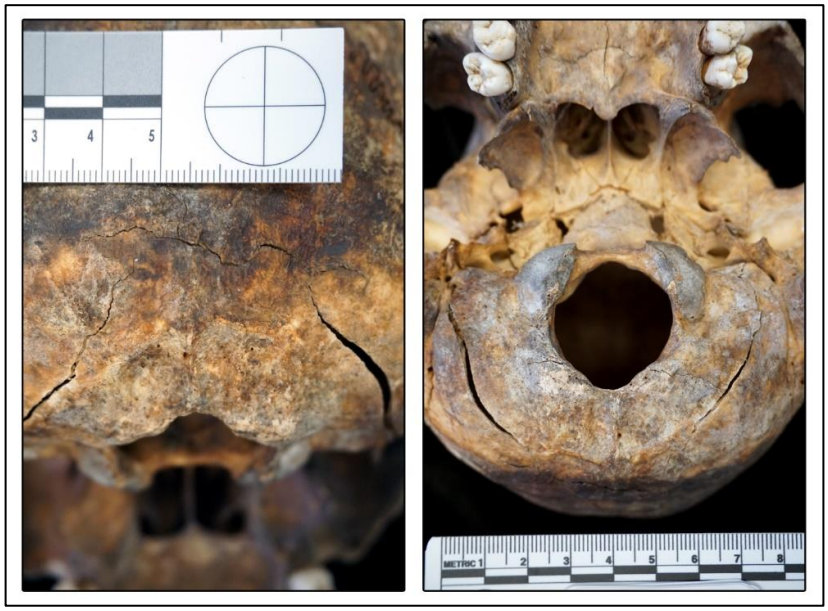

Figure 74. Radiating fractures surrounding the foramen magnum, but no absent bone. Both images are of the same cranium.

Finally, six of the 94 crania did not have fracture patterns that corresponded with those just described. What does distinguish these fractures is that they were on both the right and left sides of the foramen magnum and are extremely antero-inferiorly oriented. These fractures are located at, or anterior to, the posterior rim of the foramen magnum (Figure 75). Given the various neck muscles and vertebrae that are located in this region in a living individual—even with a hyper-flexed neck—these fractures cannot be the result of direct impacts to the foramen

magnum; thus, these fractures must be remote to the impact site although there is no indication of where the direct impact occurred. How these inferior/anterior fractures arose, and where the cranium was impacted, is certainly a topic for future research.

Figure 75. Radiating fractures of the occipital (highlighted in red) with no particular pattern. Most of the fractures are anterior to the posterior foramen magnum rim.

An additional 110 (83%) of the crania *without* discernable impact sites (*n* = 132) had blunt force injuries to the basicranium with associated radiating fractures. These fracture patterns could generally be categorized as follows: transverse perimortem fracture at or near the spheno-occipital suture; basilar portion of the occipital missing with associated perimortem fractures; perimortem fractures around the foramen magnum; and all other fractures. There were 63 crania with transverse fractures at or near the spheno-occipital suture (Figure 76). Eighteen crania had the basilar portion missing with associated perimortem fractures (Figure 77), and 23 crania had fractures surrounding the foramen magnum (Figures 78). Only six crania had occipital fracture patterns that could not be generally categorized into the prior three: two crania

Figure 76. Transverse linear fractures of the basilar portion of the occipital at the spheno-occipital suture/synchondrosis. These fractures occurred in crania with and without discernable impacts. These two crania did not have discernable impacts.

Figure 77. Crania without discernable impact sites, but with missing aspects of the lateral and basilar portions of the occipital.

had fractures posterior to the right jugular foramina; one had a longitudinal fracture that traversed the spheno-occipital suture; one had a small fracture at the right occipitomastoid suture; one had isolated fractures of the occipital planum; and one had a radiating fracture from the left occipital condyle to the occipital planum.

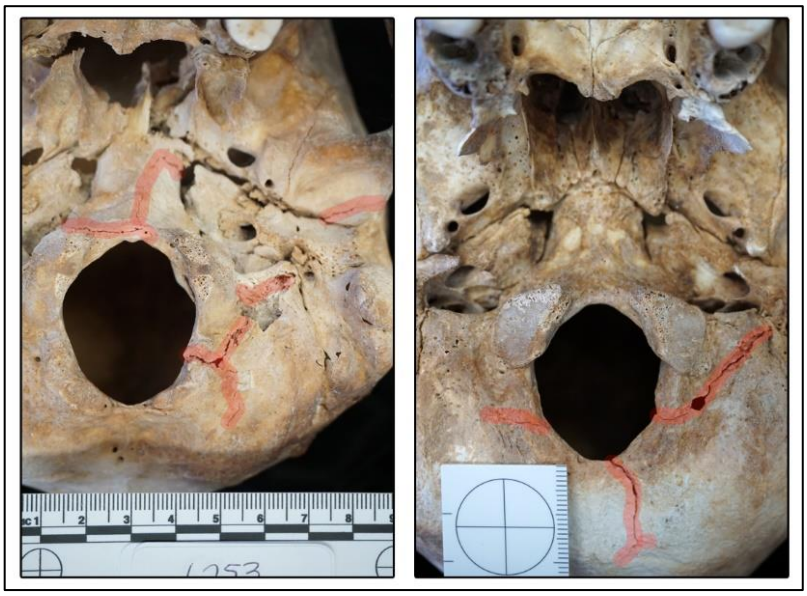

Figure 78. Crania without discernable impact sites, with radiating fractures (highlighted in red) surrounding the foramen magnum, but no missing bone. In the image on the left, note the transverse fracture of the basilar portion and the radiating fracture within the left mandibular fossa.

What is particularly interesting is that of the 63 crania with transverse fractures at or near the spheno-occipital suture, 39 (62%) did not have any other perimortem trauma on the cranium. Thus, the only traumatic injury was a fracture across the basilar portion of the occipital with no corresponding impact site or other injuries. Given that this region of the cranium is heavily protected by muscles, the vertebrae, and the mandible in a living individual, how does the basilar portion of the occipital sustain a fracture when nothing else is damaged? This is peculiar and quite puzzling and will require further research, likely in the form of experimental impacts.

However, it must be noted that 11 of these 39 crania did have postmortem missing elements: four were missing their occipital; three were missing all of their facial bones; two were missing half of their facial bones; and two were missing the right or left side of their cranium (*i.e.*, temporal and/or zygomatic bones). It is possible that these absent regions of the crania had traumatic injuries that could explain the presence of the transverse basilar fractures, reducing the frequency of these fractures with no accompanying injuries. Regardless, this is an interesting and perhaps unique fracture pattern.

The cranial fracture patterns discerned in this research generally correspond with the pattern described by Ta'ala et al. (2006; 2008). However, there are additional patterns identified, particularly focal impacts and radiating fractures around the foramen magnum with limited missing bone. In general, the patterns discussed by Ta'ala et al., as well as the patterns from this research, suggest that the majority of individuals were struck on the back of the head or neck by a blunt object resulting in extensive fracturing of the basicranium, especially the squamosal and basilar portions of the occipital.

In summary, based on cranial trauma patterns, research question two can be answered as follows: blunt force, sharp force, indeterminate force, and gunshot trauma were the specific mechanisms of violence discernable at Choeung Ek. The distribution of traumatic injuries did not differ between individuals based on age-at-death or sex indicating that all victims were executed similarly. However, the patterning of trauma did differ based on the region of the cranium and the mechanism of injury. Therefore, I can both reject and fail to reject components of hypothesis two: the pattern and distribution of trauma did not differ significantly between individuals, but it did differ between cranial regions.

Archival Data

Demographic Patterns

At least 6,285 individuals were documented as having been executed after being detained at S-21 (this number increased to 6,352 when three probable executions lists were added, see Table 24 for demographics). Again, these lists are not accounting for every detainee or execution that occurred at S-21 or Choeung Ek, but they are likely a representative sample. On these lists, 92% of individuals had their sex recorded and 72% had their ages recorded. The majority of individuals executed were males, with females representing approximately 14% of the sample. The minimum age was 11 years old, and the maximum age was 77 years old. However, one of the probable execution lists documents an eight year old; if this is actually an execution list, the age range is from 8-77 years old. These execution lists collectively document the harsh demographic reality of Khmer Rouge violence at S-21. Both sexes, although not equally, and all age categories (except infants) were targeted. No one, from children to the elderly, was spared.

Correspondence of Osteological and Archival Data

The sheer number of individuals on the S-21 executions lists makes a direct comparison of the frequencies of sex and age categories between the osteological and archival samples uninformative—the 508 crania from Choeung Ek represent approximately 8% of the total number of individuals on the execution lists. Therefore, a comparison of the sex and age ratios is more effective. At Choeung Ek, for every 121 males there were three females; this ratio is highly skewed compared to the archival data that indicates there were nearly six males for every female. This suggests that in terms of ratios, the osteological sample does not adequately

represent the distribution of males and females seen in the historical records. However, if the crania estimated to be probable males (12%) and those of indeterminate sex (2%) were actually females (*i.e.*, this population is not as skeletally sexually dimorphic as Western populations, so it is quite possible than many of the individuals assessed to be males or of indeterminate sex may have been slightly robust females), the sex ratio much more closely approximates the archival data (421:87); for every one female, there were approximately five males. In this case, the osteological data for sex would be comparable to that from the Tuol Sleng execution lists.

The age category ratios were also variable. For the young adults to all other adults ratios (Tables 6 and 26), the osteological and archival samples are somewhat comparable. For the Choeung Ek sample, for every individual estimated to be a middle or older adults there were approximately two young adults. For the archival sample, for approximately every four young adults there was an individual of middle or older adult age. However, when the ratios of adults to subadults were compared between the samples, there was a dramatic difference. The normalized ratio for the osteological sample was 6,250 while for the archival sample it was 1,780. These extreme differences can be attributed to the paucity of juvenile skeletal remains at Choeung Ek and are not necessarily indicative of the frequency of subadults being executed at the site.

Given that the normalized sex ratio is far closer to equal in the archival sample (560) compared to the skeletal sample (4,033), the survivorship and mortality models for the archival sample are more reliable. The results of the log-likelihood tests for the Tuol Sleng lists (Table 7) indicate that there are statistically significant differences between males and females in terms of mortality and survivorship, again with the qualification that this test typically identifies significant differences. According to the archival records, males have a higher probability of

mortality than females, but they also have a higher survivorship than females until nearly the end of the fourth decade of life. This corresponds with the historical narrative that suggests more males than females were targeted by the Khmer Rouge and particularly young males less than 30 years old, which would have been prime military/cadre age.

The hazard modeling and log-likelihood test comparing the osteological and archival samples also demonstrate that there are statistically significant differences between the samples (Table 7). The probability of mortality for the archival sample is more gradual, although both samples have high mortality probabilities beginning in the third and fourth decades of life. The probability of survivorship in the archival sample is also much lower than that of the osteological sample until 45 years of age.

However, a bias within these age data results from age heaping. Although the systematic bias in cranial age estimation results in the truncation of chronological age variation into discrete categories (Figure 79A), the Tuol Sleng archival lists demonstrate age heaping which is the tendency to round ages up or down to preferable digits, for example zero and five (Stockwell and Wicks 1974). Age heaping typically results in an overrepresentation of some age categories and an underrepresentation of other age categories. Figure 79B shows the age distribution for the Tuol Sleng execution lists and the presence of age heaping across the sample.

During the data collection process at Tuol Sleng I began to notice that certain ages were appearing on the lists more frequently than others. However, the majority of detainees and those killed were former Khmer Rouge cadre, most of whom were ethnic Khmer peasants (Chapter 4). As such, it seemed unlikely that individuals with this background would have known their precise date and year of birth. After a discussion with Mr. Chhay Visot, Tuol Sleng's Director, this impression was confirmed. He stated that perhaps ethnic Khmer born in the 1940s and

1950s would have known the lunar (Buddhist) Khmer year in which they were born, but not their birth date/month to provide an exact chronological age when interrogated at S-21. Mr. Chhay

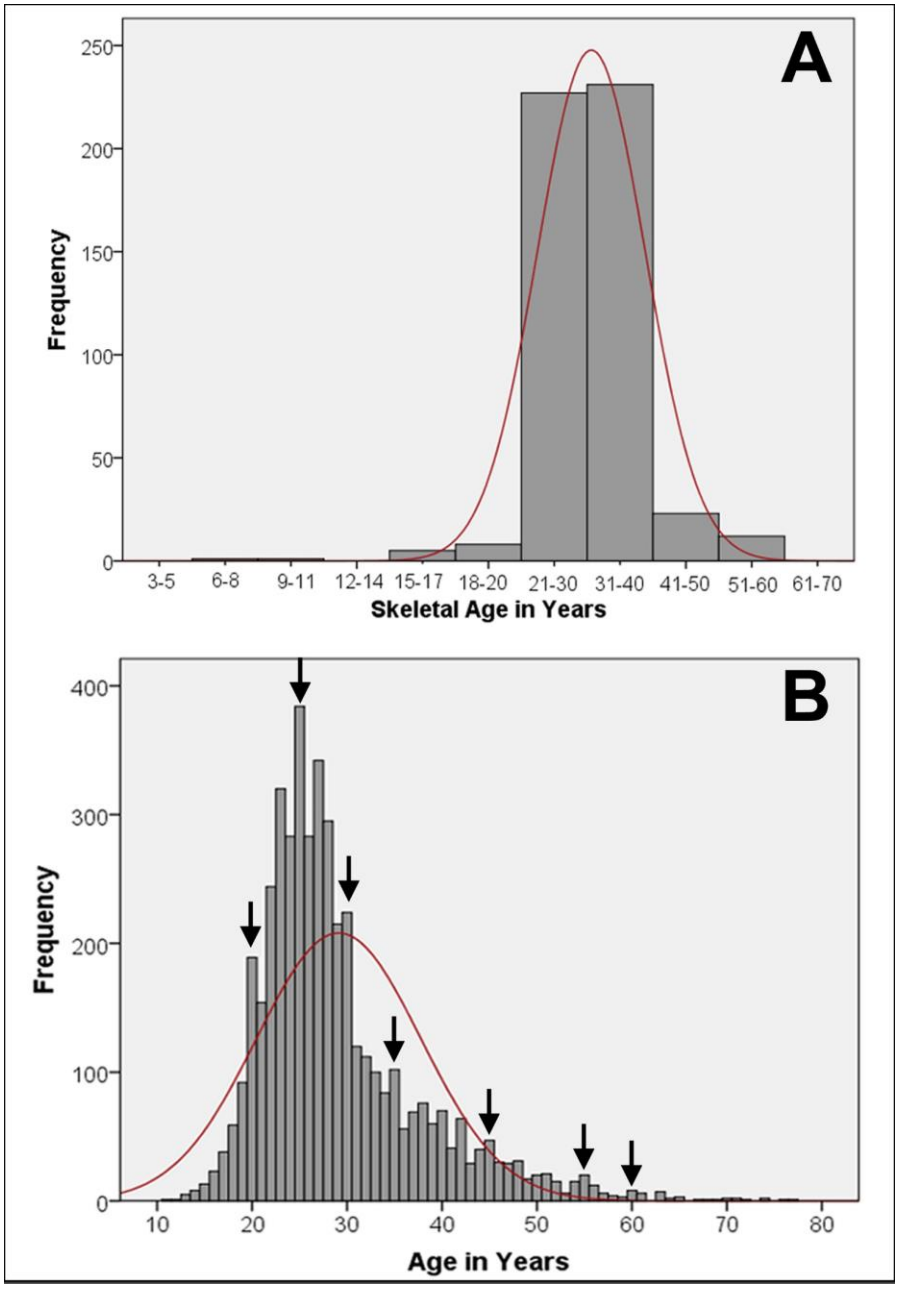

Figure 79. Age-at-death distributions for the Choeung Ek sample (A) and the Tuol Sleng archival sample (B). The red lines are the normal distribution curves. The age heaping in B is resulting in the overrepresentation of certain ages, particularly those that end in 0 or 5; the black arrows indicate the age heaping at ages 20, 25, 30, 45, 55, and 60 years.

Visot said, "celebrating birthdays was not common in the past." Thus, it is likely that the age heaping in the archival records is a result of the Khmer Rouge interrogators rounding detainees' estimated ages up or down. The degree of age rounding and the purpose behind this is unknown, but it seems this is a likely explanation for the peaks in specific ages seen in Figure 79.

However, neither the osteological nor archival data in this research are representative of traditional paleodemographic samples. For the purpose of comparison, Figure 80 depicts a probability density function for the Tuol Sleng archival sample and the Alameda-Stone cemetery sample. Alameda-Stone was a cemetery in Tucson, Arizona used by the growing and diversifying frontier population between the 1850s and 1880s, and the osteological sample comprised 1,185 individuals ranging in age from fetal to old adults (Heilen 2012).

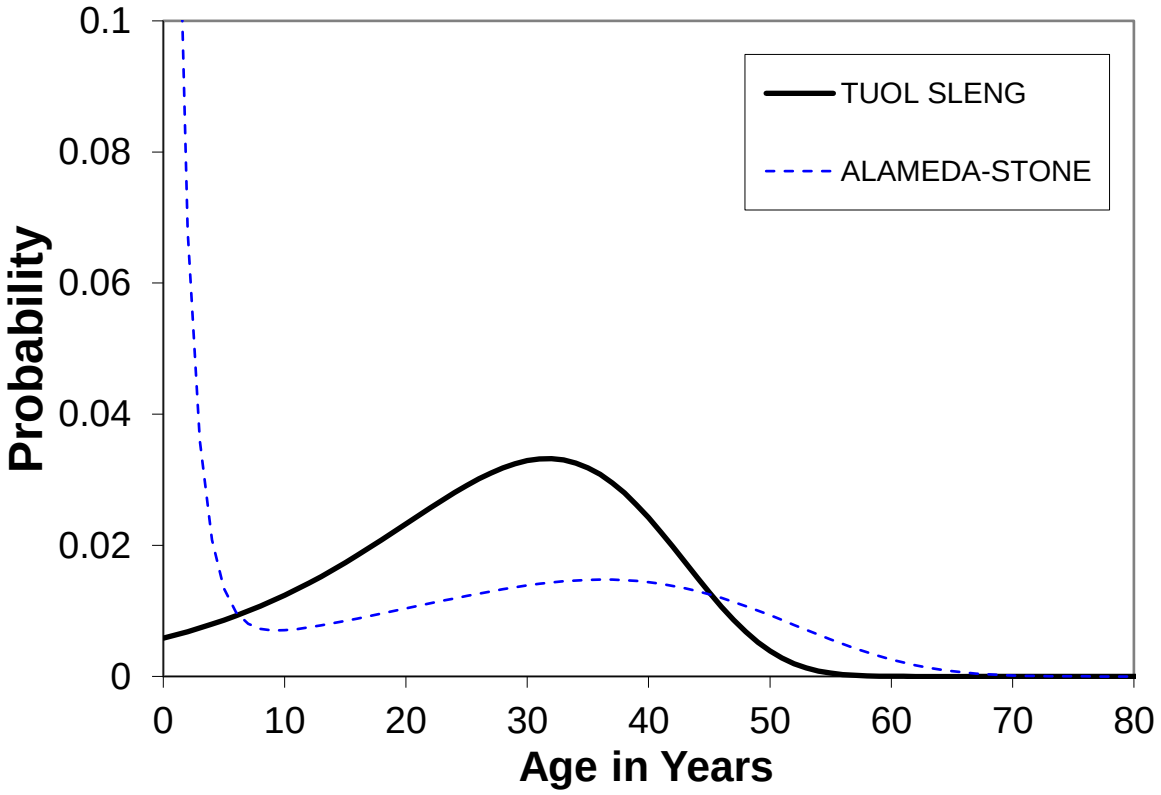

Figure 80. Probability density functions for the 97 Tuol Sleng execution lists and Alameda-Stone cemetery osteological data. (Siler model parameters for cemetery areas 3–5 provided by Ms. Lisa Bright).

The Alameda-Stone cemetery is representative of the typical pattern of historic populations: high juvenile mortality, low adult mortality, and increased mortality with senescence (Chamberlain 2006). The frequency of individuals who died at birth in the Alameda-Stone sample is nearly 100%, although this decreases rapidly with each subsequent year lived until approximately eight years of age. The frequency of dying at birth for the Tuol Sleng sample is less than 10% since the archival records are not adequately accounting for executions of infants and young children. While the number of deaths becomes relatively stable for the cemetery sample during adolescence and young adulthood, it rises for the Tuol Sleng sample.

For individuals at Tuol Sleng between the ages of 20 and 30 years old, the frequency of those who died (approximately 22-35% of the sample) is dramatically higher than for the Alameda-Stone individuals (10-15%). However, after the age of 45, longevity is higher in the cemetery sample. This difference is quite striking when examining the probability of mortality (Figure 81). At the age of 45 years, for example, the probability of mortality for the Tuol Sleng sample is 26%, while it is only 11% for the Alameda-Stone sample; the Tuol Sleng individuals had a probability of death more than two times higher at the age of 45 years than those in a nineteenth century frontier town.

What this comparison highlights is that the Tuol Sleng archives are documenting the unnatural executions of young to middle age adults during the Khmer Rouge period rather than the natural deaths across the lifespan—as is common in most osteological demography analyses, and is represented by the Alameda-Stone sample. Compared to what is expected, the probability of mortality during the prime of life was drastically altered by the Khmer Rouge's ideology.

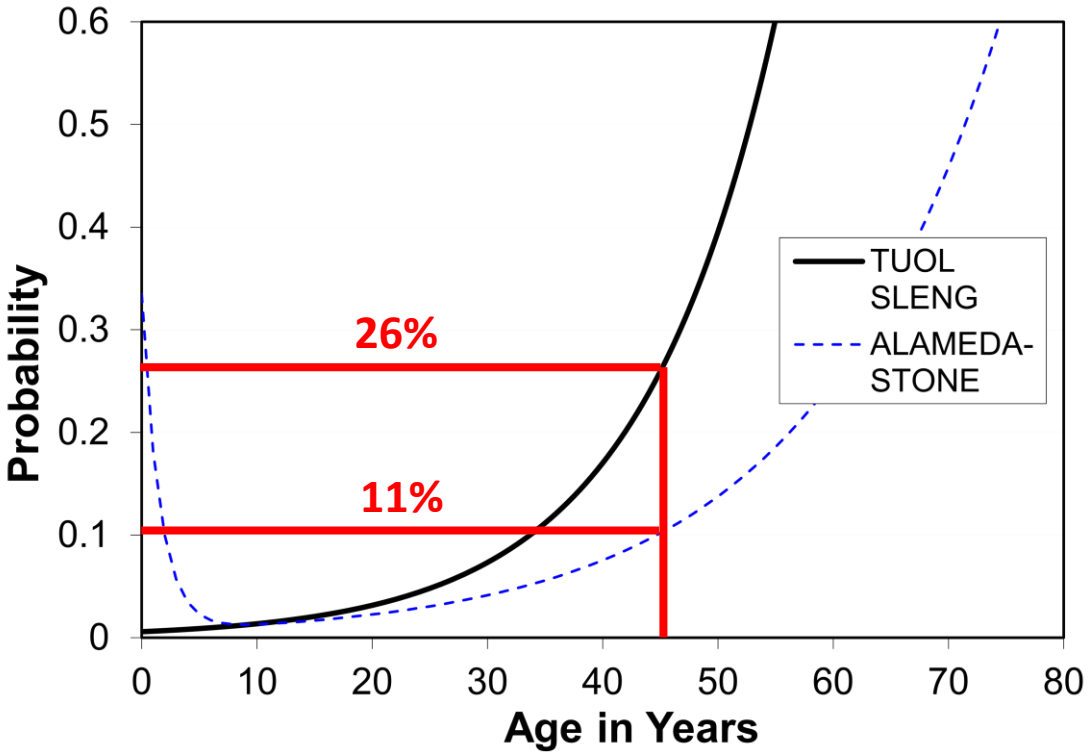

Figure 81. Mortality hazard model for age, by sample.

Thus, the Tuol Sleng archives are not indicative of natural distributions of population mortality, and are not capturing the influences of fertility, selective mortality, and hidden heterogeneity of risk—biases typically seen in paleodemographic analyses—since these individuals were not dying from disease or other natural risks. The individuals on these lists were executed, their life courses intentionally ended.

Returning to research question number one: how do the demographic profiles of the human remains correspond with the historical records? While there are some similarities in the age-at-death and sex distributions between the Choeung Ek and Tuol Sleng samples (Figure 82) (*i.e.*, fewer females, the majority of victims are young and middle age adults, etc.) the samples are statistically significantly different. Therefore, hypothesis one is rejected. However, it is

extremely important to state that while there are differences between the two samples, the demographic patterns represented by the Tuol Sleng execution lists and the Choeung Ek remains are more similar to one another, than they are to normal or typical population mortality patterns.

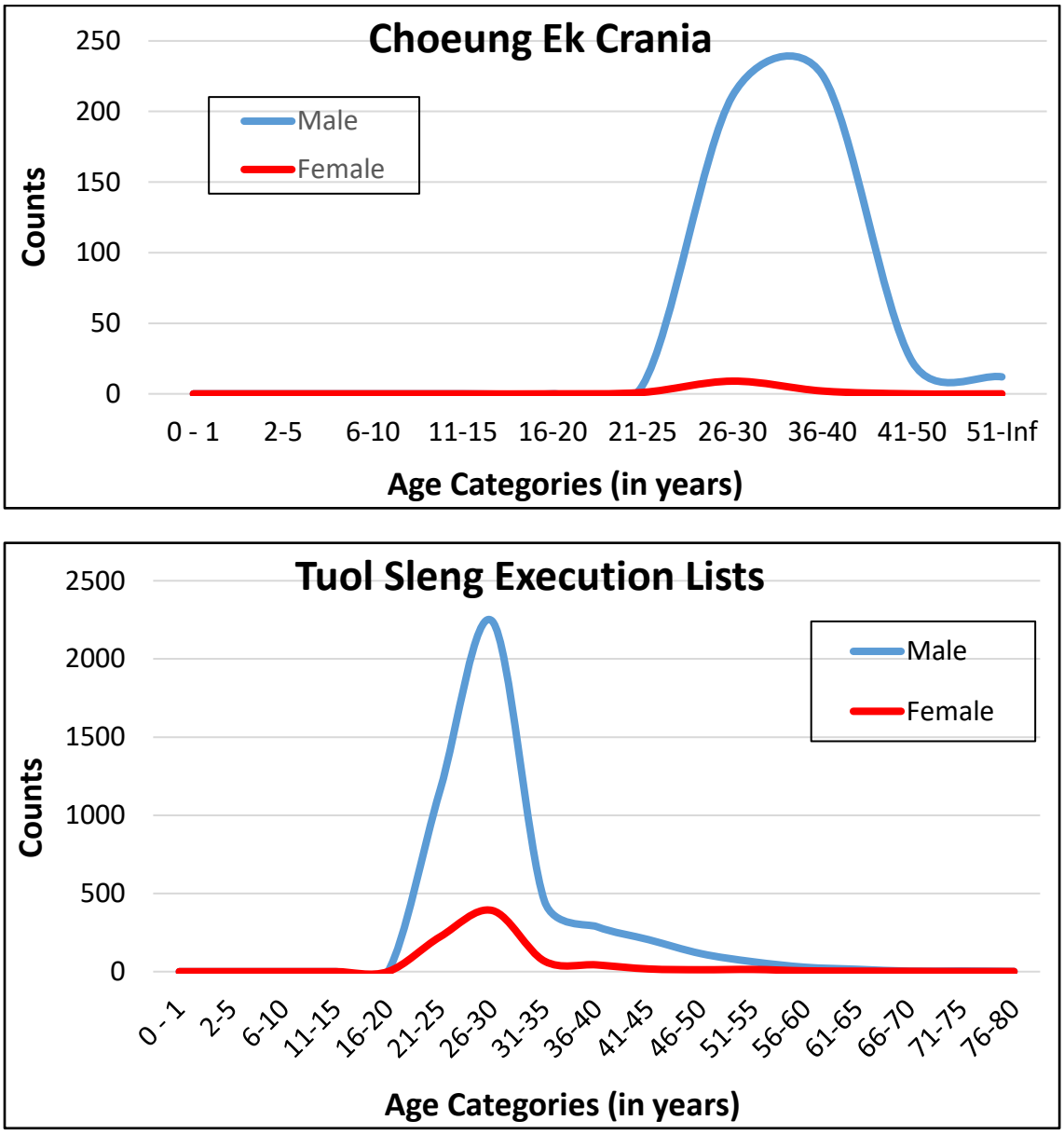

Figure 82. Demographic profiles for Choeung Ek crania and the 97 Tuol Sleng execution lists.

Correspondence with Historical Accounts

Demographics

Given the historical accounts of the Khmer Rouge period, the demographics for those detained at S-21 and later executed at Choeung Ek were expected to represent both sexes and all age categories since no one was spared under the Khmer Rouge policies of violence. However, these distributions were not expected to be normal as more males and those of younger ages were detained at S-21 (Chandler 1999). This historical disparity between the sexes can be explained by two circumstances: first, the majority of the detainees at S-21 were of high military rank or held high positions within the Khmer Rouge; females less frequently served in these positions, thus reducing their susceptibility to being accused of traitorous activity. Second, many of the S-21 detainees had been former S-21 staff, and as Chandler (1999) notes, "nearly all of the lower-ranking workers at [S-21] were young, unmarried men."

The demographic profiles generated from the human crania evaluated at Choeung Ek do include both sexes and all age categories, but are even less normally distributed than expected. There were disproportionately more male crania at Choeung Ek than female crania. While there were more males than females on the S-21 execution lists, the ratio disparity of the osteological sample is heavily skewed towards males. There are a few possible explanations for this. First, the sample of 508 crania analyzed at Choeung Ek may not be representative of the sex distribution for all human remains within the *stupa*. Second, mass graves containing more female than male victims may not have been exhumed, or perhaps the female crania were disproportionately affected by taphonomic conditions. Third, as discussed above, it is possible that the method used to estimate the sex of crania at Choeung Ek does not correspond well with the sex-specific morphoscopic traits of Cambodian individuals; perhaps Cambodian females born

around the middle of the 20th century have more robust crania than females in other regions of the world and therefore tended to be estimated as males.

The distributions of age-at-death derived from the Choeung Ek crania were more closely aligned with the historical accounts. Again, because the majority of detainees at S-21 were purged Khmer Rouge cadre, who tended to be adolescents or young adults, the fact that the majority of the Choeung Ek crania were estimated to be young adults was expected. As demonstrated by the comparisons of the osteological and archival data, the young adults are the most numerous. But considering the higher frequency of adolescents and middle aged adults in the archival sample, the low frequency of these age categories at Choeung Ek does not provide a truly representative sample of those who are known to have been executed at Choeung Ek.

Although the historical and eyewitness accounts indicate that many children were detained at S-21 and subsequently executed at Choeung Ek, the frequencies of children on the execution lists and in the osteological sample were extremely small. Regarding the archival lists, the rarity of children is not surprising since children brought to S-21 were infrequently documented or photographed (Extraordinary Chambers in the Courts of Cambodia 2010b). As for the human remains, there are again multiple explanations for the limited number of juvenile and adolescent crania. First, the skeletal remains of subadults are fragile and often do not survive burial and exhumation. Second, the exhumations at Choueng Ek were not conducted by professionals trained in archaeological techniques or osteological analysis; it is quite probable that skeletal elements of juveniles may not have been recognized during the exhumations in the early 1980s and were therefore not recovered. Third, the various taphanomic conditions to which the exhumed remains were exposed (*i.e.*, rain, heat, direct sunlight, flooding, humidity, animal scavenging) before they were placed in the original wooden memorial may have

disproportionately affected the remains of the juveniles resulting in destruction or extreme degradation. Fourth, some (perhaps all) juvenile crania are displayed on the first level of the Choeung Ek memorial; since I conducted my research at the end of the Choeung Ek Conservation project, the Cambodian team had already removed, examined, preserved, and returned the remains on the lower levels of the *stupa*. Therefore, as a matter of sampling bias beyond my control, access to juvenile remains may have been limited.

Trauma

The high frequency of blunt force trauma documented in this research corresponds with the historical accounts that at Choeung Ek, Khmer Rouge victims were generally executed by striking them with a hard and heavy object—in this case, the objects tended to be weapons of convenience such as large pieces of bamboo, farming hoes, or axles from ox carts, rather than objects intended for violence such as firearms or knives. This is not to say that injuries resulting from sharp force trauma and high velocity projectiles were not present, as a review of the literature demonstrates that the Khmer Rouge did execute victims by suffocation, stabbing or throat cutting, drowning, and shooting (Chandler 1999a; Extraordinary Chambers in the Courts of Cambodia 2016h; Kiernan 1996b).

The basicranium was the most frequently impacted region of the head which corresponds to eye witness statements and artistic renderings (Figures 83-86) indicating that Khmer Rouge victims were frequently executed by being struck on the back of the head or neck. For example, according to Mr. Him Huy, a Khmer Rouge soldier who was a guard at S-21 and later assigned to transport prisoners from S-21 to Choeung Ek for execution, the tools used for killing people at Choeung Ek were oxcart axles and knives. In his testimony at the ECCC he stated that victims

"were clubbed, then they—their throats would be slashed" (Extraordinary Chambers in the Courts of Cambodia 2016h). Mr. Tay Teng, a guard at S-21 under the direction of Him Huy and later a guard at Choeung Ek, stated during an interview with the Office of the Co-Investigating Judges of the ECCC: "First, [the prisoners] sat about one meter from the edge of the pit. They had two or three sit beside one another and they used a water pipe to strike the base of their necks. When the prisoners fell over, they removed the handcuffs, then they used the knives to finish killing them…" (Extraordinary Chambers in the Courts of Cambodia 2016i). Mr. Tay

Figure 83. Painting by Mr. Vann Nath, one of the S-21 survivors. This is his representation of the executions at Choeung Ek: the bound and blindfolded victim at the edge of the mass grave, the Khmer Rouge cadre standing above him ready to strike with a large piece of bamboo. This painting hangs in the Tuol Sleng Museum (image courtesy of Dr. Gregory Berg).

Teng later testified that the Khmer Rouge "used iron bars to beat people to death" and that the iron bars "were iron axles the width of a knife handle and about half a meter long" (Extraordinary Chambers in the Courts of Cambodia 2016j). Additionally, Mr. Him Huy was quoted as having said that his superiors, Duch and Hor, taught their subordinates how to kill. Duch and Hor instructed Huy to have prisoners "kneel, then strike at the base of the neck, then cut the throat" (Extraordinary Chambers in the Courts of Cambodia 2016i). Thus, the skeletal

Figure 84. Painting on the wall within the memorial *stupa* at Wat Kiri Bopharahm. In the center of the painting is a Khmer Rouge cadre ready to strike a bound and blindfolded victim with a farming hoe at the edge of a mass grave. At the cadre's left foot are other weapons of convenience: bamboo, an axe, and an iron cart axle. On the lower left of the painting is a mass grave with multiple victims above which another cadre is slitting the victim's throat with the stalk of a palm frond. On the right is a cadre swinging an infant towards a tree as a means of execution. To the left of the center cadre is a cadre "catching" an infant on his bayonet (another oft cited method of executing infants). Note that the victims are both male and female. The likelihood that all of these forms of violence occurred at this one site is dubious; rather, this is likely a representation of collected memories of Khmer Rouge violence.

evidence of trauma from this research is extremely consistent with the historical accounts of what transpired at Choeung Ek during the KR regime.

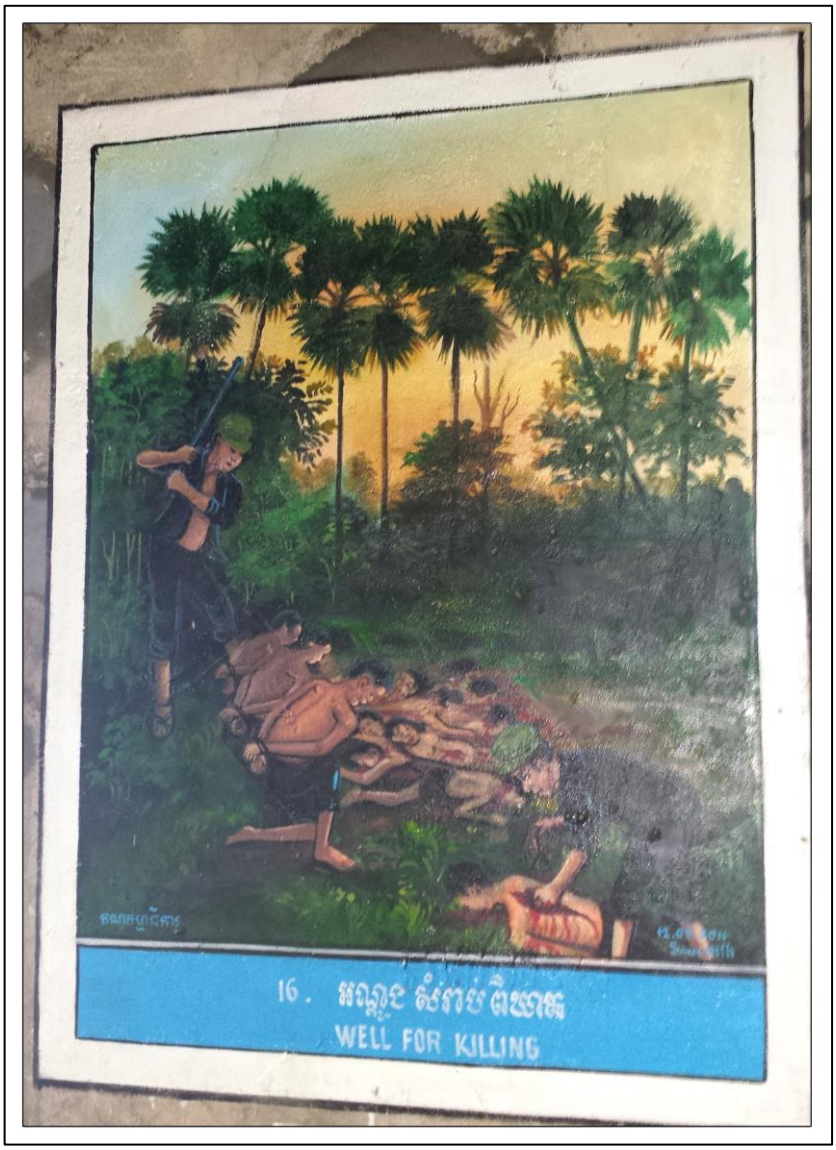

Figure 85. Painting on the wall of the torture museum at Wat Samrong Knong. The glare makes it slightly challenging to see, but the Khmer Rouge cadre on the left is standing above three bound and kneeling victims ready to strike them with a long object, likely an iron cart axle.

In addition to consistency between the historical accounts and the osteological data for the region of the cranium affected, it is also important to discuss the mechanisms of trauma. As

stated above by the purported executioners, Him Huy and Tay Teng, heavy, blunt objects were routinely used to kill individuals at Choeung Ek. Were there reasons beyond convenience that objects such as bamboo, pieces of wood, cart axles, farming hoes, or water pipes were favored? While there are crania with sharp force trauma—and there likely would have been more had the vertebrae been present for analysis, given the repeated mention of throat cutting by eyewitnesses (also see Figure 84)—there was only one gunshot wound documented in this sample. This limited number of gunshot wounds is consistent with the historical accounts of the Khmer Rouge typically forgoing execution by firearms or fusillade (firing squad) because ammunition was too expensive.[16]

Figure 86. One of the concrete sculpted panels around the base of the memorial at Wat Samrong Knong. The artist depicts a Khmer Rouge cadre striking a kneeling victim on the back of the head with a farming hoe. The text reads: "As a prelude to a mass execution, the victims are strung together with rope that was threaded through holes that had been cut into their hands, to prevent their escape."

[16] While this argument is frequently discussed, an extensive review of the literature on the Khmer Rouge, as well as a review of ECCC testimony, turned up little concrete evidence to support this claim. It appears that the frequency of execution by firearms, and the precise reason for not using firearms, may not be known.

The one gunshot wound from Choeung Ek was challenging to classify. While the endocranial surface of the entrance wound was beveled internally, the wound was not exactly round (Figure 87), and no exit wound was present (although the left temporal, where the bullet may have exited, was missing postmortem). To provide further confirmation that this injury was due to ballistic trauma, I radiographed the wound to determine whether there were any lead bullet fragments surrounding the entrance wound. No metallic elements were present on the radiographs which may suggest the type of ammunition that was used.

Documentation of the *specific* pistols and rifles used by the Khmer Rouge is limited, particularly because they had access to U.S.-, Soviet-, and Chinese-made weapons after the fall of the Lon Nol regime in 1975 (Dr. Craig Etcheson and Dr. Andrew Mertha, personal communication). In addition to the inheritance of the Lon Nol arsenal that included U.S.-made

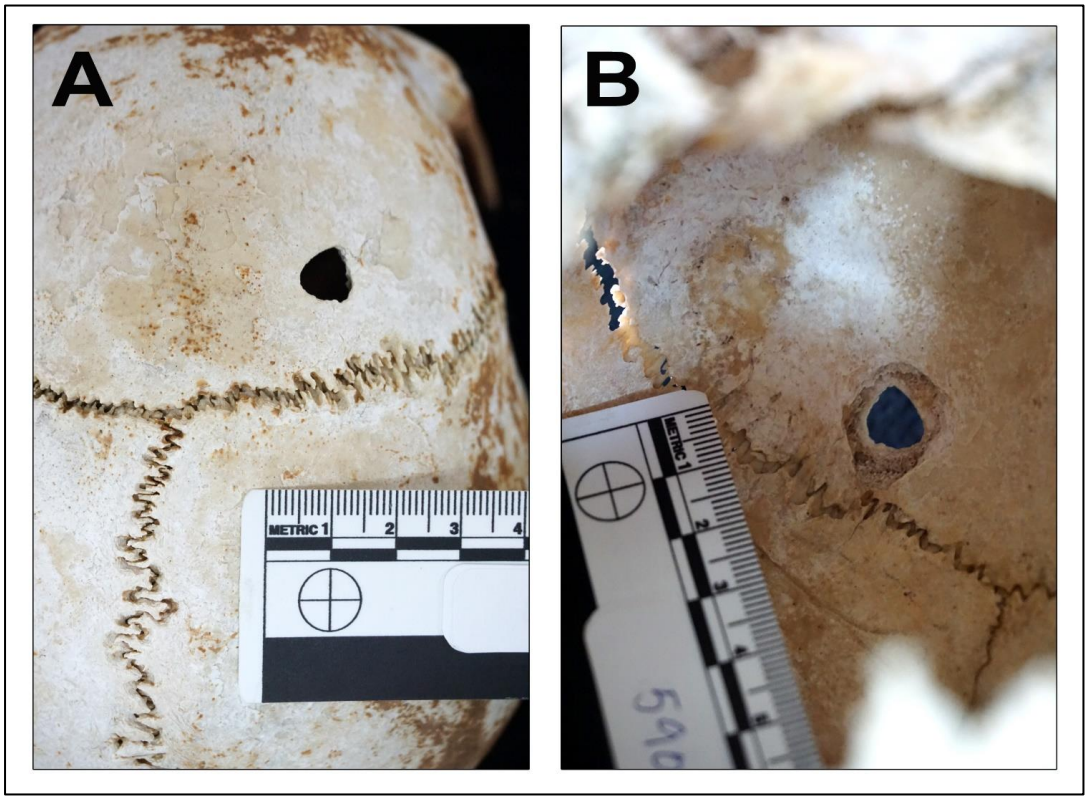

Figure 87. Gunshot entrance wound on Cheoung Ek cranium. A) the slightly non-circular entrance seen ectocranially; B) internal beveling on the endocranial surface.

M-16 rifles, the Khmer Rouge were frequently supplied with artillery from China including B-40 rockets, AK-47 assault rifles and ammunition, machine guns, tanks, rocket-launchers, and 130-mm guns (Kiernan 1996b). However, according to Mertha (2014), only Chinese weapons were used after 1975 including B-40s, 12-mm guns, and AK-47 rifles. Craig Etcheson notes that "for reasons of standardization of ammunition supply…they tended to favor designs which would use a 7.62 mm cartridge" which include the AK-47, the Chinese Type 56, and perhaps the Tokarev TT-33 (personal communication).

Rounds used with the AK-47 (7.62 x 39 mm) assault rifle tend to have full "copper-plated steel jackets" (DiMaio 2016). Jacketed bullets have a metal core, usually of steel or lead, surrounded externally by a "jacket" of blended metals—copper and zinc, copper and nickel, or in some cases only aluminum. According to DiMaio (2016), today's military ammunition is always completely jacketed (full metal jacket), which may have been the case for Soviet or Chinese ammunition 40 years ago. Full metal jacket bullets rarely fragment, even when they pass through bone, so they infrequently leave lead fragments that can be detected via radiography (DiMaio 2016). Thus, while it is generally not advisable to estimate bullet caliber or specific weaponry from gunshot wounds in bone (Berryman et al. 1995), perhaps the lack of lead fragments at this entrance wound indicates that the ammunition used in this case had a full metal jacket and may have come from an AK-47 which was commonly favored by the Khmer Rouge. There is no way to confirm this hypothesis, particularly without the remnants of the bullet, but radiography of the entrance wound demonstrating no metallic fragments provides one additional step towards hypothesizing which weapons may be have used by the Khmer Rouge to execute victims.

Ultimately, blunt force trauma to the posterior-inferior cranium is consistent with the historical accounts of victim execution at Choeung Ek. There are, however, limitations to this assessment; it is possible that there were many more crania with sharp force and gunshot trauma in the Choeung Ek *stupa* that I was not able to evaluate. Additionally, the lack of associated postcranial elements dramatically reduces traumatic injury assessments as individuals may have experienced trauma to regions of the body inferior to the head. For the available crania, however, the abundance of blunt force, basicarnial trauma is consistent with the widespread theory that execution by striking an individual on the head was extremely common during the Khmer Rouge period.

Memorialization of Human Remains in Cambodia

Bones as Objects and Subjects

Often, although not exclusively, human remains from the Khmer Rouge period are enshrined in public memorials. These memorials had their genesis in the PRK period after the overthrow of the Khmer Rouge regime, and many have been updated or renovated in keeping with the current government's emphasis on the remains as "evidence." These memorials are frequently at or near the former site of violence or the mass graves from which the remains were disinterred, rendering them more provocative, as Jacobs (2011) argues. Many of these memorials are located within *wat* complexes; they are therefore sanctified, not only in Foote's (1997) sense of being a site of memory that is well-tended and ritually commemorated, but also in a religious context. At Wat Roka Kaong, for example, the sanctified temple and its grounds were transformed by the Khmer Rouge into a site of violence and death. After the fall of the Khmer Rouge, and the restoration of Buddhism in the late 1980s, the *wat* was once again

reestablished as a sanctified site and the memorial on its grounds became a sanctified and marked space to remember those who died.

The 13 memorials I visited for this research varied widely in terms of size, location, style, and level of care. The only physical continuity was the presence of human remains, although the number of remains and their level of preservation was diverse; in some memorials there were a few dozen bones, while in others there were thousands. Some memorials (Wat Samrong Knong, Wat Bo Knong, Wat Chhoung Leap Preah Sihanouk Reah, Kraing Ta Chan, and Wat Kiri Bopharahm) had accompanying artistic depictions of what transpired or information describing the violence or the victims. The majority, however, had no information or descriptions beyond the recognition of the donors who helped to fund the construction of the memorial. As such, many of these memorials are simply physical structures with no inherent value (Jelin 2007). It is only through integration and interaction of these memorials (and the remains) with the living that they are invested with collected memory and meaning.

As research question three asks, how have memorials containing human remains been integrated into Cambodian society? How have these memorials and unearthed remains shaped mourning practices and how the living think about the deceased? Again, rather than focusing exclusively on what has been *done to* the bones since they were exhumed and enshrined in the 1980s, this research sought to understand what the bones *do to* the living, evaluating their affective presence or materiality, their subjective and objective nature (Krmpotich et al. 2010).

The informant's responses from the ten interviews elucidated this theoretical perspective. All informants indicated that the bones (as objects) can and should be displayed, primarily with the intent of informing visitors or the younger generations about the violence inflicted by the Khmer Rouge. As objects, the human remains have been intentionally collected and placed

within a memorial to be viewed; they are traces of the past that testify on behalf of those who no longer can (Lesley-Rozen 2014; Violi 2012). In this manner the remains are pedagogical tools to be understood and reflected upon. While this argument for education and violence prevention often spurs memorialization of atrocity, Ashworth (2008) notes that historically, this model has failed to be effective: "memorializing the violence of the past may anaesthetize rather than sensitize recipients, making violence more normal and acceptable rather than shocking and unacceptable." Therefore, the morbid and shocking display of human bones as objects in Cambodia may not be an effective deterrent of future violence.

The remains are also political objects. In Cambodia they have been used in the creation of national discourse, they have been the center of governmental legitimacy, and they have become synonymous with the historical rhetoric of the evilness of Khmer Rouge regime. The May 20 ceremony, particularly the government-sponsored event at Choeung Ek, is a constructive example. In front of the memorial *stupa* (built by the government in the 1980s), in front of the human remains, thousands gather to watch a dramatic reenactment of the history and violence of the Khmer Rouge period. The bones are a backdrop to this public display; they are the physical objects or agents linking this violent past with the present, influencing memory, historical narratives, and reaffirming political power (Hallam and Hockey 2001; Verdery 1999; Williams 2004a). During her attendance at the *pchum ben* ceremony at Choeung Ek in 2012, Lesley (2015) describes the speech by the district governor of the ruling Cambodian People's Party (CPP) which included statements about being grateful to the leaders of the CPP for driving the Khmer Rouge from power and reminding young people to vote, ostensibly to "repay" the government for saving the country. Again, the human remains within the *stupa* were the

backdrop for this unabashedly political rhetoric and were imbued with political meaning and value.

However, as elements once belonging to living individuals, human remains are also subjects, corporeal symbolic agents to be respected, commemorated, and cared for. "Overtly politicized reading of bones," as Krmpotich et al. (2010) state, "do not tell the complete story of the bones. Bodies and bones are, in numerous ways, central to the ongoing relationships between the living and the dead and a focus for processes of mourning." Particularly in Cambodia where religion and culture acknowledge/encourage interactions with ancestors, spirits, and ghosts, the human remains and their associated spirits can directly affect the living. Many informants expressed the need to pay respect and homage to the remains, ancestors, and spirits. The remains are retained so families can come with offerings for their deceased relatives, hoping in turn for good blessings. The remains therefore provoke and invoke interactions with the living. "A dead body is meaningful not in itself," according to Verdery (1999), "but through culturally established relations to death and through the way a specific dead person's importance is (variously) constructed." Bones are not merely inanimate osseous material (objects) to be displayed and relegated to the past; the human remains enshrined in Cambodian memorials are corporeal subjects and agents serving as a reminder of violence and loss, yet interacting with, and requesting things of the living in the present. Unlike many Western contexts in which the living very infrequently encounter the dead, interaction with the deceased (either as a corpse, as cremated ashes in an urn, as a spirit or ghost, or as skeletal remains) in Cambodia is common. Thus, many Cambodians, according to my informants, visit the memorials a few times each year to pay respect to the dead by interacting with the remains. In this way, the remains are subjects and agents that affect the living, rather than inanimate objects.

Returning to research question three, memorialization in Cambodia has a complex history that weaves together politics, memory, religion, history, and culture. The absences of individuals, and the voids left by the Khmer Rouge, may be filled by these memorials, as Sion (2015a) suggests. While the creation of the memorials was political, and the bones were (and still are) used as objects to craft the nation's historical narrative, Krmpotich et al. (2010) argue that the presence of human remains reaffirms absences. As symbols or agents of those who are no longer present, the bones affect the living who feel compelled to visit and take care of the dead or their spirits. The memorials are therefore well integrated into modern Cambodian society.

The integration is so pervasive that an event at Wat Samrong Knong took me by surprise. While I was making my observations of the memorial and the remains, a group of approximately 20 children appeared and began running around and climbing on the memorial's terraces (Figure 88). Only then did I realize that the memorial was directly adjacent to a local primary school. The children had a break from classes and had come out to play, and they were just as befuddled by my presence as I was theirs. In the brief conversation that followed, they said they were not afraid or sad when they see this memorial; they come here to play and they sometimes like to look at the bones. They do, however, think there are ghosts who haunts the memorial, particularly one of a child. In general they have not learned about the Khmer Rouge in school, but some of them said they want to know what happened. In this example, the memorial and the remains are so integrated into Cambodian society that school children use it as a playground, although the affective interaction with the dead—in the form of ghosts or spirits—is also present.

This research has therefore added an additional perspective to the discussion of Cambodian memorials. By focusing on the human remains within, as both objects and subjects,

Figure 88. Group of school children playing on the Wat Samrong Knong memorial.

a more nuanced analysis of how the memorials and the bones affect Cambodians has been presented. Additionally, this research has documented the integration of the memorials into modern Cambodian society. While the memorials began as political propaganda, they have been incorporated into religious and cultural practices, even childhood play. Although the memorials are variable, and the presence of tourists certainly influences the level of care and development of the structures, research hypothesis three can be rejected: there are no significant differences between the patterns of memorialization at the local and national (Choeung Ek) memorials. The ceremonies, although perhaps larger and better funded at Choeung Ek, are the same, the politicization is the same, and the conceptions of the structures and the remains within are similar at the numerous memorials visited for this research.

Treatments of the Dead

Research question number four asked: how do Cambodians address victim anonymity and the mutable treatments of the dead? According to my informants, there is simply no way to address or rectify victim anonymity. The human remains within the memorials, at least for now, cannot be identified. This has not, however, stopped families from visiting memorial sites to "see" their relatives and pay respect to the dead. Many informants noted that while families may not know the specific location of their relative's grave/remains, if they think that their relative died at a particular location, they will go to the corresponding memorial. Cambodians have adjusted to the vast anonymity of human remains that arose after the Khmer Rouge regime and have adapted their religious and cultural practices accordingly. But how, as Joyce (2015) asks, do unearthed bodies from violent conflicts shape how the living mourn the dead?

In Cambodia, the exhumation of hundreds of thousands of remains has altered how the living mourn for, and ritually conceptualize, the dead. There are no religious texts or cultural doctrines that guide a society toward effective and culturally appropriate disposition of the remains of mass murder victims. These decisions must be made, however, for a society to move forward and to recover from atrocity. As discussed in Chapter 7, Buddhism affords numerous means for the disposal of a corpse. While modern Khmer Buddhists prefer cremation, it is not a mandated religious practice. The retention of the human remains from the Khmer Rouge period is not unacceptable or "wrong" according to my informants. Thus, I fail to reject research hypothesis four: the retention and display of remains in memorials is a *unique* practice within traditional Khmer Buddhist mortuary rituals. Other than a few fragments of bone or hair that are touted as relics of the Buddha, Siddhartha Gautama, maintaining full skeletal elements of the dead is not common in Cambodia.

Anonymity has also confounded traditional mortuary rituals. In Cambodia, it is generally the responsibility of the decedent's family, with assistance from monks and laymen, to conduct the necessary rituals and ceremonies before, during, and after his/her death. Only families can cremate their deceased family members, as mentioned by some of my informants as well as those of Lesley (2015). If families are therefore unable to identify the bones of their relatives, they cannot be cremated. The anonymity of the human remains within the memorials has resulted in the need to alter traditional mortuary rituals. Rather than families cremating unknown remains, they ritually and spiritually attend to the dead by making offerings, holding ceremonies to accumulate merit for the dead, and conducting *bangsokol* to appease the spirits.

However, does the anonymity imposed on the remains by being collectivized and unidentified within a memorial further the ideology of the Khmer Rouge—prior to a confession "enemies" were individuals, but after a confession the individual ceased to exist? For example, one of the most common Khmer Rouge slogans stated "nothing to gain by keeping them alive, nothing to lose by doing away with them"[17] (Locard 2004). Is this form of memorialization perpetuating the Khmer Rouge-imposed victim anonymity, or does each cranium or bone, as representative of a distinct person, promote individuality? While the individual human remains cannot be identified and are still anonymous, I argue that the commemoration, memorialization, and ritualistic treatment of the remains since 1979 are sociocultural and religious means for countering the anonymity and disrespect conferred by the Khmer Rouge regime. It is not perfect, and families cannot individually cremate their relatives, but given the responses from my informants, these modified mortuary rituals and the retention of the human remains is an acceptable method for giving names and identities back to anonymous bones.

[17] Variously translated as "to keep you is no benefit, to destroy you is no loss" and "no gain in keeping, no loss in weeding out" (Lesley 2015; Locard 2004).

Controversies

In Cambodia as well as other countries, the exhumation of mass graves, the analysis of the human remains within, and the subsequent disposition of these disinterred remains are not without controversy. It must be noted that human remains resulting from genocide or crimes against humanity are rarely accessible for research primarily because they are politically, culturally, ethically, and religiously sensitive. Given the varying sociocultural and religious contexts of post-atrocity regions, the ramifications of working with human remains must be addressed on a case-by-case basis and should include governmental, cultural, and familial/community parties.

In order to address varying contexts and sensitivities, scholars have begun to discuss the conflicting ideologies and desires of forensic science/anthropology and other groups prior to the excavation of mass graves and the disinterment of human remains. For example, justice, truth, and evidence have various meanings for different political, social, and religious stakeholders (Crossland 2013; Fondebrider 2015; Rojas-Perez 2015; Rosenblatt 2013; Rosenblatt 2015; Sanford 2003). In many post-atrocity nations, religious leaders citing various beliefs and doctrines, have objected "to exhumation, autopsy, and other forensic practices, even when the mass graves in question contained crucial evidence of atrocities committed against their own members" (Rosenblatt 2013). Rosenblatt continues by stating that the division between religious groups and forensic investigators is not that the forensic teams are disrespectful of the dead or are mistreating them; rather, it is about disturbing the bodies and the graves (or sacred spaces) that they occupy. Religious or cultural groups may believe that forensic teams profane the spaces and the individuals within if the grave is disturbed.

As I have discussed (Fleischman 2016), another example of contested forensic work in Argentina is presented by Crossland (2002). While the exhumations of mass graves in Argentina, where the forensic anthropological contribution to human rights atrocities began, were politically sanctioned, mothers and other surviving relatives of the victims were opposed to the exhumations; they felt that the forensic disinterments were definitive indications that their children and relatives were deceased, rather than providing a sense of reappearance or closure. Until those who committed the crimes were held accountable, the mothers wanted to remember their children as alive rather than dead; as long as their children were "disappeared," the mothers could protest for accountability. These are only a few examples of contested spaces and ideologies in which forensic anthropologists and archaeologists find themselves and that must be considered before any forensic investigations or analysis of human remains are begun.

The final disposition of disinterred remains can also be fraught with controversy. In post-atrocity nations such as Guatemala, Bosnia-Herzegovina, Argentina, Peru, and many others, the disinterred remains have been buried, often as a means to counter the disorder of the mass violence and mass graves (Wagner 2008). Conversely, in Rwanda, as well as Cambodia, the human remains are publicly displayed (Lesley 2015). In Cambodia, the display of the human remains, particularly at Tuol Sleng, has been the center of debate in the past and present.

When Tuol Sleng opened as a museum in 1980, a map of the country hung on the wall. This map was fashioned from 300 disinterred human crania and other bones from across the country (Figure 89). The late King Norodom Sihanouk took great offense to this map. In 2001, in opposition to the governmental rhetoric of needing to preserve the human remains as "evidence," he petitioned to have the remains cremated in Khmer Buddhist tradition to honor the spirits and allow them to be reincarnated (Cougill n.d.; Ledgerwood 1997). In response, Prime

Minister Hun Sen offered to hold a referendum on the issue of cremation throughout the country, but not until the ECCC trials concluded, "in case remains were needed as evidence before the court" (Hughes 2003). Sihanouk later retracted his request for cremation possibly because of political and public opposition to his proposal. The map of skulls was eventually dismantled in 2002 citing the deteriorating condition of the bones (Hughes 2003).

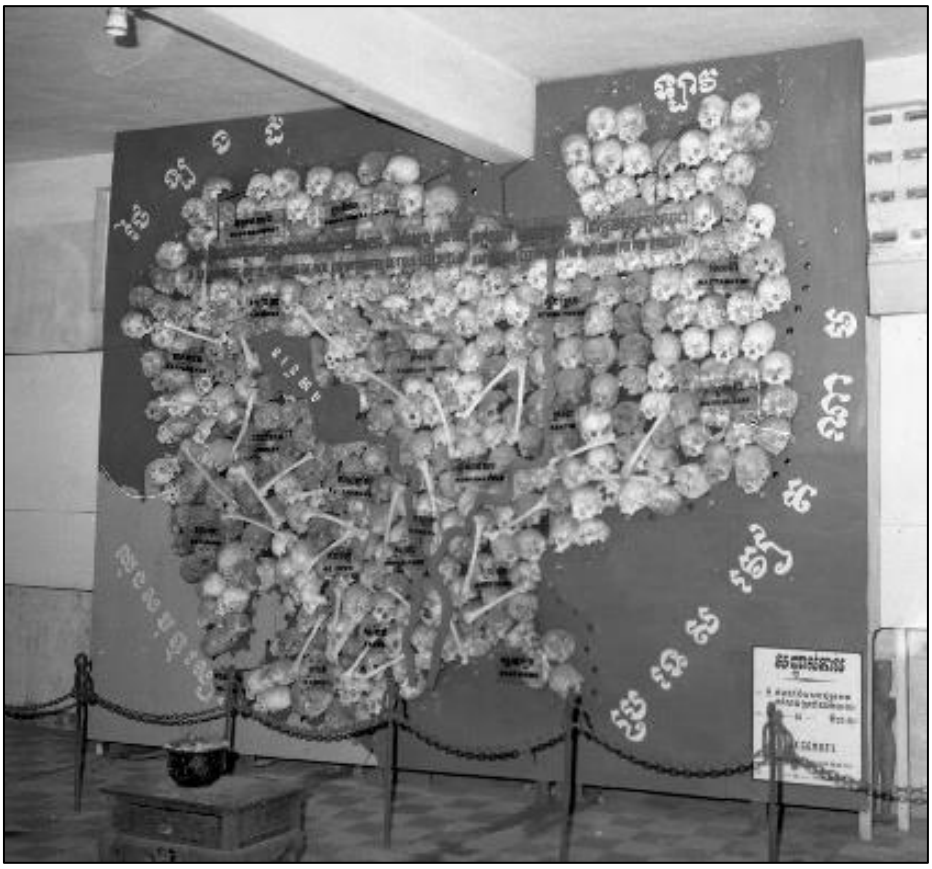

Figure 89. Map of bones that used to be displayed at Tuol Sleng (image courtesy of the Tuol Sleng Genocide Museum).

As the ECCC trials are coming to a close, it is likely that the discussion regarding disposition of the human remains from the Khmer Rouge period will be renewed in the future. Even today there are Cambodians who argue that the remains should be cremated to promote familial and national healing. In 2016, Chy wrote an opinion piece that once again raised the

question of proper display or disposal of the human remains. He argues that a national referendum will likely be the most effective method for ascertaining how Cambodians feel about the bones and how they should be treated in the future. He is careful to note that there are many non-Buddhist minority groups in Cambodia who may not feel that cremation is the most appropriate means of disposition for the bones. He states that this referendum should occur soon, despite the unknown duration of the ECCC trials; however, he incorrectly assumes that "any forensic examination of the bones, if any, should have been completed [by the ECCC] by now" (Chy 2016). This is an understandable assumption since international courts frequently authorize or request forensic investigations of human remains (see Chapter 9), although in Cambodia, the ECCC has not been involved with forensic osteological analysis. The discussions and decisions regarding the disposition of the human remains in Cambodia are important and valuable and should be encouraged.

Although forensic anthropology and archaeology have long been involved in the investigation of genocide and crimes against humanity, the cooperation between forensic scientists, human rights organizations, and local communities is still developing. Discrepancies between various stakeholders, political narratives, religious ideologies, and local and international communities will continue to pose challenges to the exhumation of mass graves, the analysis of the human remains, and the disposition of these remains. The questions and issues arising from working with atrocity-derived human remains are constructive and must continue to be discussed within the forensic science and human rights communities. Cambodia is merely one example of the research and preservation being conducted with human remains from an era of mass violence. It is certainly not representative of past or future endeavors, but illustrates

both the benefits and challenges associated with working with sensitive and often controversial human remains.

Research Limitations

Human remains resulting from mass violence or genocide, as discussed above, are rarely accessible for research due to their sensitive nature. Although the Cambodian government sanctioned the large-scale Choeung Ek conservation project, ethically it is important to request family permission to analyze human remains from such a context. However, because the remains at Choeung Ek are unidentified, I was unable to ask family permission to conduct my research. I was granted governmental permission, but it is possible that local individuals, or those who may have lost family members at S-21, may have taken offense to my inquiries. These concerns were never expressed to me, but as best practice, local family and community understanding and cooperation are always advisable in these situations. It is important to note that the remains were not damaged or altered during my research, and I always treated them with the utmost respect that they deserve.

Scientifically and analytically there were numerous potential limitations resulting from this osteological sample. First, only crania were available for analysis, so a complete biological profile and evaluation of postcranial traumatic injuries was not possible which limited analytical interpretations. Second, there were very few juvenile crania which reduced the demographic range available for analysis. Third, age-at-death and sex estimations were restricted to cranial morphology and craniometrics, neither of which are the most accurate method for estimating these variables; thus, misclassifications of sex and age-at-death likely biased the paleodemographic analysis and the overall demographics of this osteological sample. Fourth,

distinguishing between perimortem and postmortem trauma is problematic under the best of taphonomic conditions, but these remains have been exposed to the elements and frequently handled during the past three decades. As with age-at-death and sex estimations, the misclassification of perimortem and postmortem trauma may have biased the final results of this research.

Collectively these biases contribute to the challenges associated with deriving mortality indices and population demographics from human remains, also known as the Osteological Paradox (Wood et al. 1992b). Specifically, considering this skeletal assemblage as representative of the population-at-large is problematic, as is selective mortality since these individuals were executed prior to a natural death (Wood et al. 1992). However, the osteological paradox does call for a population-level approach, which this research has provided, and Wright and Yoder's (2003) reanalysis of Wood et al. (1992) suggests that the incorporation of cultural context is crucial for comprehensive demographic assessments. While the nature of these remains (crania only) cannot be altered, I took the utmost care in estimating the demographics of this sample and the timing of traumatic injuries. Misclassifications inevitably occurred, but I attempted to limit these instances with cautious analysis.

Regarding the statistical analyses conducted for this research, there were a few additional limitations. The inaccuracy of age estimation methods for older adult skeletal remains necessitated a truncation of the osteological data into an age category of 51 years and older. However, the execution lists had detailed records of individuals in their 60s and 70s. The statistical comparison of these different data sets, particularly for young and older adults, likely resulted in some biases and limitations. As mentioned above, the log-likelihood tests to assess the statistical significance between different hazard model variables is conservative and often

produces results that indicate statistical significance. Thus, the samples compared using *mle* may be less distinct than the log-likelihoods are purporting.

Finally, the language difference was a limitation. The need to have a translator present during interviews may have biased the informants' responses, and information was certainly lost during Khmer to English translation. However, having Cambodian translators with me may have been beneficial; the presence of locals (or at least fluent Khmer speakers) as my research assistants may have put the informants at ease, since the sudden appearance of a foreigner asking questions about a difficult time in their history is not always comfortable.

CHAPTER 9: THE ECCC AND ITS USE OF OSTEOLOGICAL DATA

Brief History of the Extraordinary Chambers in the Courts of Cambodia (ECCC)

The Extraordinary Chambers in the Courts of Cambodia (ECCC) was proposed in 1997 and was formally established in 2004 (Ciorciari and Heindel 2014). The ECCC, commonly referred to as the Khmer Rouge Tribunal, is a United Nations-supported court that fuses Cambodian and international law, personnel, and procedures (Ciorciari and Heindel 2014; Hinton 2013b). The ECCC was established in order to prosecute senior DK leaders who were most responsible for grave crimes including genocide, crimes against humanity, breaches of the 1949 Geneva Conventions, and crimes under domestic Cambodian law committed between April 17, 1975 and January 6, 1979 (Heder and Tittemore 2004). According to the ECCC, their prosecutory mandate only applies to the following categories of perpetrators: senior DK leaders and "those believed to be most responsible for grave violations of national and international law" (Extraordinary Chambers in the Courts of Cambodia 2015c). It has been argued that more than the top leaders should be tried at the Court, but as Ciorciari and Chhang (2005) state, there are two primary reasons why this is not feasible; first, it would be prohibitively expensive and time-consuming to try all official members of the CPK and this would politically and culturally destabilize the country, and second, the top leaders bear (legally and perhaps morally) the greatest responsibility for the policies and procedures carried out during the DK era.

Extensive research conducted by Steve Heder and the Documentation Center of Cambodia in the late 1990s and early 2000s has confirmed that numerous policies of mass execution existed throughout the DK period, and that these policies were devised at the highest levels of the CPK by its senior leadership—particularly Nuon Chea, Ieng Sary, Khieu Samphan,

Ta Mok, Kae Pok, Sou Met, and Meah Mut (Heder and Tittemore 2004). Arrests of those considered "most responsible" for the DK-era crimes began in 2007 and the first hearing of the Court was held in February 2008 (Tofan and Van der Wolf 2010). For further details about the Court's development and procedures, see the references cited throughout this section as well as Fawthrop and Jarvis (2004), Ramji and Van Schaack (2005), and the Cambodia Tribunal Monitor (Chronology & Negotiating History n.d.).

ECCC Case Load

The ECCC is responsible for four cases: 001, 002, 003, and 004. Case 001 was the trial of Kaing Kech Ieu, alias Duch, who was the leader of the S-21 security center. Duch was indicted in 2007 and was found guilty of crimes against humanity and grave breaches of the 1949 Geneva Conventions in 2010. He was sentenced to 35 years in prison (Extraordinary Chambers in the Courts of Cambodia 2015b).[18] However, as Ciorciari and Heindel (2014) note, this was a relatively straightforward case with extensive evidence.

In contrast, case 002 is more complex and addresses more offenses. This case involves Nuon Chea, former Deputy Secretary of the CPK, Ieng Sary, former Deputy Prime Minister, Ieng Thirith, former Social Affairs Minister, and Khieu Samphan, former President of the State Presidium (Ciorciari and Heindel 2014; Extraordinary Chambers in the Courts of Cambodia 2015b). Indictments were brought against the four defendants in 2010 with the trial beginning in 2011; the indictments include crimes against humanity, genocide (against the Vietnamese and the Cham Muslims), grave breaches of the 1949 Geneva Conventions, and homicide, torture, and religious persecution under the Cambodian penal code (Extraordinary Chambers in the Courts of

[18] For a more detailed analysis of Duch and his trial see Hinton (2016).

Cambodia 2015b). However, Ieng Thirith was removed from the case due to dementia and Ieng Sary passed away in 2013.

Case 002 has since been separated into separate trials, Case 002/01 and 002/02. Case 002/01 focused on crimes against humanity related to the forced movement of populations from Phnom Penh and executions of Khmer Republic soldiers; Nuon Chea and Khieu Samphan were found guilty of these crimes in 2014 and were sentenced to life in prison. Both defendants filed appeals. The appeals were reviewed, and on Novermber 23, 2016, the final judgment was provided: the Supreme Court Chamber ruled to uphold the convictions and the life imprisonment sentences for both Nuon Chea and Khieu Samphan (Extraordinary Chambers in the Courts of Cambodia 2016d). Case 002/02 encompasses further crimes including genocide against the Vietnamese and Cham, forced marriages and rape, internal purges, security centers, violence at work sites, treatment of Buddhist monks, and targeting of Khmer Republic officials; hearings against Nuon Chea and Khieu Samphan began in 2014 (Extraordinary Chambers in the Courts of Cambodia 2015b).

In the course of writing this chapter, two developments arose in Case 002/02. First, evidentiary hearings in the Trial Chamber for Case 002/02 concluded rather abruptly on January 11, 2017. Closing statements were held from June 13-23, 2017 and the final judgment is forthcoming (Extraordinary Chambers in the Courts of Cambodia 2017a). Second, on February 27, 2017 the Trial Chamber reduced the scope of Case 002 which terminates proceedings for any additional facts not already covered in Case 002/01 or 002/02 (Extraordinary Chambers in the Courts of Cambodia 2017f). Thus, the following facts are excluded from being heard in the case against Nuon Chea and Khieu Samphan: the worksites of Srae Ambel and Prey Sar; the security centers at Sang, Koh Kyang, Prey Damrei Sot, Wat Kirirum, in the North Zone, Wat Tlork, and

Kok Kduoch; the execution sites of District 12 (West Zone), Tuol Po Chrey, and Steung Tauch; phase three of the movement of the population from the East zone; the nationwide treatment of Buddhists; the treatment of the Cham at the Kroch Chhmar security center; and crimes committed by the Revolutionary Army of Kampuchea within Vietnamese territory. The Trial Chamber terminated these proceedings noting that "conducting a further trial in Case 002 would not be in the interests of a fair, meaningful and expeditious procedure" and that the facts adjudicated in Case 002/01 and those heard in Case 002/02 sufficiently covered the "totality of the alleged criminal acts and individual culpability of the Accused" (Extraordinary Chambers in the Courts of Cambodia 2017f). The civil parties who filed claims related to the aforementioned facts will have to rely on the evidence relating to the facts that were already heard in Case 002/01 and 002/02, rather than their own.

In 2008, two new investigations were initiated to pursue additional individuals deemed "most responsible" for Khmer Rouge crimes. These investigations have resulted in Cases 003 and 004 (Ciorciari and Heindel 2014). Case 003 has charged Mr. Meas Muth, former Commander of the Democratic Kampuchea Navy and Division Secretary of the Revolutionary Army of Kampuchea, with genocide, crimes against humanity, grave breaches of the Geneva Conventions of 1949, and violations of the 1956 Cambodian penal code. This case is currently under investigation (Extraordinary Chambers in the Courts of Cambodia 2015d). Case 004 is in progress and focuses on the following alleged crimes: actions against the Cham population in Kampong Cham Province, against the Khmer Krom population in Takeo and Pursat Provinces, against Eastern Zone evacuees, purges of the Central Zone (Kampong Cham and Kampong Thom Provinces), and purges of the Northwest Zone (Pursat, Battambang, and Banteay

Meanchey Provinces). Mr. Ao An and Mr. Yim Tith have been charged in this case (Extraordinary Chambers in the Courts of Cambodia 2015a).

In February 2016, to expedite the judicial proceedings, Case 004 was split resulting in Case 004/01. Ms. Im Chaem, alleged secretary of the Preah Net Preah District in the Northwest Zone, was charged in Case 004/01 with homicide and crimes against humanity at the Phnom Trayoung security center and the Spean Sreng worksite (Extraordinary Chambers in the Courts of Cambodia 2016a; Extraordinary Chambers in the Courts of Cambodia 2016f). In a surprising development, on February 22, 2017, the Co-Investigating Judges in Case 004/01 issued a closing order dismissing the case against Im Chaem. The Judges cited that Ms. Im Chaem's case did not fall within the jurisdiction of the Court as she was not a senior Khmer Rouge leader, nor an individual most responsible for the acts committed (Extraordinary Chambers in the Courts of Cambodia 2017b). The Co-Investigating Judges' reasons for dismissal indicate that the collective evidence against Im Chaem did not adequately demonstrate that she was an individual most responsible under the legal standards of the ECCC (Extraordinary Chambers in the Courts of Cambodia 2017c).

Despite these cases and verdicts, the court and the trials are not without criticism. General critiques suggest that the Court has been the epicenter of corruption and controversies, has been mismanaged by administrative parties, has been extremely costly and inefficient, and there have been extensive political arguments regarding the scope of jurisdiction or prosecution by the Court. Specifically, it has been argued that the United Nations is too involved in the legal process while simultaneously having too little administrative authority, the Court has faced innumerable challenges in trying to blend civil and common law, and the limited capacity of Cambodia's judiciary system has led to extensive political interference (Ciorciari and Heindel

2014). While Ciorciari and Heindel (2014) note that there are some positive aspects that have arisen from the ECCC, such as the inclusion of victims as civil parties, outreach within communities to discuss the Court proceedings, and the legacy of justice and strengthening the local legal system, they ultimately conclude that the ECCC model—that of a hybrid court—should not be followed in the future.

The Use of Osteological Data at the ECCC

History

Throughout the nearly ten years of the ECCC trials, very little reference has been made to forensic evidence, particularly osteological evidence. From a Western medico-legal perspective, this seems unexpected given the thousands of mass graves that have been recorded and the millions of bones that have been unearthed since 1979. It is perhaps even more surprising since Klinkner (2008) states that "the importance of forensic work has been recognized by the ECCC" and that the Office of the Co-Investigating Judges (OCIJ) was interested in exploring the potentials of forensic evidence for their proceedings. In fact, the OCIJ commissioned a forensic needs assessment to be conducted by Dr. Andrew Thompson, a physician who worked with the International Criminal Tribunals for Rwanda and the former Yugoslavia managing their forensic science units; this report was submitted to the OCIJ in 2007, although neither Klinkner (2008) or I were able to access this document since it is still confidential. Another of Klinkner's (2008) interviewees from the court stated that "forensic scientists will help establish a nationwide patterns of systematic mass murder of 'class enemies' of the Khmer Rouge regime, as well as of certain ethnic and religious groups, such as the Muslim Cham, Buddhist monks, Christians, and

the Vietnamese minority." Despite this early interest, the ECCC seems to have eschewed the use of forensic and scientific evidence.

I argue that the primary reason for this minimal inclusion of forensic evidence, specifically osteological evidence, was that Cambodia lacked the appropriate experts to analyze the human remains; therefore, osteological data was not readily available. Both Klinkner (2008) and Pollanen (2002) suggest that the capacity of forensic science within Cambodia was/is limited. However, the ECCC as a UN-supported legal entity responsible for documenting crimes and holding individuals accountable for the atrocities committed during Democratic Kampuchea, could have requested international experts to assist with such analyses as has occurred in post-atrocity nations across the globe.

This is not to say that osteological analyses and forensic research have not been conducted in Cambodia. As mentioned briefly in Chapter 4, between 1988 and 1989, a Vietnamese team from Ho Chi Minh University, directed by Professor Quang Quyen and Dr. Tran Hung, was commissioned by the Phnom Penh Municipality Department of Culture to scientifically analyze the crania at Choeung Ek (Fawthrop and Jarvis 2004). Over the course of three trips, according to Fawthrop and Jarvis (2004), this Vietnamese team evaluated 8,000 crania to estimate their age, sex, ancestry, and causes of death; they also coated the remains with a preservative. However, according to Mr. Voeun Vuthy, the director of the Choeung Ek Conservation Project, the Vietnamese only cleaned the remains with water and lye and wrote identification numbers on approximately 4,000 crania; this Vietnamese team did not chemically preserve the remains or scientifically analyze them (personal communication, December 15, 2105). Precisely what this Vietnamese team did, and whether or not they preserved the remains and/or conducted osteological analyses is limited to personal accounts since no reports have been

made public (Klinkner 2008). The Documentation Center of Cambodia (DC-Cam), the staff at the Choeung Ek Genocidal Center, Mr. Tom Fawthrop and Dr. Helen Jarvis, and even the investigative divisions of the ECCC have been unable to locate or obtain any reports by the Vietnamese regarding their work at Choeung Ek in the 1980s.

In the early 2000s, the Documentation Center of Cambodia, in collaboration with the Coalition of International Justice, Dr. Michael Pollanen, a Canadian forensic pathologist, and Dr. Craig Etcheson, initiated a three-phase project to assemble forensic data about the deaths during DK. Phase one was an initial assessment of human remains at three memorial sites in Cambodia: Kampong Speu, Pomhea Leu (Oudong), and the former Sang Prison (this is likely the same memorial I visited at the village of Trapeang Sva) (Pollanen 2002). The purpose of this project was to provide general evaluations of the conditions of the human remains, to cursorily document osteological evidence of trauma, and to provide recommendations regarding the feasibility of future medico-legal analyses of human remains and mass graves in Cambodia (Pollanen 2002). Phase two of this project involved "detailed reconnaissance of mass graves to identify potential candidate sites for a full-scale forensic exhumation" and collection of a representative sample of human remains with traumatic injuries to be curated in a museum exhibit (Documentation Center of Cambodia 2004b). Phase two was completed in 2003. For various reasons, the exhumation of a mass grave proposed as Phase three of the project was never realized (Documentation Center of Cambodia 2004b). This was the first, and only, forensic project to be undertaken in Cambodia emphasizing the human skeletal remains from the Khmer Rouge period.[19]

[19] Recall from Chapter 4 that the work conducted by the Cambodian team at the Choeung Ek Genocidal Center was not forensic in nature, nor was the research for this dissertation. While the goals of the Documentation Center of Cambodia's project were not to provide evidence to a court of law, the experts involved were forensic practitioners.

As part of the DC-Cam project's Phase two, an exhibition of human remains with traumatic skeletal injuries was established at the Tuol Sleng Genocide Museum. The goal of this phase of the project was to preserve and curate "a representative sample of traumatized human skeletal remains from memorial sites, and then to characterize these remains using standard forensic methods" (Documentation Center of Cambodia 2004b). In addition to documentation and curation, it was proposed that this exhibit would educate Cambodians and foreign tourists about the violence that transpired during the Khmer Rouge period by displaying examples of osteological trauma. The exhibition was launched in 2004 and displayed 10 crania from various memorials throughout the country. These crania were scientifically evaluated by Dr. Michael Pollanen and Dr. Katharine Gruspier, a forensic anthropologist, who documented evidence of blunt force trauma (n = 3), sharp force trauma (n = 3), and gunshot wounds (n = 4) (Documentation Center of Cambodia 2004a; Documentation Center of Cambodia 2004b). Nine of the ten crania were assessed to be male and one was female with ages-at-death estimated to be between 20 and 55 years old (Documentation Center of Cambodia 2004b). These ten crania are still on display at the Tuol Sleng Museum, although there is no information about why they are being exhibited (Figure 90). Each cranium is accompanied by a small metal plaque describing its biological information and the traumatic injury present, but there is no overarching explanation about the project, its intended purpose, or how the conclusions were drawn.

Additional analyses of human remains have occurred, but again, these were not forensic or comprehensive. In 2003, while on a Southeast Asian mission for the Joint POW/MIA Accounting Command (JPAC) (now referred to as the Defense POW/MIA Accounting Agency, DPAA), Dr. Gregory Berg and Ms. Sabrina Ta'ala visited Cheoung Ek to collect mandibular metrics and cranial non-metrics, respectively. While examining the crania, Ms. Ta'ala noticed

Figure 90. The crania in the glass boxes atop the black stands are from the DC-Cam forensic exhibition. The small plaques at the top of each stand provide brief descriptions of each cranium. Note the Vann Nath painting hanging on the wall to the left.

numerous instances of traumatic injury as well as pathologies such as porotic hyperostosis and cribra orbitalia (Sabrina Ta'ala, personal communication). Numerous publications have resulted from these osteological analyses: Berg (2008a); Berg (2008b); Berg (2015); Ta'ala et al. (2006); Ta'ala et al. (2008). Finally, throughout the course of the Choeung Ek Conservation project, according to conversations with Mr. Voeun Vuthy and a final report presented during a ceremony at the Phnom Penh City Hall in May, 2016 (Voeun 2016), various international scholars visited the osteology laboratory. To my knowledge these scholars were not forensically

trained, but at least two of them, Dr. Nancy Beavan and Dr. Michael Gantley, helped teach the Choeung Ek team about human osteological analysis. In addition to Dr. Beavan and Dr. Gantley, a German scholar who helped preserve human remains in Kosovo visited, along with myself, and two University students (from Hawaii and the Philippines) who participated in a skeletal conservation workshop (Voeun 2016). It is not clear whether these scholars conducted research with the human remains at Choeung Ek or whether they came to offer assistance/training.

As far as I have been able to ascertain, none of the aforementioned international research or studies were used as evidence in any of the ECCC trials to date. While human remains have been mentioned at various periods throughout the Case 001 and Case 002 trials, forensic and/or scientific analyses of osteological material have not been discussed in detail. Given the confidential nature of aspects of the ECCC, it is certainly possible that the above studies/research were brought to the attention of the OCIJ or the Trial Chamber Judges during the investigative and pre-trial periods, but as for testimony specifically related to human remains, it has been extremely limited over the past nine years.[20]

Osteological Expert Witness Testimony in Case 002/02

A dramatic shift occurred on December 13 and 14, 2016, when Mr. Voeun Vuthy, the Director of the Department of Archaeology and Prehistory at the Ministry of Culture and Fine Arts, was called as an expert witness to testify at the ECCC for Case 002/02. Voeun Vuthy has a Master's degree in Zooarchaeology and is a specialist in prehistoric Cambodian archaeology. As

[20] It is certainly possible that I have overlooked the presentation of some osteological evidence, but after thorough searches of the ECCC's archive, the Cambodia Tribunal Monitor (http://www.cambodiatribunal.org/), and personal discussions with Dr. John Ciorciari and Mr. Youk Chhang, it is my assessment that very little mention has been made of human remains during the ECCC trials.

the director of four projects to preserve and analyze human skeletal remains from the Khmer Rouge era, Voeun Vuthy was requested to testify about his osteological analytical work at the Choeung Ek Genocidal Center and the site of Kraing Ta Chan in Takeo Province.[21] These two days of testimony were video recorded—with English and French translations provided in real time—and later transcribed in English and French; these videos and transcriptions are available on the ECCC's website (Extraordinary Chambers in the Courts of Cambodia 2016g).

The testimony of Mr. Voeun Vuthy was the culmination of evidentiary protocols that began with a request from defendant Nuon Chea on April 21, 2016 that an article in the *Phnom Penh Post* newspaper titled "Skull by Skull, Team Catalogues KR Killings" be admitted into the court as evidence (Extraordinary Chambers in the Courts of Cambodia 2016b). The article was published months before on February 6, 2016 and describes the osteological analysis and preservation work that Voeun Vuthy and his team conducted at the Choeung Ek Genocidal Center, particularly their documentation of traumatic injuries to the crania (Crane 2016). The request of Nuon Chea was granted, and after further investigation—including contacting Veoun Vuthy, myself (I was quoted in the *Post* article), and Ms. Ros Sophearavy, the Vice President of the Cheoung Ek Genocidal Center—the Court obtained the following information: 1) Of the 32 volumes created at the completion of the Choeung Ek Conservation of Victims at the Killing Fields Project, the ECCC Library had been in possession of 11 volumes since January 2015; 2) "The Choeung Ek Study is not a 'forensic report' but is 'an osteological (bone) study with an emphasis on skeletal trauma;'"[22] and 3) An External Program Evaluation Report of the Choeung

[21] I acquired funding for an additional cooperative analysis and conservation project for human remains from the Khmer Rouge period (Fleischman 2016).
[22] These direct quotes, although not cited as such, were provided by me in an email on April 21, 2016 to Mr. Roger Phillips, a legal officer for the Trial Chamber Judges at the ECCC.

Ek Conservation Project, authored by Dr. Nancy Beaven, had been available in the ECCC Library since February 2016 (Extraordinary Chambers in the Courts of Cambodia 2016b).

On May 23, 2016 the Trial Chamber ruled that the Evaluation Report, the preface to each of the 32 Choeung Ek volumes, an example of a page from one of the volumes depicting the analysis conducted, photographs indicating the implements used as weapons at Choeung Ek, and summary charts of the Choeung Ek study's findings all be admitted as evidence to the Court. Additionally, the Trial Chamber granted Nuon Chea's defense team's request co call Mr. Voeun Vuthy to testify on the methods and procedures used to conduct the Choeung Ek project (Extraordinary Chambers in the Courts of Cambodia 2016e). Thus, Voeun Vuthy was summoned by the Court to testify in December 2016.

Over the course of two days, Voeun Vuthy testified for approximately five hours and was questioned by the Trial Chamber President, Judge Nil Nonn, Trial Chamber judges, the co-defense lawyer for Nuon Chea, Mr. Victor Koppe, and assistant prosecutor, Mr. Dale Lysak. The general scope of the questions by the defense and the prosecution focused on clarifying the scientific methods Voeun Vuthy and his team used to analyze the human remains at the sites of Choeung Ek and Kraing Ta Chan, and the subsequent results of these studies. The site of Choeung Ek was the primary focus, with Kraing Ta Chan only being discussed briefly at the end of the questioning sessions for both the defense and prosecution.

The video recordings and transcripts of these Trial Chamber sessions are archived on the ECCC's website. Between January 14 and 31, 2017 I watched the video recordings and reviewed the transcripts of Voeun Vuthy's testimony. To my knowledge, this was the first time that osteological evidence from the Khmer Rouge period had been formally presented in this Court. As such, it was clear that there were challenges for both the lawyers and Voeun Vuthy

resulting from the use of scientific language, translations of such terminology into the three languages of the Court (Khmer, English, and French), and the ability to describe and comprehend scientific analytical procedures, techniques, evidence, and conclusions. Despite these challenges, valuable information was presented and informative and probing questions were asked.

It is beyond the scope of this chapter to summarize five hours of testimony, but I will discuss some of the salient questions and corresponding answers and data. The testimony began with the Trial Chamber President asking Voeun Vuthy to describe his educational background and experience. In addition to the osteological analytical and conservation projects at the Choeung Ek Genocidal Center and Kraing Ta Chan, Voeun Vuthy stated that he and his team completed two additional projects with Khmer Rouge period human remains at Wat Prasat Vitei (វត្តប្រាសាទវដ្ដី) in Kampong Cham and Wat Kok Prech (វត្តគោកព្រេច) in Takeo province (Extraordinary Chambers in the Courts of Cambodia 2017d). The primary goals of these projects were to maintain the available evidence for the next generation, to prevent the return of the Khmer Rouge regime, and to document the trauma and torture inflicted upon the victims. Again, we see the perpetuated use of prior governmental rhetoric regarding the human remains as evidence for the next generation, and despite the Khmer Rouge regime having officially become defunct more than 20 years ago, the discourse of preventing their return is still prevalent.

When the President asked Voeun Vuthy why he was interested in conducting projects at these four sites of mass death, he replied that he is a victim of the Khmer Rouge regime. His father, a teacher, was killed and six other family members died (Extraordinary Chambers in the Courts of Cambodia 2017d). While we were working together at Choeung Ek, Voeun Vuthy shared these same sentiments with me. When I asked him why it was important to study and

preserve the remains, he said it is primarily because of his family that he does this work. He lost family members so he has a desire to learn more about their fates and that of thousands of others. He also wants to make sure that he is training the future generation of Cambodian archaeologists and osteologists so this type of work can continue in the future. Similar statements were made by members of his team; at the end of my time at Choeung Ek I interviewed all of my Cambodian colleagues and asked why they wanted to pursue this type of work. Many said they had lost family members and therefore wanted to know what happened to victims and to learn about the history of this period and these individuals (personal communications with Choeung Ek osteology team members, 2015).

The President continued by asking Voeun Vuthy about the methods used for the analysis and conservation of the human remains at Choeung Ek. At the outset of the project, Voeun Vuthy indicated that he and his team conducted research and interviews with witnesses (such as Him Huy) to find out what transpired at the site in the late 1970s. Then they followed 12 steps to remove the remains from the *stupa*, clean them, photograph them, analyze, and preserve them (Extraordinary Chambers in the Courts of Cambodia 2017d). Regarding the results of the Choeung Ek analysis, Voeun Vuthy indicated that between 2013 and 2015 his team documented 6,426 crania with 28,083 marks of osteological trauma/torture and an additional 63,112 postcranial elements and cranial fragments.

When the crania were analyzed for demographics, the team concluded that there were 4,798 males, 1,611 females, and 17 crania of indeterminate sex; when divided into age categories there were 13 individuals between the ages of three and eight years, 241 between eight and 19 years of age, 3,984 between 20 and 34 years, 1,894 between 35 and 45 years, 273 between 50 and 69 years, 18 older than 70 years, and three of indeterminate age (Extraordinary Chambers in

the Courts of Cambodia 2017d). Returning to the traumatic injuries, the team documented cranial damage resulting from being struck with bamboo, square wooden sticks, rounded iron bars, iron rods, and farming hoes; they were stabbed with knives and axes and had their ears cut off; they were shot with guns, were impaled with bayonets, had their throats slit, and ingested poison. Marks of torture on the crania included "pushing against solid material," being stabbed or poked with the point of a gun or the tip of an iron rod (rifle cleaning rod), having iron tools poked into their ears, and signs of medical torture. The number of individuals affected by each of these categories was unclear during the testimony so I have refrained from providing frequencies. Ultimately, Voeun Vuthy stated that among the 6,426 crania analyzed at Choeung Ek, *only one* did not show evidence of torture or trauma (Extraordinary Chambers in the Courts of Cambodia 2017d).

Another interesting element of the testimony involved the number of individuals represented by the bones in the *stupa* at Choeung Ek. The initial count of individuals in the 1980s produced the number 8,985 which was recorded on a plaque and placed in the original stupa (Figure 7, middle image) (Extraordinary Chambers in the Courts of Cambodia 2017e). This figure has been reiterated repeatedly, particularly in English-language scholarly literature. However, neither Voeun Vuthy nor the Court has been able to locate the original documentation of this figure and how it was derived. By 2010, when the Choeung Ek conservation project was in the initial planning stages, Voeun Vuthy indicated that he was informed that the number was actually 7,500 individuals (Extraordinary Chambers in the Courts of Cambodia 2017e). He said the discrepancy in numbers is due to numerous factors: the remains were fragmented and cranial elements were likely miscounted, some remains fell back into the grave pits in the intervening time between when they were exhumed and placed in the original wooden *stupa* (Figures 6 and

7), and some of the remains were eaten by cows. Ultimately, Voeun Vuthy and his team documented only 6,426 crania in total (Extraordinary Chambers in the Courts of Cambodia 2017e). As the defense counsel pointed out, however, there are other skeletal elements that are more numerous than the crania. For example, the team identified 7,708 right humeri, indicating that the minimum number of individuals is actually higher than 6,246 and perhaps closer to the original estimate (Extraordinary Chambers in the Courts of Cambodia 2017e).

Additional questions were put to the expert regarding the provenance of the human remains within the *stupa* at Choeung Ek. The defense counsel repeatedly asked Voeun Vuthy how he and his team were able to scientifically determine that the human remains at Choeung Ek are in fact from the 1977-1979 mass graves at Choeung Ek rather than remains of individuals buried in the original Chinese cemetery, or remains that were brought in from elsewhere and buried (Extraordinary Chambers in the Courts of Cambodia 2017e). The answer to this question was rather convoluted but the expert provided the following information: the remains from the mass graves were distinguished from all others because there was marks/evidence of killing, and the remains from the mass graves had mud embedded within the trabecular bone spaces indicating that the remains had been buried without a coffin. Unsatisfied with this answer, and after objections from the prosecution and discussions with the President, Mr. Koppe said the following: "I believe this is forensic pathology 101, Mr. President. I'm just trying to establish the chain of custody…So my question again is: How do we know, in this very specific case—and I think that's a valid question—that this particular [cranium] was, in fact, executed in Choeung Ek and wasn't someone who was buried at the Chinese graveyard or the victim of another execution?" (Extraordinary Chambers in the Courts of Cambodia 2017e). As will be

discussed below, this is a valid and important question, but poses a challenge to an expert who never intended to testify about this osteological research.

Another point of contention arose when distinguishing between signs of osteological trauma and torture. Mr. Koppe provided the example of cranium number 6201 from the Choeung Ek project. The English translation of the record for this particular cranium was read by Mr. Koppe: "After the analysis and based on the evidence of the cracks in the skull, for example, the first crack in the right skull; hit with a hard object, breaking the bone, the second crack in the left skull; hit with a hard object, breaking the bone, the third crack in the forehead; hit with a hard object, breaking the bone, and the fourth crack in the right skull line; hit with a hard object, breaking the bone. This victim was found to be brutally tortured before being killed" (Extraordinary Chambers in the Courts of Cambodia 2017e). Mr. Koppe requested clarification regarding the determination that these traumatic injuries represented torture rather than execution. Again, after an elaborate answer, one of the Trial Chamber Judges, Ms. Claudia Fenz, summarized Voeun Vuthy's statements as follows: torture is indicated when the individual did not die immediate from the blows rendered, therefore indicating suffering over a long period of time. The expert confirmed this summary indicating that depressions or "dents" in the bone did not result in immediate death and are indicative of torture; if the individual was struck as a means of execution, there would be a hole in the bone rather than a depression (Extraordinary Chambers in the Courts of Cambodia 2017e). The defense counsel pushed forward and finished the session by asking, and receiving confirmation from Voeun Vuthy, that the conclusions of this research regarding evidence of killing and torture were only possible due to the acquisition of information provided by outside sources (*i.e.*, Him Huy) as well as the osteological evidence (Extraordinary Chambers in the Courts of Cambodia 2017e). From a scientific perspective, this

would make for a very interesting case study on the impacts of cognitive and confirmation biases (Edmond et al. 2017; Kassin et al. 2013; Nakhaeizadeh et al. 2014) when conducting osteological analyses, whether they be forensic, historic, or bioarchaeological.

In the next trial session, Mr. Koppe transitioned to asking questions about the site of Kraing Ta Chan. Mr. Koppe confirmed with Voeun Vuthy that he and his team documented 1,904 crania, but like Choeung Ek, noted that there was a discrepancy between the number of crania analyzed by Voeun Vuthy and the reported number of deaths at the site. According to a document from DC-Cam, the deaths of 10,042 individuals occurred at Kraing Ta Chan (Extraordinary Chambers in the Courts of Cambodia 2017e). Voeun Vuthy said that the number of 10,042 individuals was provided by villagers who lived in the area after the fall of the Khmer Rouge who may have been present when the mass graves were exhumed. To conclude his questioning, Mr. Koppe asked Voeun Vuthy what might explain the discrepancy in the number of crania. Voeun Vuthy stated that perhaps the number of individuals was a sum of different exhumations or that the remains had not been properly counted (Extraordinary Chambers in the Courts of Cambodia 2017e). Mr. Voeun Vuthy did not hypothesize about additional reasons that there were fewer human remains, as he had done with the disparity at Choeung Ek. Mr. Koppe thanked the witness but said he was out of time.

The floor was then given to the Co-Prosecutor, Mr. Lysak. Mr. Lysak began his questioning of the witness by asking for confirmation about the dates of the original exhumations at Choeung Ek, the number of mass graves exhumed compared to the total presumed number of graves, and who conducted the original exhumations. Voeun Vuthy confirmed that 86 of the 129 mass graves were originally exhumed in the early 1980s by local individuals searching for ordinary items that may have been buried with the victims. Later the PRK's Office of Culture

and Cult oversaw the exhumations (Extraordinary Chambers in the Courts of Cambodia 2017e). Mr. Lysak continued by asking questions about the provenance of photos purportedly taken of human skeletal remains at Choeung Ek as well as about the location of the un-exhumed mass grave pits. Voeun Vuthy could confirm the provenance of some of the photos, but not others. Regarding the unearthed mass graves, Mr. Voeun Vuthy stated that he is aware of their locations and that he "actually made a request to the government to exhume those pits, but [the government] did not allow us to exhume any more pits" (Extraordinary Chambers in the Courts of Cambodia 2017e).

Mr. Lysak then shifted to asking questions about whether executions of prisoners at S-21 occurred elsewhere prior to the establishment of Choeung Ek. Voeun Vuthy provided personal anecdotal evidence that in 1998 when he visited a friend who lived in the vicinity of Tuol Sleng, this friend stated that when he dug into the soil of his banana plantation, he would often come across bones. Voeun Vuthy also stated that during his pre-research interviews, Mr. Him Huy said that initially victims were buried near Tuol Sleng after they were executed (Extraordinary Chambers in the Courts of Cambodia 2017e).

Mr. Lysak continued by asking the witness whether he was able to differentiate between the graves of the Chinese cemetery and the mass graves of the Khmer Rouge period. Perhaps misunderstanding the question, Mr. Voeun Vuthy said that in his analysis of the skeletal remains, he was not able to identify any remains that belonged to those who were buried in the Chinese cemetery. After further questions regarding whether the bones of the Chinese individuals could be distinguished from those of Khmer Rouge victims, Voeun Vuthy again stated that they had not found the remains of individuals of Chinese descent, as there would be differences in the conditions of the remains: 1) the Chinese crania would not have marks of trauma or torture, and

2) the bones would have been clean and free of mud and soil because the Chinese bury their dead in coffins (Extraordinary Chambers in the Courts of Cambodia 2017e).

In the final session of testimony, Mr. Lysak again questioned Mr. Voeun Vuthy about photographs of the original wooden memorial at Choeung Ek and then the concrete memorial *stupa* that was constructed in 1988. Again, Voeun Vuthy confirmed that the images presented were of the memorial structures at Choeung Ek. Advancing to perhaps a more important question, Mr. Lysak asked the witness about the number of bones and the corresponding number of individuals analyzed at Choeung Ek. In the Choeung Ek report, the chart indicating the total number of skeletal elements states that the team found 7,708 right humeri and 7,673 left humeri. Mr. Lysak correctly asks "Does this not mean that there were at least 7,708 bodies in the Choeung Ek graves?" If this is the most numerous of the skeletal elements documented, scientifically this number does represent the minimum number of individuals. However, Voeun Vuthy responded by stating that because many of the postcranial elements did not have evidence of trauma or torture, they did not use postcranial remains to determine the total (or minimum) number of individuals: "We only focused or concentrated on the (marks) on the crania. And of course, if you counted the limbs part, the humerus part, you could say that could compose or become the number of individuals, but we made our inventory list with the main focus on the accounting of the crania because those crania had marks of execution or marks of torture" (Extraordinary Chambers in the Courts of Cambodia 2017e). The Co-Prosecutor was satisfied with that answer and moved on.

The next series of questions concerned the evidence of trauma and torture on the crania. According to the Choeung Ek report, Voeun Vuthy and his team documented 9,802 examples of trauma resulting from being beaten on the neck with wood and bamboo sticks as well as 2,435

examples of individuals being struck with square sticks and 5,806 injuries resulting from being beaten with a steel bar or cart axle. In total, the team documented 28,000 traumatic injuries to the 6,426 crania at Choeung Ek. Mr. Lysak asked why the total number of injuries was so high. Voen Vuthy responded that on nearly every cranium, there were multiple impacts—ranging from two impacts to the maximum of nine impacts (Extraordinary Chambers in the Courts of Cambodia 2017e). The following question addressed whether the cutting of victim's throats was common practice as Him Huy and others had stated, and whether evidence of throat cutting could be documented by analyzing crania. Voeun Vuthy stated that according to Him Huy every victim's throat was slit, and that there were many examples of trauma to the bones of the throat and neck (anatomically distinct from the cranium which was the focus of this research) of individuals whose throats had been cut severely (Extraordinary Chambers in the Courts of Cambodia 2017e).

Before concluding, Mr. Lysak asked a few questions about the analysis conducted at Kraing Ta Chan. Again, there were questions as to the number of possible victims at the site and how this number was derived to which Mr. Voeun Vuthy stated that he received the same total of approximately 10,000 victims as word of mouth from members of the local community; he said he had "many interviews and figures. But they are not eligible. That figure is not really scientifically (or historically) based, so I cannot say anything about it" (Extraordinary Chambers in the Courts of Cambodia 2017e). The final question put to the witness involved the traumatic injuries. Reading from the Kraing Ta Chan report, Mr. Lysak stated that the team documented 2,623 examples of being struck with a wooden stick or piece of bamboo and 1,933 examples of being beaten by a piece of round iron or a cart axle. He then asks "Is it correct that the evidence you found of trauma, the most common forms of trauma to the skull…at Kraing Ta Chan was

similar to the evidence that you found at Choeung Ek in terms of what the most common markings of force were?" Mr. Voeun Vuthy said he was surprised to find that in fact the mechanisms of injury were similar. However, he is not sure whether the methods of execution were systematic across the country or whether those instructed to kill were taught specific methods. Voeun Vuthy concluded his testimony by stating that this was an interesting question for both national and international researchers (Extraordinary Chambers in the Courts of Cambodia 2017e).

At the time this testimony concluded on December 14, the President of the Trial Chamber stated that the witness would need to return to the Count to complete his testimony. The President confirmed with Mr. Voeun Vuthy that the second week of January, 2017 would be an appropriate time. However, this further testimony never transpired as the entire Case 002/02 ended with Closing Statements on January 11, 2017.

Challenges and Implications

The ECCC is part of the international transitional justice system. Transitional justice is a relatively new field that has taken shape in the wake of the Nuremberg and Tokyo War Crimes Trials, the increased rhetoric of human rights after the adoption of the UN Declaration of Human Rights and the Convention on the Prevention and Punishment of the Crime of Genocide in 1948, and the shift in the 1980s of numerous Latin American and African countries from military dictatorships to democracies (Hinton 2010). Generally, transitional justice is defined as the process of moving from an authoritarian and often violent past to a more democratic and liberal future by addressing and redressing the harm caused by the authoritarian state. In recent years, however, this definition has expanded to include recourse for human rights violations in general

as well as the advancement of social justice and local development. The field of transitional justice is now firmly rooted in practices such as truth commissions, prosecutions, amnesties, and memorialization, as well as institutional structures including nongovernmental organizations (NGOs), international courts and tribunals—the International Criminal Court (ICC), the International Criminal Tribunal for the former Yugoslavia (ICTY), and the International Criminal Tribunal for Rwanda (ICTR)—and the United Nations Development Program (UNDP) (Hinton 2010). The ECCC was developed within this context of tribunals, human rights, and prosecution and can therefore readily be considered a cog in the transitional justice machine.

However, the practices and institutions of transitional justice are not without challenges; they can result, as Hinton (2010) suggests, in unintended consequences or "frictions." While in many cases these "frictions" refer to the tensions between the international mechanisms of transitional justice and local understandings of justice or reconciliation (Drexler 2010), in the case of Cambodia, these frictions can be extended to the intersection of the transitional justice practices and local conceptions of preserving history.

As discussed previously, the "Choeung Ek Conservation of Victims at the Killing Fields" project and the osteological project at the site of Kraing Ta Chan were not forensic initiatives. The impetus for these projects did not derive from the ECCC, nor was the purpose to collect evidence of violent death to be used in a criminal court. Rather, these projects were initiated by the Ministry of Culture and Fine Arts and/or community members with the goal of preserving the human remains and protecting them against further environmental degradation. While data concerning traumatic injuries, demographics, and bone condition were collected as elements of these project, and anthropological techniques were used to produce these data, the objectives

were conservation of the deteriorating human remains within memorials and historical accounting of the Khmer Rouge period.

However, when Mr. Voeun Vuthy was subpoenaed as an expert witness by the ECCC and testified about his analyses and conclusions regarding the human remains, these historical, osteological data were transformed into forensic evidence. While the scientific techniques for analyzing human remains are similar for forensic and non-forensic cases, as discussed in Chapter 3, the questions that are being asked, and the broader contextualization, can be dramatically different between forensic and historical documentation. As such, a "friction" developed. How does one convert non-forensic osteological data into forensic evidence that is being used to address the larger patterns of violence and death perpetrated by the Khmer Rouge? What challenges arise when this occurs? How does this affect the "typical" transitional justice practices, particularly those of international criminal tribunals such as the ECCC?

Given that forensic anthropologists and archaeologists have been involved in exhuming mass graves and analyzing the associated human remains for decades, and that courts established to prosecute individuals for war crimes and genocide have an even longer history, it seemed that turning to the literature to evaluate the cycle of 1) locating mass graves, 2) exhuming them, 3) assessing the remains within, and 4) testifying about these data in court would be informative. As I discovered, this "graves-bones-court" cycle is not well documented. A database or compilation of mission reports documenting the various countries/regions in which anthropologists and archaeologists have exhumed mass graves does not exist; therefore, a comprehensive record of osteological analyses and subsequent legal testimony is also absent. Individual organizations such as Physicians for Human Rights (PHR), the Argentine Forensic Anthropology Team (Equipo Argentino de Antropología Forense, EAAF), the Peruvian Forensic

Anthropology Team (Equipo Peruano de Antropología Forense, EPAF), the UN-supported ICTY and ICTR, and the Guatemalan Forensic Anthropology Foundation (Fundacion De Antropología Forense De Guatemala, FAFG), keep records of their own projects and contributions, but which aspects of the graves-bones-courts cycle they have participated in is not abundantly clear.

The one, and to my knowledge only, attempt to assemble this information was undertaken by Steadman and Haglund (2005). In their survey of EAAF, FAFG, ICTY, and PHR reports, they found that anthropologists and archaeologists were deployed to 33 countries to investigate human rights atrocities from 1990 to 1999. However, given the variable level of detail provided and the inaccessibility of some reports, their ability to determine the precise role(s) of the anthropologists and archaeologists was restricted. Despite these limitations, Steadman and Haglund (2005) concluded that in addition to the more traditional roles of excavating and analyzing human remains, forensic anthropologists and archaeologists also contribute to logistics, assisting forensic pathologists, database management, project administration, and international legal testimony.

While this was a tremendous step for the quantification of anthropological and archaeological involvement in post-conflict forensic investigations, their article does not provide the level of detail required to answer the questions I posed above. For example, what are the 33 countries in which forensic anthropologists have consulted or worked and who commissioned the work? Was the primary goal of these projects to analyze the human remains and provide legal testimony concerning violence, therefore making the projects forensic, or was the goal to locate mass graves, exhume the remains, identify the individuals, and return them to their community or families—a more humanitarian objective? Is it more common for anthropologists and archaeologists to be involved in international projects that result in criminal proceedings (as a

form of transitional justice) or projects that do not have legal implications at their inceptions? Additionally, the article (published more than 10 years ago) addresses project that occurred approximately 20 to 30 years ago. How have forensic anthropological/archaeological contributions to this type of work changed over two decades? This requires a new research initiative that cannot be addressed by this dissertation, but it does raise interesting ideas for future research.

Returning to Cambodia, how does the osteological testimony at the ECCC in 2016 fit into the graves-bones-courts cycle? Although the frequency of legal testimony regarding human remains disinterred from mass graves has not been officially quantified, the available information suggests that it is relatively infrequent. Between 1984 and today, approximately 24 forensic anthropologists/archaeologists have testified about osteological evidence in seven different legal venues: the trials of three Argentine juntas, the ICTY, ICTR, the National Courts of Guatemala, the International Criminal Court (ICC), the Iraqi High Tribunal, and the Special Court for Sierra Leone (SCSL) (Congram et al. 2016; Eisenbrandt 2013; Roberts 2013; Derek Congram, personal communication). The first forensic anthropologist to provide legal testimony about osteological data resulting from mass violence was Dr. Clyde Snow at the trials of the Argentine junta members in 1985 (Doretti and Snow 2003). But who initiated this work?

The first exhumations of mass graves with the assistance of forensic anthropology/archaeology occurred in Argentina in the mid-1980s. Between 1983 (the end of the dictatorship) and 1986, grave exhumations were ordered by local judges (Doretti and Snow 2003). However, these exhumations were not conducted professionally, so the Argentine truth commission—the National Commission on Disappeared People (CONADEP)—and the Grandmothers of the Plaza de Mayo requested the international assistance of the American

Association for the Advancement of Science (AAAS) to provide qualified personnel to exhume the mass graves. Dr. Snow traveled to Argentina to assist, trained local professionals which eventually resulted in the establishment of the EAAF, and provided legal testimony. While this work was originally commenced by local judges and the truth commission, due to unstable governmental conditions, the investigations/exhumations of the EAAF in Argentina between 1986 and 2001 shifted to be more humanitarian in nature rather than legal (Doretti and Snow 2003). Thus, the genesis of anthropological contributions to mass grave exhumation and osteological analysis began within a legal framework, but transitioned to a more humanitarian endeavor when political circumstances fluctuated.

While forensic anthropologists and archaeologists have conducted mass grave exhumations and osteological analysis since the 1980s, not all of this evidence has gone to trial. What follows is a brief outline of the cases that have gone to trial with testimony given by anthropologists or archaeologists. Excavations and analysis of remains in the Balkans began in 1996 under the direction of Office of the Prosecutor for ICTY with the intention of using the resulting evidence in the court. Between 1998 and 2013 at least six forensic anthropologists or archaeologists testified in various trials regarding the mass gravesites and/or the human remains resulting from court-initiated investigations (International Criminal Tribunal for the former Yugoslavia 1998; International Criminal Tribunal for the former Yugoslavia 2013; Juhl 2005).

In Rwanda, exhumations of graves, and the analysis of human remains at the Kibuye Roman Catholic Church and the Home St. Jean Complex were commissioned by the ICTR. At least two forensic anthropologists testified in the subsequent trials about this evidence (Juhl 2005). In 2002, on behalf of the Office of the Prosecutor of the Special Court of Sierra Leone (SCSL), forensic anthropologist Dr. Willliam Haglund was asked to investigate and later exhume

mass graves in Sierra Leone. Dr. Haglund testified about his findings at the SCSL in 2005 (Special Court for Sierra Leone 2002; Special Court for Sierra Leone 2005). Following the invasion of Iraq in 2003, the U.S. Department of Justice's Regime Crimes Liaison Office (RCLO), in agreement with the Iraqi High Tribunal (a national court established to hear crimes from Saddam Hussein's Ba'ath Party regime), began investigating mass graves. Three forensic anthropologists and archaeologists later testified at the Iraqi High Tribunal during Saddam Hussein's *Anfal* trial (Kelly 2007). In the Democratic Republic of Congo, the Office of the Prosecutor at the International Criminal Court commissioned a forensic team to exhume bodies from graves in 2014. In 2016, forensic archaeologist Dr. Derek Congram provided his testimony about this work at the ICC (International Criminal Court 2016). These cases therefore share a common thread: the investigations and exhumations of mass graves and the subsequent legal testimony were initiated by a legal body, generally a criminal court, to provide evidence of violence and egregious crimes.

The one outlier is the work of the FAFG in Guatemala. After the collapse of the military regime in Guatemala, exhumations of mass graves were initially requested by communities and survivors, and later by the UN Commission for Historical Clarification (CEH)—although akin to Argentina, these initial exhumations were done unprofessionally (Juhl 2005). To rectify the situation, local judges sought assistance from AAAS's Committee for Scientific Freedom and Responsibility who brought Dr. Snow to Guatemala. Over the subsequent years, with help from the EAAF team, multiple mass graves were exhumed; eventually this work led to the creation of the FAFG (Stuesse et al. 2013). The domestic trial of Ríos Montt, Guatemala's de facto president and military leader from 1982 to 1983, at the National Courts of Guatemala did not begin until 2012 (Open Society Justice Foundations). While the FAFG was asked to produce

reports for the CEH based upon their exhumations and analyses (Stuesse et al. 2013), and many members of the FAFG testified in the Montt case in 2013 (Eisenbrandt 2013; Roberts 2013), the initial exhumations and osteological analyses were not commissioned by courts and were not intended to be used as legal evidence.

Although at this time the available information concerning legal testimony resulting from exhumation or analyses of remains from mass graves is limited (particular since pre-trial or depositional statements are usually not available to the public), the general pattern distilled from the above examples suggest that the assistance of anthropologists and archaeologists is often requested by courts or tribunals. Thus, the graves-bones-courts cycle is generally initiated by a legal entity for the purpose of documenting mass murder and eventually using this osteological evidence in the prosecution of individuals deemed responsible for the crimes. With the exception of the FAFG's work in Guatemala, the majority of the work by anthropologists and archaeologists, and the subsequent testimony, was established within a legal or transitional justice framework rather than an historical, documentation framework. The larger socio-political questions (*i.e.*, what does the osteological evidence of trauma suggest about the mechanisms and manner of death at the population-level; can the placement of the bodies within a grave indicate perpetrator behavior or ideology; how many individuals are in a grave, and what are the demographics of the individuals compared to the broader population?) are asked in the former, but usually not the latter. Therefore, the testimony regarding osteological evidence at the ECCC is unusual. The graves were not exhumed for legal purposes, the remains were not examined for more than 30 years after exhumation, the purpose of analysis (which was secondary to preservation) and documentation was not intended to provide information for legal or transitional justice scenarios, and broader social questions were not asked.

Given these two distinct paths towards osteological testimony in an international court—legally initiated or historically inclined—Hinton's concept of "frictions" within the transitional justice system can be extended. Not only does transitional justice pose frictions between local and international concepts of truth, justice, and reconciliation, but it can also result in frictions between local reasons for conducting scientific/anthropological analyses and the need for forensic evidence in a court of law. These frictions were evident in the questions posed by the ECCC defense and prosecution, and in the answers provided by Mr. Veoun Vuthy; these osteological data were not collected to answer socio-political questions or to address the broad patterns of Khmer Rouge violence. These osteological data and their concomitant explanations did not correspond well within the transitional justice framework of "forensic evidence" that was being requested by the lawyers.

I therefore suggest that to avoid or mitigate such frictions in the future, it is imperative to establish the goals and scope of osteological analyses resulting from mass violence or genocide in the early phases of the project. This may not always be possible as decades can ensue between exhumation/analysis and a trial (if a trial ever occurs), but determining what level of analysis (*i.e.,* scientific/forensic or historical/documentary) and how these data may be used in the future is crucial. These decisions are often made within specific political or social contexts that can fluctuate, particularly in post-atrocity regions where there may be resistance to truth or justice, but where feasible, determining the goals of anthropological research or analysis may help reduce the scientific frictions that exist in the current transitional justice milieu.

To conclude, transitional justice undertakings are generally enmeshed in politics, both local and international, that tend to emphasize some groups and narratives at the expense of others. "The quest to establish the 'truth,' for example, is often circumscribed by political

considerations that influence who is heard, what sorts of information may be considered, how that information is used in a final report or verdict, and so forth" (Hinton 2010). This sentiment is corroborated by Lesley-Rozen (2014) who argues that the ECCC, for both social and political reasons, has crafted an historical narrative that places the blame on the senior leaders of DK while failing to address the crimes that were committed within the lower ranks. This narrative is directly linked to the PRK/CPP narrative of demonizing the Khmer Rouge and framing the regime as the *most* violent and brutal socialist/communist incarnation. I do not disagree with these frameworks, but I believe the osteological evidence at the ECCC was included to corroborate this narrative. Additionally, during my time at the Choeung Ek Genocidal Center, it was my impression that the traumatic injuries were being (over)documented to substantiate the national (and ECCC) rhetoric of the Khmer Rouge's extreme brutality. Again, I do not disagree that the Khmer Rouge massacred hundreds of thousands of individuals and that their policies supported extreme violence and execution; my data suggest as much. But I conclude by acknowledging that the results of this research, and the impetus for the "Choeung Ek Conservation of Victims at the Killing Fields" project, fit comfortably within the deeply rooted national discourse of Khmer Rouge violence. Despite this state-level narrative of Cambodian history, the accounts, memories, and evidence of massacre represented at the Choeung Ek Genocidal Center or Kraing Ta Chan are not necessarily hegemonic and may not represent the experiences of all survivors (Hinton 2013a; Williams 2004b). Thus, transitional justice has many facets and frictions where truth, reconciliation, and justice are concerned.

CHAPTER 10: CONCLUSION

Taking a Biocultural Approach

This research sought to unite scientific and cultural data using the biocultural approach to provide a more holistic and comprehensive evaluation of the violence committed by the Khmer Rouge. This was the first large-scale biological analysis, with simultaneous incorporation of cultural significance, to be undertaken on the human remains at the Choeung Ek Genocidal Center. In addition to the human remains at Choueng Ek, I evaluated Khmer Rouge execution lists at Tuol Sleng, and visited memorials containing human remains throughout Cambodia to assess the affective presence of the bones. This research therefore provides sound evidence and quantification of Khmer Rouge violence, as well as cultural documentation of how the unidentified dead in Cambodia are conceptualized and treated.

The study of human skeletal remains resulting from mass violence or genocide is imperative for numerous reasons. First, an analysis of remains can provide information that might not otherwise be available. In Cambodia, for example, Khmer Rouge survivors have described the brutal treatment of individuals indicating that executions would often be carried out by a blow to the victim's head and/or neck. Examining the remains from Cambodian mass graves can provide scientific evidentiary support for these accounts, while also providing evidence for additional mechanisms of execution that may not have been previously reported or documented.

Second, evidence of physical violence, as well as victims' demographics are important for legal justice. If leaders of violent regimes are held accountable in a court of law, as Chapter 9 detailed, evidence from the human remains can help quantify and explain the patterns of

violence that occurred. Third, analyzing human remains can provide healing for families and nations. In some cases, the information provided by anthropologists can help to identify victims resulting in the return of remains to family members, although this can be controversial. While identifying a victim of mass violence is never a joyous occasion, this knowledge can assist a family in finding closure and permits the victim to receive culturally appropriate death rituals. In the case of Cambodia, skeletal analyses are urgent as the bones have deteriorated with time—and will continue to do so—resulting in a loss of potential identifying information.

But the human remains cannot be analyzed or understood in isolation. The historical and political contexts leading up to the Khmer Rouge regime, as well as what transpired during and after the regime are imperative for proper contextualization. Comparing osteological data to that of historical records, as was done with the Tuol Sleng execution lists, and assessing (even from a limited number of interviews) the agency of the remains some 30 years after their exhumation, are extremely valuable and permit the answering of broader anthropological questions.

Review of Research Questions and Resultant Data

The questions asked for this research attempted to address larger anthropological conceptions of human behavior that moved beyond scientific analysis of human remains. Question one asked: How do the osteological demographic profiles of the Choeung Ek remains correspond with the Tuol Sleng archival records? The results indicate that while there are general patterns of similarity between the two samples, such as fewer females and most victims being of young or middle age, the log-likelihood results indicate that there are statistically significant differences between the osteological and archival data. Much of this difference is likely explained by the composition of the osteological sample as well as the challenges

associated with estimating age-at-death and sex from human crania and the conservative nature of the *mle* model. Thus, from these data, the Choueng Ek sample is somewhat representative of the demographic population known to have been detained at S-21 and subsequently executed.

Question two asked: Based on cranial trauma patterns, what are the specific methods of violence that can be distinguished at Choeung Ek and are they distributed evenly between cranial regions and individuals? Based on the analysis of 508 crania, antemortem, perimortem, and postmortem injuries were discovered resulting from blunt force, sharp force, gunshot wounds, and indeterminate mechanisms. However, the majority of crania (61%) had perimortem traumatic injuries, and of those impacts that were discernable, most (87%) were the result of blunt force trauma. Regarding differences between individuals, there were no statistically significant differences between traumatic injuries based on age-at-death and sex indicating that individuals of all ages and all sexes received similar treatment. However, there were significant differences between cranial regions. Blunt force impacts to the basicranium were significantly more common, and this directly corresponds to the historical and eyewitness accounts suggesting that the Khmer Rouge favored striking a victim on the back of the head or neck to execute them.

Question three asked: How have victims of the Khmer Rouge been memorialized in Cambodia, and how have memorials containing human remains been integrated into Cambodian society? Observations of 13 different memorials throughout Cambodia, as well as the memorial at Choeung Ek, suggest that human remains from the Khmer Rouge period are often enshrined in public memorials, frequently resembling tradition Buddhist *stupa*. Although the memorials varied in terms of size, location, style, and level of care, they all contained remains. As for the integration of the bones into modern Cambodian society, based on the ten interviews with memorial caretakers, the remains are understood as both objects and subjects. The memorials

and the remains are used as pedagogical tools, for political purposes, and as an historical lesson. But the bones are also understood as subjects, embodied with cultural and religious power to affect the living. The living interact with the memorials and the remains, they make offerings to appease their deceased (even if unidentified) ancestors, and suggest that the public display of the remains is culturally acceptable. Given the length of time that has passed since the end of the Khmer Rouge period, and the deeply ingrained cultural narrative of the Khmer Rouge, these memorials, and the bones within, are well integrated in Cambodian culture, religion, and society.

Finally, research question four asked: How do Cambodians address victim anonymity and the mutable treatments of the dead? Unfortunately, according to my informants, victim anonymity cannot be remedied; the human remains are nameless and will remain so. Despite this anonymity, the bones are treated as if they are known since Cambodians have adapted their religious and cultural practices to accommodate this unusual post-atrocity context. However, the retention and display of remains in memorials is a *unique* practice within traditional Khmer Buddhist mortuary rituals. While it is not considered inappropriate or an affront to Buddhism or Khmer culture, the display of human remains is not the typical practice for disposition of the deceased in Cambodia. But what was regularly stated by my informants was the need to care for the bones and the memorial. If they are well-tended and looked after, the remains can be displayed as a reminder of what happened in the past.

As these questions demonstrate, scientifically analyzing and preserving human remains from mass violence is not sufficient. The sociocultural context in which the remains reside must be understood; comprehension of the social, political, and even religious ideologies that shape how the remains are regarded, analyzed, and memorialized is indispensable. The massacres

committed by the Khmer Rouge are ensconced in Cambodia's national historical narrative, and this is reflected in the treatment of the human remains in both the past and present.

Future Research

While this research asked four primary questions, there are many more that can be asked. Comprehending the various aspects of the Khmer Rouge period and its aftermath has been undertaken by scholars for decades. This dissertation contributes one small element to this endeavor, and addresses Khmer Rouge violence from the perspective of the remains, both physical and archival. This research contributes scientific evidence from the human skeletal remains enshrined at the national Choeung Ek memorial, as well as addressing the affective agency of the remains today. However, there are many more elements that I would like to address in the future.

I would like to return to Cambodia to analyze human remains from additional mass gravesites. There are more than 20,000 documented mass gravesites in the country, and approximately 80 sites where remains have been exhumed and are potentially available for osteological analysis. From a bioarchaeological perspective, the remains can be assessed for pathologies, dental disease, and traumatic injuries. I collected data from two of these sites (Choeung Ek and Kraing Ta Chan), but examining remains from further gravesites will help to establish whether Khmer Rouge execution methods, and victim demographics, were consistent throughout the country. Using a biocultural approach, and building upon this research, I want ask the following questions:

1. Are the patterns of skeletal and dental pathologies consistent with primarily rural populations, particularly during decades of social upheaval?

2. What are the patterns of skeletal trauma, and do these correlate with mechanisms of execution/torture commonly used in Cambodia?
3. Are the skeletal demographics consistent at each gravesite, or are some locations primarily for males, and some for females and juveniles? Are the skeletal demographics consistent with the population demographics for those who were known to have died under the Khmer Rouge?

In addition to assessing skeletal trauma patterns, I want to conduct a more nuanced analysis of remains from these mass graves by incorporating stable isotope research. The Khmer Rouge frequently relocated individuals throughout the country, so isotopically determining where victims originated—via Carbon, Nitrogen, Oxygen, and Strontium isotopes from dental and osseous samples—will provide information that is presently unknown. While this level of analysis will not result in individual victim identification, it will be the first step towards geographically locating where particular victims were born and raised, which might result in distinguishing Cambodian from Vietnamese victims.

I would also like to return to assist my Cambodian colleagues with establishing skeletal analytical standards for their own population. They currently use Buikstra and Ubelaker's *Standards* (1994) for age and sex estimation, which were not designed to be used in Southeast Asia. I would therefore like to help develop metric and non-metric standards for Cambodian males and females. However, Cambodia does not have skeletal samples of known individuals, so this project would require DNA analysis of remains from the Khmer Rouge period to

genetically confirm the sex of skeletal remains. Once sex is determined, standards can be developed based on a sample of known males and females

Inspired by the patterns of cranial trauma I encountered during this research, I would like to investigate the occurrence of basilar cranial fractures from blunt force impacts to the back of the head. How common are fractures of the inferior/basilar portion of the occipital when individuals were known to have been struck on the head? First, I will survey forensic anthropologists to determine how frequently these types of fractures occur in modern cases. Second, if forensic anthropologists have encountered these fractures, I would like to collect the associated reports and information indicating the manner of death and mechanism of injury, if known; this information may permit a correlation, and possible causation, for these fractures. Finally, with appropriate external grant funding, experimental impact research on crania will help scientifically establish that blunt execution blows to the posterior-inferior aspect of the head result in known fracture patterns.

Moving beyond Cambodia, I would like to continue to undertake skeletal analysis on remains from modern mass violence or genocides. Because these events are fortunately infrequent, there are currently few comparisons. However, I want to further embrace the biocultural approach by being able to compare and contrast the mechanisms of skeletal trauma to determine whether there are patterns in the manner in which people are executed during human rights atrocities. I realize remains from these contexts are not often available for research, but there are a few options. Rwanda would be one possibility, as would Iraq. Additionally, as mentioned in the previous chapter, the availability of comprehensive data regarding where, why, and for whom forensic anthropologists and archaeologists participate in exhumations of mass graves is limited. I would like to undertake a project to compile these data because it is

important that the work of forensic specialists be recognized. I am also interested in how frequently (or infrequently) these forensic practitioners are asked to testify in an international court. Compiling these data will require surveying and/or interviewing numerous forensic anthropologists and archaeologists who have participated in this type of work throughout the world.

Finally, although not utilized as a component of this dissertation, while conducting my research at Choeung Ek, I gathered digital craniometric data, or skull measurements, for 251 crania. I plan to analyze these results with a particular focus on elucidating whether there are metric differences that can help distinguish males and females. As mentioned earlier, there were likely some biases in this research based on inaccurate estimations of sex from morphoscopic traits. These craniometric data may help quantify differences between the sexes that can be used to improve estimations in the future.

Data Storage and Distribution

Original data generated in the course of this research are documented in various forms. From the Choeung Ek Genocidal Center: skeletal analytical notes and diagrams (both hard copies and digital copies); digital photographs of crania; digital photographs of the laboratory, museum, *stupa*, and various ceremonies; digital dental and skeletal radiographs of selected crania; digital English translations of interviews with Choeung Ek staff, and electronic spreadsheets containing craniometric, demographic, and traumatic injury data. From the Tuol Sleng Genocide Museum: electronic spreadsheets containing demographic and other pertinent data from the execution lists, digital notes regarding the Tuol Sleng execution lists, digital photographs taken throughout the museum, and scanned copies of execution lists and

photographs from the Tuol Sleng archive. From the memorials visited: digital photographs of each memorial, hard copies of the observational and interview notes, typed digital summaries of observational and interview data, and digital audio recordings of the 10 interviews conducted. Additionally, from the Documentation Center of Cambodia: typed digital notes regarding various archival documents, digital copies of photographs depicting Choeung Ek and the original architectural blueprint of the *stupa*, and a few hard and scanned copies of various archival documents.

All raw data will be stored in digital file formats such as .docx, .jpg, .pdf, and .xlsx. These file formats have been chosen as they are easily accessible both within the United States and internationally. All data will be maintained and stored on external hard drives, remote cloud storage, and will be deposited with the Michigan State University Anthropology Department for long-term storage. Before departing Cambodia, I provided electronic copies of all collected Choeung Ek and Tuol Sleng data to Mr. Voeun Vuthy and Mr. Chhay Visot at each institution, respectively. Thus, copies of my original data are maintained in Cambodia should future researchers require access. These raw data will not be published, as I maintain sole propriety; however, future scholars may make a written request for the academic/research use of these data.

All data collected from the human skeletal remains are anonymous and do not pose any privacy issues. The interview data are anonymous, as the names of the individuals being interviewed were never recorded. The archival documents derived from the Tuol Sleng Genocide Museum and the Documentation Center of Cambodia are public record. Therefore, there was only minimal risk posed to the human subjects in this research project, and it was deemed exempt from a complete IRB review via Michigan State University.

Finally, these data and findings presented in this doctoral dissertation will be disseminated to the broader community. This dissertation will be electronically published and archived within the ProQuest database. Electronic copies of this dissertation will be provided to the Choeung Ek Genocidal Center, the Cambodian Ministry of Culture and Fine Arts, the Phnom Penh Municipality, the Tuol Sleng Genocide Museum, and the Documentation Center of Cambodia. My findings will be presented in scholarly forums and published in peer-reviewed scholarly journals.

APPENDIX

APPENDIX

Table 28. Multi-bone and multi-region combinations for Choeung Ek perimortem cranial impacts

Multi-bone Combinations	**Multi-region Combinations**
1. L. Parietal, L. Temporal	1. Vault, L. Lateral
2. R. Parietal, R. Temporal	2. Vault, R. Lateral
3. R. Parietal, R. Temporal, Sphenoid	3. Vault, Face
4. L. Parietal, L. Temporal, Occipital	4. Vault, Basicranium
5. R. Parietal, L. Parietal	5. Basicranium, L. Lateral
6. R. Zygomatic, L. Zygomatic (midface)	6. Basicranium, R. Lateral
7. L. Temporal, Occipital	7. R. Lateral, Face
8. R. Temporal, Occipital	8. Vault, L. Lateral, Face
9. R. Maxilla, Frontal	9. Basicranium, Face
10. L. Parietal, Occipital	10. Vault, Basicranium, R. Lateral
11. R. Parietal, Occipital	11. Vault, Basicranium, R. Lateral, Face
12. R. Parietal, Frontal	12. Basicranium, R. Lateral, Face
13. L. Parietal, Frontal	13. Vault, Basicranium, Face
14. L. Parietal, R. Temporal, Occipital	
15. R. Maxilla, L. Maxilla	
16. R. Parietal, R. Temporal, Occipital	
17. L. Zygomatic, Frontal	
18. L. Parietal, Sphenoid, Frontal	
19. R. Temporal, Frontal	
20. R. Temporal, R. Zygomatic	
21. R. Maxilla, Sphenoid	
22. L. Parietal, Frontal, R. Maxilla, Occipital	
23. R. Sphenoid, R. Zygomatic, Occipital	
24. R. Parietal, Frontal, R. Zygomatic, Sphenoid, Occipital	
* L. Zygomatic, L. Temporal, L. Parietal	
* R. Parietal, L. Parietal, Occipital	

* Antemortem trauma only

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