Disposing of the Dead: An Investigation into Prehistoric Mortuary Practices During the Neolithic and Bronze Ages at Ban Non Wat, Thailand

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A thesis submitted for the degree of
Master of Science
at the University of Otago, Dunedin, New Zealand

September 2010
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Ban Non Wat is a prehistoric mounded site located in the upper Mun Valley of Northeast Thailand. It was excavated over five years under the Origins of the Civilization of Angkor research project, which uncovered 635 human burials ranging from pre-agriculturalists to Late Iron Age inhabitants. This thesis examined 244 adult burials in nine mortuary phases from the Neolithic and Bronze Age, applying an anthropologie de terrain approach. The main aim of the thesis was to examine the mortuary practices used in each mortuary phase and compare these practices over time.

Anthropologie de terrain is a taphonomically based methodology used to reconstruct past funerary practices. Upon careful examination of skeletal elements within a grave it is possible to determine; whether a burial was primary in nature or occurred over multiple episodes (burial type), the original position of the cadaver within the grave (burial position), and what kind of container an individual was interred in (burial context). An anthropologie de terrain approach was adapted to allow the analysis of a large number of burials based on photographs and field drawings. Iron Age burials were excluded from the research because of their often disturbed and fragmentary appearance.

Two hypotheses were put forth: that mortuary practices would change over time as social, technological, and subsistence practices became more complex; and that mortuary practices would be linked to social identity. The aspects of social identity examined were sex, age, wealth, and the location of the burial as it has been suggested by Higham (pers comm.) that the grouping of individuals at the site may represent family clusters. By examining links between mortuary practices and social identity it was possible to assess the suitability of the
mortuary practices examined as indicators of different modes of social organisation.

An increase was found in the variety of mortuary practices used over time, especially burial context, which showed the most variety at the end of the Bronze Age. This differed slightly from findings at the nearby site of Ban Lum Khao (Willis and Tayles, 2009), where Late Bronze Age individuals were interred in one context.

Links between mortuary practices and social identity were not found for the Neolithic or Bronze eras. The practice most likely to show conclusive results was burial context, which had relatively large sample sizes. However, no correlations were found between burial context and any aspect of social identity investigated, suggesting two possible interpretations. Firstly, burial context is not a reliable indicator of social status, as there were no demonstrable links between context and wealth. Secondly, an unidentified variable other than sex, age, location, or wealth influenced the choice of container. It was proposed that this variable was the season of death, with busy periods coinciding with the rice harvest necessitating less elaborate and time consuming burial practices.
Acknowledgements

I would firstly like to thank my supervisor Dr Nancy Tayles. Not only for her advice, guidance and patience in the course of this thesis, but also for introducing me to the prehistoric inhabitants of Ban Non Wat by allowing me to assist with her work in Phimai.

The research carried out in this thesis was only possible with the careful recording of the excavation of Ban Non Wat. Therefore, I would like to thank the excavation directors Professor Charles Higham and Dr Rachanie Thorarat, the people of Ban Non Wat, and the many volunteers and researchers involved with excavations. Special mention must be made of those in charge of drawing the burials, in particular Dr Warrachai Wiriyaromp and Mr Peter Petchey, as well as those who took photographs of the burials.

I would like to thank Professor Higham for making available unpublished manuscripts of his work on Ban Non Wat, as well as the field drawings and burial images. Dr Tayles also kindly allowed the use of her burial images, for which I am grateful. Ms Cathleen Hauman was kind enough to offer to proofread a number of chapters, which was very much appreciated.

Thank you to Dr Nigel Chang who invited me to excavate at Ban Non Wat for a season, although not directly related to this thesis my time spent excavating at the site definitely had an influence on the end result.

On a more personal note I would like to thank my friends and family for their support, especially Cat, Mum, Josh, and Mo.
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1.0.0. Introduction

Recent excavations at the prehistoric site of Ban Non Wat in northeastern Thailand recovered over 600 human burials and have presented the opportunity to investigate many aspects of the lives of its prehistoric populace. This thesis explores the mortuary practices of the Neolithic and Bronze Age inhabitants of Ban Non Wat through the careful examination of 237 adult burials. The research will examine selected aspects of the mortuary rituals used within a series of mortuary phases before considering how these practices changed over some 1,300 years; a period that saw a revolution in subsistence strategies, technological advancements, and changes in social organisation. It is expected that attitudes towards the dead, as well as the social factors that determined the conditions under which individuals were interred, evolved during this time period and that these changes will be reflected in the mortuary practices.

While a significant body of work has been carried out concerning the mortuary rituals used in prehistoric Thailand, the majority of these focus on grave goods (for example Chang, 2001 and Barribeau, 2007). Very few studies in this region have had as their primary consideration the condition of the body or that of the grave at the time of burial, with the exception of that by Pautreau and Mornais (2003), Willis (2005), and Willis and Tayles (2009). This thesis will examine mortuary practices through the application of anthropologie de terrain. Anthropologie de terrain is a taphonomically based methodology that reconstructs the original burial practices of the past (Nilsson Stutz, 2003b). More specifically, this technique allows the researcher to infer whether an individual was interred in a single episode or over multiple episodes (burial type), the original position they were placed in (burial position), and what type of containers they were interred in (burial context). Such containers could
include wrappings, coffins, or ceramic mortuary jars. There has currently been only one similar investigation including Ban Non Wat. Carried out by Willis (2005) at an early stage in the excavation of the site, the research examined differences in burial position and burial context between three prehistoric settlements and, as such, did not provide an in depth investigation of any single site. The current research builds on that conducted by Willis and will involve a larger number of burials that have been placed in a chronological sequence, therefore allowing a more thorough overview.

Each of nine mortuary phases from the Neolithic and Bronze Ages at Ban Non Wat will be examined separately. Within each phase the anthropologie de terrain methods will be applied, allowing temporal changes to be charted. Additionally, possible relationships between the three mortuary rituals listed above and four aspects of social identity (sex, age, mortuary wealth, and location of the burial) will be assessed for burials from the Neolithic and Bronze eras. This will enable the identification of factors influencing mortuary practices and whether these change from the Neolithic to Bronze Age.

It is important that at this early stage some mention is made regarding the terminology used in this dissertation. This is of particular relevance to the use of the terms 'mortuary ritual', 'mortuary practices', and 'burial practices'. Chang (2001) has given an overview of the characteristics of an interment, of which a modified version can be seen in Figure 1.1. It is clear in the diagram that 'mortuary ritual' is a term used to describe a wide array of activities that can be either identified in the archaeological record or are invisible. As mentioned, this study will concern itself with burial type, burial position, and burial context. For the purpose of this thesis the terms 'mortuary practices' and 'burial practices' will be used interchangeably to refer to these three aspects of the mortuary ritual.
Now the site of Ban Non Wat will be introduced, after which the aims, hypotheses, and structure of this thesis will be detailed.

1.1.0. The Site: Ban Non Wat

Ban Non Wat is one of many large moated prehistoric sites located in the upper Mun Valley of northeast Thailand (Higham and Thosarat, 2006) (Fig. 1.2). First
identified through the use of Thai military aerial photographs, it was described by Boyd et al. (1999) as a medium sized mound, approximately 300 meters in diameter with numerous ditches. Situated at 15°16’ latitude and 102°17’ longitude, it is located in a tropical climate with a yearly wet season between mid-May and September (Boyd et al., 1999). Recent radiocarbon analysis has provided date ranges for the mortuary record at Ban Non Wat, starting with early agriculturalist groups around 1750BC and ending in the early historic period with the introduction of Buddhism circa AD500 (Higham and Higham, 2009a, 2009b).

Figure 1.2: Location of Ban Non Wat and other prehistoric Thai sites mentioned in the text (adapted from Higham, 2002).
1.2.0. The Excavation of Ban Non Wat

Excavations at Ban Non Wat began in January 2002 as part of *The Origins of the Civilization of Angkor* research project, continuing under its auspices until December 2007 (Cawte *et al.*, 2009). During this time 906 square meters of the site and 635 human burials were unearthed in three locations (Cawte *et al.*, 2009; Higham, 2009a). The main excavation square, 'A', was located near the center of the mound, with two smaller squares termed 'X' and 'Y' located to the southeast and northeast respectively (Fig. 1.3). Square 'A' received the most attention, measuring some thirty-two meters by thirty-six meters at its widest points. The majority of the burials were located in this square, with a mortuary sequence running from the initial occupation of the site to the early historic period (Cawte *et al.*, 2009). This thesis focuses solely on the burials from excavation square 'A' excluding those from 'X' and 'Y'. This is because reliable sex and age estimates for the skeletal material, which will be mentioned in more detail shortly, were only complete for those burials from square 'A'.

![Figure 1.3: Ban Non Wat showing areas 'A', 'X', and 'Y' excavated between 2002 and 2007 (Cawte *et al.*, 2009).](image-url)
1.2.1. Excavation Procedure

Cemetery sites in Thailand are known to be stratigraphically complicated with the numerous pits, postholes, and graves even further complicated by bioturbation of the soil (Higham and Higham, 2009a, 2009b). With this in mind, the excavation procedure followed at Ban Non Wat consisted of excavating layers in 10cm spits (Cawte et al., 2009). Five layers were identified in square 'A' based on changes in soil inclusions, soil colour, and soil texture. Materials excavated were given a catalogue number and recorded in a central register with provenance details based on either which layer and spit they came from or from which feature they originated. Features included pits, postholes, and burials. Each feature was identified, outlined, drawn on spit plans and, where applicable, section drawings (Cawte et al., 2009).

Excavation of the human remains followed those methods used by the Origins of Angkor research team at Ban Lum Khao (Domett, 2004) and Noen U-Loke (Tayles et al., 2007). A Neolithic and Bronze Age site, and an Iron Age site respectively, both are located in the upper Mun Valley in close proximity to Ban Non Wat (Fig. 1.2). Each burial excavated was exposed in situ, photographed and drawn before being lifted from the soil. In many cases the dimensions of the grave cut could not be reliably estimated because of the homogeneity of the soil, the importance of which will become apparent. During excavation the presence of skeletal elements was recorded and, when possible, preliminary age and sex estimates were carried out. Complete long bones were measured using calipers, and any evident pathologies were noted. Bones were then washed and dried before being moved to the laboratory for further analysis, including comprehensive age and sex estimates.
1.2.2. Age and Sex Estimations

Dr Nancy Tayles carried out the age and sex estimates of adult skeletal remains from Ban Non Wat. The methods used to determine these are outlined below as described by Dr Tayles (pers comm.).

The sex of adult remains was estimated, ideally, by use of the pelvis as advocated by Buikstra and Ubelaker (1994). The subpubic angle, sciatic notch, ventral arc, subpubic concavity, and morphology of the ischial ramus were used to differentiate between male and female. As an alternative, or further, approach, sex was estimated by an investigation of the skull. Five cranial characteristics, as outlined by Buikstra and Ubelaker, were examined; the mastoid processes, nuchal crest, supra-orbital margin, glabella, and mental eminence. Metric data was also collected for postcranial elements and used to augment equivocal estimates, as was relative robusticity.

An investigation of tooth wear for age estimation involved the construction of base lines from which relative age of the adults was ascertained. This was done by first identifying skeletally mature young adults by epiphyseal fusion, and then recording their tooth wear. Wear was graded using a modified version of the Scott (1979) method, reduced from a 1-40 scale down to 1-10 as such precision was seen as redundant in this context. The range of wear for each individual's molars was then determined. As these were deemed to be young adults based on their skeletal maturity they made up the 'young' age group from 20 to 30 years of age. The pubic symphyses and auricular surfaces of these individuals were examined to give a baseline for aging older individuals. Next, the oldest individuals in the sample were identified based on tooth wear and from this the pelvic data could be obtained. This group was not prescribed a chronological age range as the methods used only allowed relative age to be extrapolated. Based on the data obtained from the two baseline groups, age was
inferred through tooth wear and/or the pubic symphysis and auricular surface. Adults were aged as young, middle, or old.

1.3.0. The Mortuary Sequence of Ban Non Wat

Higham (2009c) has assigned prehistoric burials from Ban Non Wat to thirteen mortuary phases. These were constructed based on a number of factors including the superposition of burials, grave form, grave location, grave orientation, and mortuary offerings (Higham and Higham, 2009a, 2009b; Higham, 2009c). The most important of these factors was seen to be superposition of burials, with the mortuary phases showing relative chronology (Higham and Higham, 2009b; Higham, 2009c). This meant that when there was superpositioning Neolithic 2 burials were always above Neolithic 1, Bronze Age 1 graves were always above the Neolithic burials, and so on.

The mortuary sequence at Ban Non Wat can be broadly split into the Neolithic, Bronze Age, and Iron Age. There is some uncertainty as to whether a group of flexed burials represent a section of the Neolithic population or a different group entirely, an issue that will be explored shortly. Mortuary or occupational remains that included domestic animals or plants but no evidence for metallurgy characterised the Neolithic (Higham and Higham, 2009a). Within the Neolithic era Higham (2009c) has assigned burials to one of two mortuary phases, Neolithic 1 and Neolithic 2. There were six mortuary phases in the Bronze era (Higham, 2009c). The Bronze Age saw the inclusion in burials of copper based artefacts, crucibles, or moulds (Higham and Higham, 2009b). The Iron Age was separated into four mortuary phases in which burials were accompanied by iron implements, or evidence for iron forging (Higham and Higham, 2009a). Iron Age burials were generally in poor condition and heavily disturbed by later human activity (Higham and Higham, 2009a, 2009b). Such disturbance is likely to limit the successful application of anthropologie de
terrain methods and, therefore, this research will exclude Iron Age interments from analysis, and its mortuary phases will not be examined here.

1.3.1. The Flexed Burials

A group of individuals from among the earliest occupation of Ban Non Wat were interred with their limbs flexed. This led to the group being termed 'flexed burials'. Dated to between 1750BC and 1050BC (Higham and Higham, 2009a, 2009b), this mortuary phase included fourteen individuals, with the defining characteristic being their flexed position (Higham, pers comm.). As mentioned, there is some ambiguity as to where in the mortuary sequence these burials should be placed. The radiocarbon dates given above overlap with the Neolithic 1 and 2 mortuary phases, and the earliest burial to be stratigraphically later than any flexed interment was from the Early Bronze Age. Higham (2009a) suggests that these individuals may represent a group of hunter-gatherers. This assertion is based on the flexed position, which he sees as typical of hunter-gatherer groups in Southeast Asia, supported by the presence of flexed hunter-gatherers at the sites of Nong Nor (Higham and Thosarat, 1998), the Tham Lod rockshelter (Shoocongdej, 2004) and the Ban Rai rockshelter (Pureepatpong, 2006) (Fig. 1.2). In Higham’s scenario the group of hunter-gatherers likely shared the use of the site with incoming Neolithic farmers (Higham, 2009c). In support of this hypothesis Higham and Wiriyaromp (pers comm.) cite a material culture seen as distinct from that of the Neolithic mortuary phases. These distinct artefacts were associated with three individuals in two burials and consisted of the decoration used on a single pottery vessel, the rudimentary appearance of some shell beads, and the shape of other shell beads from a necklace.

An alternative explanation for the burial positions of the flexed interments may be that they were a subsection of the Neolithic populations who were treated differently for some, as yet, unknown reason. The distribution of the burials
across square 'A' may support this theory, as they were interred along different orientations and there is no evidence of any grouping except in two cases where a woman and an infant (B462, B461), and a man and a woman (B438, B454) have been buried next to each other (Fig. 1.4). This distribution could suggest that the individuals were a subsection of the Neolithic population and, therefore, were spread out, or it may be an indication that the hunter-gatherer groups either did not know where individuals were buried, or made few attempts to inter individuals close together. Such an explanation might be pertinent as the members of foraging bands were constantly changing and even if the site was being used repeatedly over several years it is unlikely that it was always by the same group of individuals (Marcus, 2008).
Figure 1.4: Distribution of flexed burials across excavation square 'A' at Ban Non Wat with burials placed next to each other shown in the circles (adapted from Higham, 2009c).

1.3.2. The Neolithic 1 Burials

There are essentially two competing theories concerning the origins of the Neolithic peoples in Southeast Asia. The immigration theory, also known as the population replacement model or two-layer model, suggests that agriculture
began in Southern China before some of these early farmers moved into Southeast Asia replacing the endemic hunter-gatherer groups (Bellwood, 1997; Higham, 2002). This viewpoint is supported by linguistic (Blust, 1996) as well as some bioarchaeological data (Bellwood and Oxenham, 2008; Matsumura et al., 2008), and suggests that the Neolithic 1 inhabitants represent an alien population in a new environment. The alternative hypothesis is that there was no population replacement. Termed the local evolution or population continuity model, it minimises the role played by migrants, instead arguing that the current population in Southeast Asia are descended from the original hunter-gatherer groups (Hanihara, 1993; Pietrusewsky, 2006; Turner, 1989, 1990). This viewpoint has been strengthened through the examination of bioarchaeological material by the authors mentioned above as well as Pietrusewsky and Douglas (2002), Pietrusewsky (2010) and Cox (2009). The work carried out by Cox deserves special mention as it included isotopic and dental analysis of burials from Ban Non Wat, which found no evidence for large-scale population movements into the region, with minimal numbers of migrants. At present, the origins of the Neolithic peoples of Southeast Asia are unclear and it appears will remain a contentious issue, at least for the immediate future.

In total, twenty-nine individuals were assigned to the Neolithic 1 phase at Ban Non Wat, which was dated to between 1650BC and 1250BC (Higham and Higham, 2009a, 2009b). Neolithic 1 infants were often interred in mortuary vessels, as were two adults. The ceramics were decorated with complex incised designs and were the primary mortuary offerings of this period (Higham and Higham, 2009a; Higham, 2009c). Other grave goods included marine shell ornaments, pig bones, and freshwater bivalve shells (Higham and Higham, 2009a). The burials were spread over the main excavation square along either a north-south or east-west axis, some in small groups, such as burial 86, a young male surrounded by five infant mortuary vessels (Higham, 2009c) (Fig. 1.5).
1.3.3. The Neolithic 2 Burials

Based on Higham’s (2009c) mortuary plan forty individuals were assigned to the Neolithic 2 phase, which has been dated to 1250BC-1050BC (Higham and Higham, 2009a, 2009b). According to Higham and Higham (2009a) they were
usually orientated on an east to west axis, however, they seem to have been interred along a number of axes including east-west, north-south, northeast-southwest, and northwest-southeast (Fig. 1.6). Some of the burials may have been placed in groups, however others show no such proclivity. The grave goods were markedly poorer when compared with the Neolithic 1 interments, usually consisting of one or two globular cord marked pots distinct in form from the Neolithic 1 vessels and, sometimes, a bivalve shell (Higham and Higham, 2009a; Higham, 2009c).
1.3.4. The Bronze Age 1 Burials

The first mortuary phase of the Bronze Age (1050BC-1000BC) consisted of five individuals, each accompanied by a copper based artefact (Higham and Higham, 2009a, 2009b). The number of mortuary goods in the graves increased in
comparison to the Neolithic burials, and included a series of small ceramics similar to those found in the graves identified as late Neolithic at Ban Lum Khao (Higham and Higham, 2009a, 2009b). Higham (2009c) believes that burial 569 was interred in a wooden coffin the shape of a boat with a pointed prow. All Bronze Age 1 burials were located in the eastern section of the main square on a northeast-southwest axis (Fig. 1.7).

Figure 1.7: Distribution of Bronze Age 1 burials across excavation square 'A' at Ban Non Wat (Higham, 2009c).
1.3.5. The Bronze Age 2 Burials

Radiocarbon dated to between 1000BC and 900BC, Bronze Age 2 saw a continued increase in wealth with the exceptional affluence found in some burials prompting the term 'super burials' (Higham and Higham, 2009a, 2009b). Based on Higham's (2009c) mortuary plan (Fig. 1.8) there were at least thirty-six individuals assigned to this phase, which were characterised by the large size of the graves and orientation of the head towards the north or northwest. The mortuary goods accompanying the burials included ceramic vessels, copper based socketed axes, chisels, anklets, and rings. The dead wore exotic shell and marble ornaments and multiple shell bead necklaces and belts (Higham and Higham, 2009a, 2009b). Higham (pers comm.) has identified three areas where individuals seem to have been interred in rows, which he believes may have been successive generations of the same lineage (Fig. 1.8). This is despite the fact that other researchers have suggested group clusters to be because of alternative reasons such as social status (Binford, 1971), circumstance of death (Quilter, 1989), and the death of individuals at the same time (Bazaliiskiy and Savelyev, 2003).
Figure 1.8: Distribution of Bronze Age 2 burials across excavation square 'A' at Ban Non Wat with three possible descent groups shown in the circles (adapted from Higham, 2009c).

1.3.6. The Bronze Age 3A Burials

Bronze Ages 3A and 3B were originally classified as one group interred between 900BC and 800BC (Higham and Higham, 2009a, 2009b). They were later separated, based largely on wealth, with Bronze Age 3A wealthier than 3B (Higham, 2009c). Although the two mortuary phases were separated, Higham
(2009c) notes that it is unclear whether the phases represent progression through time with 3B being later, or if the two groups were contemporaneous with the differences in wealth due to social status.

The Bronze Age 3A burials were interred in a tight group near the centre of the main excavation square along a northeast to southwest orientation (Fig. 1.9). There were fourteen individuals assigned to this phase, placed in two rows with the men situated towards the middle of the group (Higham, pers comm.). Higham (pers comm.) believes that mortuary wealth continued to be high from Bronze Age 2, with a large number of ceramic vessels included in the graves, as well as the wearing of shell and marble bangles.
1.3.7. Bronze Age 3B Burials

There were twenty-two individuals assigned to Bronze Age 3B, all located south of the 3A interments on the same northeast to southwest orientation (Higham, 2009c) (Fig. 1.10). They were considerably poorer than the Bronze Age 3A interments, with the number of marble bangles, shell bangles, and bronze goods
decreasing, as well as a reduction in the number of ceramic vessel forms (Higham, 2009c).

Figure 1.10: Distribution of Bronze Age 3B burials across excavation square ‘A’ at Ban Non Wat (adapted from Higham, 2009c).

1.3.8. Bronze Age 4 Burials

Bronze Age 4 is the most well represented phase at Ban Non Wat with, based on data from Higham (2009c), 176 individuals assigned to the phase. Dated to
between 800BC and 700BC burials were set out on a northeast to southwest axis (Higham and Higham, 2009a, 2009b). Higham (pers comm.) divided the burials into five groups based on rows and columns (Fig. 1.11). On examination of the mortuary plan these distinctions seem arbitrary, a concession Higham makes himself. He proposes that some of these groups contained individuals from the same descent groups, with successive generations possibly interred superior to the head or distal to the feet. Based on mineralised wood in some of the graves he suggests that individuals were interred in wooden coffins, or at the least that those from groups B and E were (Higham, pers comm.). The mortuary goods continued to decrease from earlier phases with bronze very rare, the numbers of marble and shell jewellery declining, and the decoration of ceramic vessels becoming simpler (Higham and Higham, 2009a).
1.3.9. Bronze Age 5 Burials

Bronze Age 5 burials were distinguished from Bronze Age 4 by the distinct form of the ceramic vessels in the shape of large open bowls, large globular vessels with small everted rims, and pots with cylindrical necks (Higham, pers comm.).
Based on Higham’s (2009c) mortuary plan (Fig. 1.12) there were thirty-seven individuals assigned to the phase. Distributed primarily in the centre of square 'A', Bronze Age 5 burials were interred between 700BC and 420BC (Higham and Higham, 2009a, 2009b). Graves were predominantly on a northeast to southwest axis with some of these individuals’ heads pointing to the north, some to the south, and a minority towards the east and north-east. The inclusion of spindle whorls in graves peaked during this phase, suggesting that weaving was well-established by this time (Higham, 2009b, 2009c). Based on stratigraphy, Bronze Age 5 was seen to have developed seamlessly into Iron Age 1, with the only difference being the inclusion of iron goods in the Iron Age 1 burials (Higham and Higham, 2009a).
1.4.0. Critique of the Mortuary Sequence

The mortuary sequence described in this chapter was originally proposed by Higham and Higham (2009a), and later updated by Higham (2009c). It was primarily constructed on the superposition of burials and the form of the
ceramic vessels, supported by radiocarbon dating. A large number of additional variables were used to augment these data including the mortuary goods, orientation, location, and grave form. Perhaps the main weakness with this sequence is that so many variables were used in its construction. This could have had the effect of masking social stratification in favour of an explanation based on chronological change. Such an issue is best displayed in the distinctions between Bronze Age 5 and Iron Age 1. The two phases were situated side by side in excavation square 'A', and it is believed that they show horizontal stratigraphy (Higham and Higham, 2009a), with the implication that the burials were interred around the time that iron was introduced to the region; the Bronze Age 5 burials just prior and the Iron Age 1 burials just after. Higham and Higham (2009a:132) have previously stated that "...it is only on the basis of the presence of iron artefacts that on occasion one can distinguish the two, for the ceramic vessels are virtually identical". Therefore, a possible alternative explanation may be that the absence of iron artefacts in some graves shows differing social classes rather than a temporal change. This would suggest that Bronze Age 5 burials were in fact contemporary with those from Iron Age 1 but from a lower social class. Although this issue does exist, Higham (2009c) has shown awareness of it in his move to split Bronze Ages 3A and 3B based on their apparent differences in wealth, acknowledging that at this point it is unknown whether they were contemporary or not.

Despite the potential issue mentioned above, the mortuary sequence described has placed more than 600 burials from Ban Non Wat in a chronological sequence. One of the main aims of this thesis, which will be presented next, is to examine changes in burial practices through time. As such, the mortuary sequence is of vital importance to this research and a fundamental tenet around which it is set.
1.5.0. Research Aims and Objectives

The primary aim of this thesis is to examine mortuary practices at Ban Non Wat during the period of 1750BC to 420BC, between the initial use of the site and the introduction of iron. Secondly, it will compare mortuary practices over time, examining any differences between the phases. Lastly, it will assess whether mortuary practices were linked to social identity in the form of sex, age, wealth, or proximity to other burials with shared practices; and through this whether their examination can add to the current debate on social evolution in prehistoric Thailand.

These aims will be achieved through a number of objectives:

1. The adaptation of an *anthropologie de terrain* methodology that will allow the assessment of mortuary practices for a large number of burials.
2. The construction of mortuary profiles for each burial interred during the time span in question. These profiles will amalgamate the temporal, social, and mortuary data.
3. The determination of burial practices in use within each mortuary phase (burial type, burial position, and burial context).
4. The comparison of mortuary practices between phases in order to assess changes over time.
5. The inquiry of whether mortuary practices were linked to sex, age, wealth, or location to contemporary burials during the Neolithic and Bronze eras.

1.6.0. Hypotheses

Achieving the objectives will provide in depth knowledge of the burial practices used during each mortuary phase, how these practices changed over time, and whether burial practices were linked to social identity. This will enable the
hypotheses to be accepted or refuted. The first hypothesis is concerned with changes through the mortuary phases, while the second amalgamates the phases into two groups in order to attempt to identify factors determining burial practices during the Neolithic and Bronze Age.

1.6.1. Hypothesis One: Mortuary practices will change over time

It is hypothesised that the mortuary practices used at Ban Non Wat changed over time. The sequence of phases being investigated will allow changes in mortuary practices to be charted from the earliest stages of occupation at Ban Non Wat through to the end of the Bronze Age. This is a large time period, during which many aspects of prehistoric life changed. These changes included technological development, especially in the introduction of bronze, as well as possible increases in social complexity, population enlargement, and migration. It is put forth that the burial practices used to inter the dead changed along with the technological and social advancements.

1.6.2. Hypothesis Two: Mortuary practices will be linked to social identity

It is hypothesised that mortuary practices will be linked to social identity. This may allow the identification of social factors that determined mortuary practices. In addition, it could present results contributing to the current debate concerning the social organisation of prehistoric Southeast Asia. During the Neolithic status was obtained by charisma or personal achievement (Marcus, 2008), and while in many parts of the world the Bronze Age saw the introduction of hierarchical social structures, there has been a paucity of evidence supporting this in Southeast Asia (Muhly, 1988). This has led to the proposition of an alternative model termed heterarchy, in which status in achieved rather than inherited (O'Reilly, 1999).
These views on the social structure of prehistoric Thailand would suggest that during the Neolithic mortuary practices were most likely influenced by age, while in the Bronze Age mortuary practices may have been linked to age, sex, or location, dependant upon the dominant social structure. If during the Bronze Age a heterarchy was in place the expected correlation would be with age, while a hierarchy could be indicated by links between burial practices and either sex or location. As Higham (pers comm.) has identified groupings of individuals as possible ancestral lines, preferential treatment of some groups may indicate inherited social status. In order to support these arguments, however, it will be necessary to identify links between specific mortuary practices and rank, which will be achieved by investigating mortuary wealth in relation to burial practices.

It is expected that mortuary practices will be linked to social identity, however, in order to make any implications concerning social organisation a link must be shown between mortuary practices and social status, calculated in this thesis by the wealth an individual was interred with. If such a link cannot be established it would suggest that the mortuary practices examined are not suitable indicators of social status. Such an occurrence could still allow for the identification of the aspects of social identity influencing the choice of practices.

1.7.0. Thesis Structure

Chapter One has provided an introduction, both to this thesis and the site of Ban Non Wat, as well as presenting the aims and hypotheses of my research. The literature review will be split into two parts. Chapter Two will situate the research in terms of recent trends in mortuary studies and current theories for social organisation in prehistoric Thailand, while Chapter Three will introduce the anthropologie de terrain approach. This will be followed by Chapter Four, describing the methods used in this thesis, including the creation of a system allowing for the application of anthropologie de terrain to a large number of
burials based on photographs and field drawings. Chapter Five details the results from the application of this method to burials from the Neolithic and Bronze Ages. Lastly, Chapter Six presents a discussion of the results, the limitations of the research, an appraisal of the proposed hypotheses, suggested avenues for future research, and a conclusion.

1.8.0. Summary

This chapter introduced the site of Ban Non Wat before describing the research as an attempt to investigate mortuary practices in the early stages of occupation at the site between 1750BC and 420BC. This will be accomplished by constructing a method allowing a large number of burials to be assessed pertaining to the conditions under which they were interred. The burials will be examined by mortuary phase before being compared over time, and links between mortuary practices and social factors will be sought. The chapter concluded with an explanation of the structure of this thesis. Next, the literature review will begin.
2.0.0. Mortuary Ritual and Society in Prehistoric Southeast Asia

This chapter is concerned with the ways that researchers have explored the social organisation of past societies through the analysis of archaeological remains. It will begin by giving a broad overview of how mortuary rituals have been studied in the archaeological literature before looking more specifically at social organisation in Southeast Asia. The second hypothesis mentioned in Chapter One is related to social organisation and it is important that the issue be reviewed.

2.1.0. Mortuary Ritual and Society

Nilsson Stutz (2003b) describes the death of an individual as resulting in two factors, the loss of a social being and the emergence of a cadaver. As such, mortuary rituals must deal with these two aspects of death. They must not only deal with the disposal of a body, but also with the emotionally charged farewell of an individual who fulfilled specific social roles in life. The ways in which these factors are dealt with vary widely, both within and between societies. They vary for a number of reasons and a large area of mortuary studies has been involved with identifying these reasons. Much of this relates to the identification of roles in society and the detection of rank. The recognition of rank based on mortuary rituals has long been a focus of mortuary archaeology (Saxe, 1971). In essence, there have been two approaches to the study of rank based on mortuary rituals. The processual approach sees the data as reflecting the social standing of the individual during their lifetime (Binford, 1971; Saxe, 1971). Hence, mortuary wealth can be directly related to social status. In contrast, the post-processual approach views mortuary rituals as a political tool that those farewelling the dead manipulate for specific reasons (Hodder, 1982).
This viewpoint, therefore, rejects the notion that rank can be reliably obtained based on the study of mortuary rituals.

The processual approach has its origins in the early 1970s with the work of Binford (1971) and Saxe (1971). Both authors investigated status based on mortuary remains. This approach is reliant on the concept that the status of an individual will be reflected in the mortuary rituals applied to their burial, and is the position taken in the majority of this type of research concerning Southeast Asia. The reasoning behind the processual approach is that social inequalities result in an uneven distribution of resources and labour, which is reflected in mortuary rituals (Trinkaus, 1995). An increase in the energy expended on a grave is seen to indicate an individual of higher status, as more people are obliged to help with the interment process (Watson, 1994). Watson identifies problems with this approach, revolving around the fact that there are other ways to recognise status besides the total amount of energy spent constructing a burial. For example, value bestowed upon an object is not solely related to the time spent making it, objects may have sentimental or symbolic value, and aspects of burial ritual that indicated status at the time of interment may be archaeologically invisible (such as feasting or the use of flowers). These issues do not make the approach obsolete; they limit the distinction of small inequalities in social status, but they can still be used to identify larger differences if applied correctly (Watson, 1994).

Pearson (1982) recognises three assumptions implicit in the processual approach. Firstly, the social status of the individual is transferred to material form after death. Secondly, the material expressions of these differences can be compared between individuals. Thirdly, the resulting patterns of roles in the material remains can be ranked hierarchically to show relative status in the society. In opposition to these assumptions Pearson believes that the material remains do not exhibit actual relations of power but rather an idealised version of these relationships. The dead are used by the living to show or limit status
differences depending on the political needs of those carrying out the mortuary rituals (Pearson, 1982). This idea that the dead are used by groups to maintain or enhance power is in accordance with the post-processual approach, which can be best summarised by Hodder (1982:152):

Burial ritual may be used as part of an ideology which faithfully represents and mirrors aspects of a living society, but it is equally possible that the ideology may be concerned with distorting, obscuring, hiding or inverting particular forms of social relationships.

Hodder regards the funerary process as a political tool that may not directly relate to the social standing of an individual. Despite this, Brown (1995) believes that the processual and post-processual approaches can be used in tandem; they are not mutually exclusive.

The current research will analyse aspects of the mortuary ritual to make inferences about past societies, while accepting that these will be limited somewhat by the culturally manipulated nature of mortuary data. Therefore, I am taking an approach similar to that of Watson (1994), accepting that mortuary rituals are not be a passive reflection, however, holding firm to the assertion that large differences in social status can be identified.

2.2.0. Social Organisation in Prehistoric Thailand

Social evolution, as defined by Marcus (2008:252) is the ..."appearance of new forms of social or sociopolitical organization, without necessarily implying changes in overall culture or ethnicity". As such, it encompasses the movements of some groups from egalitarian hunter-gatherers to hierarchically structured complex civilisations. These changes in sociopolitical organisation are believed to occur in the movements between periods, for example during the change
from the Neolithic to the Bronze Age (Marcus, 2008). This is because the introduction of such a revolutionary material can provide new opportunities for attaining wealth that did not fit into the earlier organisation, prompting the development of new social classes. As such, exceptionally wealthy grave goods tend to appear in transitional stages, such as early state formation, as a reflection of the increase in social complexity (Childe, 1945).

Such a scenario has proven applicable in many parts of the world, where the introduction of bronze metallurgy was the impetus for social developments resulting in the construction of hierarchical social structures (Muhly, 1988). However, Muhly goes on to state that this does not seem to have been the case in Southeast Asia. While the existence of hierarchies in the Iron Age has been identified (Rivett, 1999; Talbot, 2002), the social organisation of Bronze Age Thailand is less conclusive. This has led to White (2002) contesting the existence of a Bronze Age in the area. Stating that the introduction of bronze to Thailand did not cause the socio-political complexity found in China and Western Asia, she believes the connotations associated with the term 'Bronze Age' were not met. Thus, there are two competing theories regarding the social organisation of 'Bronze Age' Southeast Asia; a traditional model supporting the emergence of hierarchies incited by the introduction of bronze (Higham and Higham, 2009a), and another suggesting that groups in the region did not reach this level of social organisation until chronologically later and that the term 'Bronze Age' is not applicable (White, 2002). Throughout this thesis the term 'Bronze Age' will be used despite this contention, however, it will be used without the implied connotations of social complexity, instead merely delineating a period of time between the introduction of bronze and iron.

2.2.1. Hierarchy and Heterarchy in Bronze Age Thailand

Hierarchy is a familiar concept in which a minority elite holds power. Induction into these elite groups occurs by way of birth, meaning that status is inherited
rather than acquired (Crumley, 1995). There has been little evidence of hierarchies in Bronze Age Southeast Asian sites. The exceptions to this are the site of Non Nok Tha (Fig. 1.2) and, Higham (Higham and Higham, 2009a; Higham, 2004) believes, Ban Non Wat. In an investigation of the grave goods accompanying individuals at Non Nok Tha, Bacus (2006) identified a gendered hierarchical system where Early Bronze Age females were distinguished from males. The second site, Ban Non Wat, has been identified by Higham (Higham and Higham, 2009a; Higham, 2004) as possessing an elite group of individuals in Bronze Age 2, who may suggest a hierarchy was in place from around 1000BC. Hauman (2009) has recently shown, based on comparative analysis of the mortuary vessels from each site, Bronze Ages 2, 3A, and 3B at Ban Non Wat to be contemporary with Mortuary Phase 2 at Ban Lum Khao. This is of significance because of the propinquity of the sites (Fig. 1.2), and because O’Reilly (1999) has shown Mortuary Phase 2 burials from Ban Lum Khao to be relatively poor, with on average less than ten mortuary goods placed in each grave. When this is considered with the relative wealth shown in Bronze Age 2 at Ban Non Wat, the argument can be made that the evidence shows a hierarchy between the sites (Hauman, 2009).

Prior to the research by Higham, Bacus, and Hauman there was no evidence of a social elite during the Bronze Age in Thailand, causing Higham (1989) to state that Bronze Age settlements were small autonomous groups made up of less than 500 individuals where the attainment of status was flexible and the relative political position of each settlement fluctuated. Such evidence prompted the application of a heterarchical model to the development of social organisation in Bronze Age Southeast Asia. Crumley (1995:3) defines heterarchy as "...the relation of elements to one another when they are unranked or when they possess the potential for being ranked in a number of ways". This implies that rather than being static with an individual holding power under any circumstance, power is dynamic and attributed based on ability. This is a key idea that differentiates heterarchy from hierarchy. Power is dynamic, elements
are not permanently ranked relative to one another but rather spatially and temporally dependant (O'Reilly, 2000). Heterarchical systems embrace the fact that human interactions are multidimensional and context specific (O'Reilley, 1999). Interrelationships can be ranked, however, they can also be unranked or situationally ranked, where ranking is context specific (White, 1995). As can be seen, heterarchical structures are in essence a series of small hierarchies. However, they are fluid whereas in a true hierarchical system power stays with an elite group. Therefore, even in heterarchical systems hierarchy exists, with the relative strength of each fluctuating over time (Schoep and Knappet, 2004). This dynamic relationship between hierarchy and heterarchy can be seen in Table 2.1, which shows the interplay between the two structures. Each society will be somewhere along the continua for each of the social factors, of which, gender relations and social status will be considered in this thesis in relation to Hypothesis Two. Gender relations will be important in relation to the second hypothesis, as within hereditary social structures males are dominant, suggesting that males will be treated preferentially in death. While in heterarchical structures sex is less important, with individuals treated differently based on personal achievement. In a system where personal achievement defines ones place in society, it is expected that preferential treatment will be reserved for older individuals who can accrue such achievements. However, if social status was inherited we would expect location of the burial may be important, with individuals grouped together representing ancestral groups.
Table 2.1: Continuum showing the interplay between hierarchical and heterarchical structures (Talbot, 2002 after White, 1995).

<table>
<thead>
<tr>
<th>Social Factors</th>
<th>Hierarchy</th>
<th>&lt;-----</th>
<th>Heterarchy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rules for the behaviour of individuals</strong></td>
<td>Rigid, proscribed rules with strong consequences for violation.</td>
<td>&lt;-----</td>
<td>Flexible, preferred rules with social ties not permanently broken if violated.</td>
</tr>
<tr>
<td><strong>Gender Relations</strong></td>
<td>Marked stratification and role definition based on gender, male dominance.</td>
<td>&lt;-----</td>
<td>Roles more flexible with women holding access to economic and political power.</td>
</tr>
<tr>
<td><strong>Economy</strong></td>
<td>Centralised and controlled.</td>
<td>&lt;-----</td>
<td>Self-organised, market-based, commercial, and multi-modal.</td>
</tr>
<tr>
<td><strong>Social Status</strong></td>
<td>Ascribed, hereditary or rigid class system, 'vertically' differentiated.</td>
<td>&lt;-----</td>
<td>Flexible, multiple ways in which to enhance status, largely based on personal achievements, 'horizontally' differentiated.</td>
</tr>
<tr>
<td><strong>Conflict Resolution</strong></td>
<td>Violence-focused, control oriented, solutions imposed upon vanquished.</td>
<td>&lt;-----</td>
<td>Peace focused, cooperative or alliance oriented, solutions negotiated between parties.</td>
</tr>
<tr>
<td><strong>Social Ideology</strong></td>
<td>Global, cultural imperialism in which intergroup differences are reduced or eliminated.</td>
<td>&lt;-----</td>
<td>Localised, pluralistic, intergroup differences accepted and/or integrated.</td>
</tr>
<tr>
<td><strong>Political Relationship between leaders and followers</strong></td>
<td>Autocratic, authoritarian.</td>
<td>&lt;-----</td>
<td>Consensus-oriented, 'democratic' in that its economically and socially viable for individuals to move to more hospitable political climates.</td>
</tr>
<tr>
<td><strong>Temporal Dynamics</strong></td>
<td>Linear, progressive, steady state.</td>
<td>&lt;-----</td>
<td>Oscillating, cylindrical, pulsating.</td>
</tr>
</tbody>
</table>

White (1995) goes on to suggest four broad patterns or themes which are seen to be indicative of heterarchy and can ideally be seen in the archaeological record. The first of these is cultural pluralism, a term used to describe when small groups retained their cultural practices, values, and identities despite being a member of a larger group. The second pattern White notes is the
existence of communities based on the household unit of production; community based economic specialisation, and competitive centers of goods distribution, rather than the existence of monopolies. Thirdly, social status systems that were flexible rather than fixed and based on personal achievements rather than lineage (acquired as opposed to hereditary). Lastly, White points to conflict resolution where warfare is uncommon. White applies these patterns to Bronze Age Thailand, however, does not produce unequivocal results. O'Reilly (2003) believes that this is because inferring heterarchy from the archaeological record is not particularly well understood. However, that it will ultimately rely on a lack of inequalities, whether those be in wealth, a symbolic signifier of rank, or evidenced in the marshalling of labour forces. The argument being that each of these is seen as only possible in the presence of a hierarchy and, therefore, their absence will indicate heterarchy (O'Reilly, 2003). It must be noted, however, that each of these factors have problems in terms of identification in the archaeological record. While attempting to infer wealth or rank from mortuary objects is often accompanied by the post-processual arguments briefly mentioned earlier in this chapter, the marshalling of labour forces can be carried out without hierarchies, for instance in order to plant and harvest rice crops.

As mentioned above, White (1995) believes that Bronze Age Thailand fulfills her criteria for heterarchical societies. Sites showed a large degree of site-to-site variability in mortuary and occupational remains, suggesting small, localised cultures. However, these were not culturally isolated, as evidenced by the inclusion of items that could only have been acquired through long distance trade. There was marked centralisation in the material culture produced at sites, with specialist craft communities seeming to have developed. Individuality in graves was observed, with unusual graves seen to represent those individuals who fulfilled some type of leadership role, and there was little evidence of organised violence or warfare. Chetwin (2001), in an investigation into a number of sites and site assemblages from Bronze and Iron Age Thailand,
backs up White's claim concerning warfare in Bronze Age Thailand stating that, in general, it was at a low intensity and especially so during the Bronze Age.

O'Reilly (1999, 2000, 2003) reinforces many of White’s arguments, strengthening the stance for heterarchy. Firstly, most Bronze Age cemeteries seem to have only one or two individuals who have more mortuary wealth than the others. This is interpreted, again, as indicative of individuals who have achieved status. Additionally, production of bronze goods was at the household level, and there is no evidence for either the marshalling of large labour forces or restricted access to resources (O'Reilly, 2000). O'Reilly goes on to say that the quantity and range of goods in adult burials from a number of sites, including Ban Lum Khao, Ban Na Di (Fig. 1.2), and Khok Phanom Di (Fig. 1.2), were undifferentiated based on age or sex. These sites seem to show a continuum in burial wealth with no clear divisions, as would be expected if an elite group held sway over resources (O'Reilly, 2000). O'Reilly (1999), does acknowledge that infants and children tended to be buried with more grave wealth than adults. Therefore, it could be argued that the presence of the rich subadult individuals are evidence of inherited status as would be expected in hierarchical societies. The young children could not have achieved enough status themselves to be interred with such wealth, suggesting that they inherited it. White (1995) argues against this, suggesting that the high number of grave goods accompanying such burials instead show parental affection for their children.

The discussion concerning social organisation in Bronze Age Thailand continues. Fueling the debate is the fact that many of the strains of evidence for heterarchy are concerned with proving an absence of hierarchy. This leaves open the rebuttal that this is due to the relatively small size and number of excavations and that more evidence will be available in due course.
2.3.0. Summary

This chapter briefly detailed trends in how mortuary data has been used to infer social organisation in past societies. It began by presenting the processual and post-processual approaches, before moving on to current views on the subject of social organisation in prehistoric Southeast Asia. The concepts of hierarchy and heterarchy were presented, with the arguments for the presence of each during the Bronze Age put forth. Additionally, possible ways this thesis might be used to contribute to the debate concerning social organisation were mentioned. As Table 2.1 showed preferential treatment awarded to males may indicate hierarchy, while links between preferential treatment and age may indicate that status was achieved. The next chapter will introduce *anthropologie de terrain*, detailing its history, the opportunities it presents, and the fundamental concepts behind the method.
3.0.0. *Anthropologie de Terrain*

This chapter will introduce the concept of *anthropologie de terrain*. It details the fundamental principles on which the method is based and discusses how it is applied. Beginning with an introduction to the method, this is followed by its main principles and the process of decomposition of the human body. The second half of the chapter will detail the methods used to discern past mortuary practices, as well as how these have been applied in Southeast Asia.

3.1.0. Introduction to *Anthropologie de Terrain*

*Anthropologie de terrain*, also known as field anthropology or archaeothanatology, is a methodology used to infer past mortuary practices. Developed in France in the 1970s and 1980s it was pioneered by Henri Duday (Nilsson Stutz, 2003b). Despite being widely incorporated into French archaeology, it has until recently received little attention elsewhere (Nilsson Stutz, 2003a). *Anthropologie de terrain* is a multidisciplinary methodology incorporating anatomy, archaeology and bioarchaeology. Willis and Tayles (2009) suggest this multidisciplinary nature to be one of the reasons for the lack of uptake by English speaking researchers. Certainly lack of cohesion between archaeology and bioarchaeology was demonstrated by Goldstein (2006), who examined eight archaeological journals between 1995 and 2000 and found limited knowledge sharing between the two disciplines. Knudson and Stojanowski (2008) believe the lack of uptake of *anthropologie de terrain* is due to time and financial limitations, as well as an emphasis in bioarchaeology towards population-based research. This may very well be the case; *Anthropologie de terrain* is reliant on thorough excavation techniques. In the field Duday (Duday, 2006; Duday and Guillon, 2006) advocates the
identification of each element in situ, recording its exact position (including slant and depth of the lowest part of the bone), anatomical orientation, and spatial relation to other elements. The recording of such data involves a substantial investment of time and as a corollary, money. Both groups of authors agree that a lack of literature in English has been hampering more widespread adoption (Knudson and Stojanowski, 2008; Willis and Tayles, 2009). Despite this, *anthropologie de terrain* seems to have, in recent years, gained a foothold in the English literature (Crubézy et al., 1996; Cruz and Codinha, 2009; Duday, 2009; Duday and Guillon, 2006; Murail et al., 2000; Murail et al., 2004; Nilsson Stutz, 2003a, 2003b, 2006, 2008; Pautreau and Mornais, 2003; Peressinotto et al., 2004; Valentin et al., 2000; Valentin et al., 2010; Willis, 2005; Willis and Tayles, 2009).

3.1.1. Fundamental Concepts of *Anthropologie de Terrain*

The grave as excavated is, according to Duday and Guillon (2006), the result of an interaction between two processes that will determine its appearance. The first of these is the original characteristics of the funerary deposit. These are the intentional and unintentional acts made by individuals at the time of burial, the funerary aspects, and these can include the position of the body at the time of burial and burial context. The second process Duday and Guillon mention are taphonomic processes. These are chance modifications that change the characteristics of the deposit, both those originating from human interaction and non-human interaction. An example of a human taphonomic factor that could influence an interment is the digging of a posthole through a burial, a phenomenon prevalent at Ban Non Wat. Non-human taphonomic factors include those from animal activity such as bioturbation and movement of skeletal elements by scavenging animals, as well as ‘natural’ taphonomic factors such as a variable water table and gravity. Of all the taphonomic factors that influence a grave, the most important from an *anthropologie de terrain* perspective are interactions between the decomposition of the cadaver and
gravity. As the soft tissues of the cadaver dissolve, gravity causes movements that are either allowed by the space in the grave or restricted by the lack thereof. By determining what types of spaces were present in the grave it is possible to hypothesise the conditions under which the individual was interred; the nature of any funerary containers, original position of the body, and occasionally whether or not there were grave goods present that have since disintegrated (Duday and Guillon, 2006). As the process of decomposition is an integral part of understanding how spaces form in the grave it will be examined next.

3.2.0. Processes of Cadaveric Decomposition

Decomposition is the term used to describe all the processes that occur in a human body from the time of death to the disintegration of its body parts (Pinheiro, 2006). The timing of the decomposition of a corpse occurs at varying rates depending on a multitude of factors including the condition of the cadaver at burial and the environment in which it was placed (Galloway, 1997; Janaway, 1996; Mann et al., 1990; Pinheiro, 2006). These factors influence not only the decomposition of the corpse as a whole, determining rates, they can also affect decomposition of different areas of the corpse. This differentiation is caused by microenvironments within the grave (Pinheiro, 2006). Despite such temporal and distributional variability the general processes of decomposition run linearly from autolysis to putrefaction and decay (Fiedler and Graw, 2003). This sequence can be interrupted by saponification and mummification which preserve the remains, arresting the decomposition of the soft tissues, sometimes for decades or even centuries (Pinheiro, 2006). This section will describe the processes involved in decomposition from the time of death to skeletonisation, including explaining natural forms of preservation, after which the focus will turn exclusively towards the decomposition of buried cadavers.
Autolysis is the 'self digestion' of the body's tissues, carried out by enzymes. At the time of death oxygen ceases to enter the body, causing cytoplasmic pH to decrease and a loss of cell membrane integrity. This weakening of the cell membrane leads to the release of lysosomes and their digestive enzymes. These digestive enzymes are the cause of autolytic decay (Tsokos and Jason, 2005). The literature, however, largely ignores autolytic decay, instead focusing on putrefaction. A reason for this may be the fact that although autolysis is an enzymatic activity and putrefaction bacterial, the destruction of the tissues in each are analogous to another. This makes distinguishing those aspects of decay that are due to putrefaction and those due to autolysis largely academic (Tsokos and Jason, 2005).

After death, one of the first processes to begin to occur is a cooling of the body's temperature to that of its surrounding environment (Mant, 1987). This cooling is an important factor in the processes of putrefaction. Putrefaction occurs due to the movement of bacteria and enzymes from the bowel into the body tissues, which then begin to destroy the soft tissues. When the soft tissues decompose, bones are left articulated by ligaments, with a liquefied mass of soft tissues surrounding them until this is absorbed into the soil (Janaway, 1996). Temperature plays an important role in decomposition, as the more active aerobic bacteria stop multiplying when the temperature decreases below 21ºC. This means that the sooner the body cools to below 21ºC the longer the process of putrefaction will take, or alternatively, the longer such a drop takes the more advanced putrefaction will be. Therefore, environmental temperature will affect putrefaction rates as will any covering, which slows the loss of body heat (Mant, 1987). Skeletonisation is the last stage of decomposition and involves the disintegration of all soft tissues from the bone. It is very variable in timing (Pinheiro, 2006) both within the same and between different individuals.

It is important to note that muscle fibres go through three stages of change after death; this is in contrast to the notion that as soon as rigor mortis sets in
muscles become immovable. First the muscles become flaccid but contractible, at this point they still possess cellular life (Janaway, 1996). The second stage is rigor mortis, this begins to set in three to four hours after death, with the whole body affected after approximately twelve hours, and causes the muscles to become rigid and lose their ability to contract. The environment influences the speed and duration of rigor mortis, with higher temperatures causing earlier onset and shorter duration (Gunn, 2009). In the last stage muscles lose their rigidity but can no longer contract, this commonly occurs 36 hours after death (Gunn, 2009; Janaway, 1996). Flexed burials do not have to have been tightly bound in the short interval between death and the onset of rigor mortis as Saxe (1971) has previously inferred. Therefore, I believe that at Ban Non Wat the positioning of flexed individuals likely took place after rigor mortis due to its early onset and short duration in hot environments.

### 3.2.1. Preservation of Human Remains

Two forms of natural preservation will be mentioned, mummification and saponification. Mummification consists of the dehydration of tissues (Pinheiro, 2006). It usually occurs in dry ventilated environments (Pinheiro, 2006) and, therefore, is not a major factor when considering buried remains, so will not be explored in any more depth.

Saponification is defined by Mant (1987:66) as the:

...hydrolysis and hydrogenation of the subcutaneous fat and other body fats into a substance called adipocere (adipo = fat; cere = wax) which is a mixture of fatty acids deprived from the fats present in the body.

Adipocere formation is variable and irregular, usually only involving divisions of the body, as full saponification is rare (Pinheiro, 2006). Fiedler and Graw
(2003) state that it is difficult to give the precise conditions under which adipocere forms due to a lack of systematic investigations and contradictory opinions, however, there are a number of factors that do affect it. Firstly there are those related to the individual characteristics of the corpse such as weight, sex, age, and cause of death. Secondly there are characteristics of the burial itself such as the depth, context, and presence of clothing. Lastly there are the properties of the environment; the soil, temperature, and presence of water (Fiedler and Graw, 2003). Regardless of its causes adipocere formation has the potential to arrest decomposition rates, and can therefore be relevant to an *anthropologie de terrain* analysis.

### 3.2.2. Decomposition of Buried Remains

The skeletonisation of a buried corpse in general takes eight times longer than its equivalent above ground (Rodriguez, 1997). This statement is echoed in other publications where it is generally believed that the greater the depth of interment, the greater the preservation of soft tissues (Mant, 1987; Pinheiro, 2006; Rodriguez and Bass, 1985). There are two main reasons for this decrease in decomposition rates. The first is the limited access for insects and other animals that a buried body provides, this is directly related to both soil compactness and burial depth (Mann *et al.*, 1990; Mant, 1987; Rodriguez, 1997; Rodriguez and Bass, 1985). Bodies placed on the ground allow for virtually any type of carrion insect to get access to it, whether from the air or the ground. In contrast, bodies buried in the earth limit the access of insects to only those that burrow, which decrease in number the greater the depth. The second factor is the soil environment, particularly in relation to temperature, which depth has an inverse relationship with (Mann *et al.*, 1990; Mant, 1987; Rodriguez, 1997; Rodriguez and Bass, 1985).

Ban Non Wat experiences a variable water table, rising in the wet season and falling in the dry. For that reason it is expected that during the wet season
burials could have been submerged in water. Immersion in wet environments has been shown to alter the decomposition of the human body (Haglund, 1993). However, most of this research is concentrated on bodies in seas or lakes, in which currents heavily affect decomposition. There is no research on the changes of human buried bodies in an environment that involves a variable water table or similar source. The only study in which a seasonally high water table is mentioned in relation to the burial of remains is Wilson et al.’s (2007) experiment with domestic pigs in Yorkshire, England. The study found that the presence of water slowed decomposition due to the decreased temperature and water logging. It is unclear how applicable these findings would be at Ban Non Wat because, although water logging would likely occur, the higher temperatures may offset the resulting reduction in decomposition rates. It is, therefore, unclear how long buried remains may have taken to decompose at Ban Non Wat. If decomposition of the soft tissues was slowed, containers may have partially decayed before the ligaments, affecting the *anthropologie de terrain* analysis.

### 3.3.0. Anthropologie de Terrain Methods

This section will detail the four steps taken in an *anthropologie de terrain* analysis. The first of these is deducing burial type, which describes whether an individual was interred in a single episode or over multiple episodes (primary vs. secondary). After burial type the space present in graves will be analysed, followed by how burial position affects the spatial distribution of skeletal elements. Lastly, burial context will be explored, which concerns any containers that individuals were interred in.
3.3.1. Burial Type

Identifying burial type is one of the first steps in conducting an analysis using *anthropologie de terrain* methods. It is also the one most ignored in the literature, with a large percentage of research excluding this process. When burial type is mentioned its assignment is only briefly noted, with methods based predominantly on whether the skeleton appeared ‘articulated’ or ‘disarticulated’. Here a more in depth discussion of how burial type is allocated will be given, beginning with definitions.

A 'primary' interment refers to a burial that, when excavated, is in the same location that it was placed originally during the funerary process (Roksandic, 2002). In the current thesis primary burials will include both those that were interred in a grave and left undisturbed as well as those disturbed by humans at a later date, either intentionally or unintentionally providing the individual is kept in the original location. In contrast, ‘secondary’ burials refer to those that involved the decomposition of human remains in more than one location (Nilsson Stutz, 2003b). They entail intentional rearrangement by humans, indicating a purposeful removal of the bones to other locations (Andrews and Bello, 2006). Although the term 'secondary burial' is used in the majority of the literature, the mortuary practices of such burials may involve reburial more than twice, making the term imprecise. This had led to the use of the term 'burial in multiple episodes' which more accurately describes the phenomenon (Nilsson Stutz, 2003b). This term does not implicitly include those deposits of human remains that do not fit the term burial (an intentional act). For the purposes of this thesis the terms 'burial in multiple episodes' and 'disposal in multiple episodes' will be used interchangeably, without the implied connotations of the word burial.

In theory, burial type categories can be easily defined, however, identifying them in the field can be more difficult. According to Duday and Guillon (2006)
proving a grave as primary relies on anatomical connections, finding evidence that soft tissues were present when the body was inhumed. The way this is accomplished is through examining the position of skeletal elements. As mentioned, during decomposition the ligaments are generally the last soft tissues to decompose (Nilsson Stutz, 2003b), this means that once they disappear relocating the body involves the movement of individual skeletal elements, a process that will result in their shifting from the anatomical position. Ligaments can be divided into two groups based on the length of time taken for them to decompose (Duday and Guillon, 2006). By examining the articulation of a specific type of ligament burial type can be deduced.

Persistent ligaments take a relatively long time to disintegrate as they are placed under high biomechanical stress. The reasoning behind this is that these weight-bearing ligaments are required to be thicker due to the stress under which the joint is placed. Examples of joints with persistent ligaments are the atlanto-occipital, atlanto-axial, sacro-iliac, knees, and ankles (Duday, 2006; Valentin et al., 2010). Because they take a long time to decompose their use in inferring burial type is limited, as by the time a persistent joint has disarticulated the body could have been moved multiple times.

Labile joints take less time to decompose than persistent joints and are placed under less biomechanical stress. This group includes joints in the hands, the phalanges of the feet, and the cervical vertebrae (excluding the atlanto-occipital and atlanto-axial joints) (Duday, 2006). Because they take less time to decompose, these joints are the most important for the identification of a primary burial. The articulation of labile joints demarcates a shorter period of time between death and location of the primary deposit than persistent joints. If the bones that make up a labile joint are articulated, then that would indicate that the individual was interred while the ligaments were in place and, therefore, that the burial was most likely primary (Fig. 3.1). The alternative, that disarticulation of labile joints indicates a burial in multiple episodes does
not hold true. This is because decomposition of soft tissues or organic goods often creates pockets into which skeletal elements can fall. Therefore, it is very difficult to confidently identify a burial as occurring over multiple episodes unless the individual was cremated.

Figure 3.1: Photograph of burial 571 showing burial as primary based on articulation of the labile joints of the hands.

The fluids released into the soil beneath a cadaver during decomposition can also be used to infer a primary burial. The decomposition fluids attract worms, which, in turn, attract other animals that feed on the worms. Therefore, a concentration of animal remains or animal activity, such as ant nests, under a skeleton may indicate a primary grave. The worms also form calcareous spherules in the sediment, which may indicate that the burial is primary (Duday, 2006; Duday and Guillon, 2006). Such a concentration of spherules is not expected to be observed at Ban Non Wat, where the variable water table will likely destroy such evidence. Ban Non Wat also has complex superpositioning of burials, which would make inferring links between animal remains outside a grave and a specific burial difficult, especially based on field recordings.
3.3.2. Spaces in the Grave

The next step in an *anthropologie de terrain* investigation is deducing the presence or absence of spaces in a grave, including evidence of constriction in the skeletons. Space is a prerequisite for movement meaning the type and extent of space within a grave will play a major role in the resulting positioning of skeletal elements. Roksandic (2002) defines space as that between the body and the surrounding sediment. There are three types of space; internal formed by the decomposition of the soft tissues of the body, external outside the original confines of the body, and secondary external space formed when organic objects in the grave decompose.

**Internal Space**

Internal spaces form in all types of burial where the body was buried before significant decomposition of the soft tissues, and is formed by the disappearance of those tissues during decomposition (Duday and Guillon, 2006). As such, the formation of internal spaces can vary temporally, dependant upon decomposition rates. Once the spaces have formed they provide areas into which skeletal elements can move, causing the remains to become disarticulated (Duday and Guillon, 2006). These spaces are, in time, filled with sediment that serves to stabilise the position of the bones. The movement of sediment into space can be either immediate or delayed (Roksandic, 2002).

If the filling is immediate, termed 'progressive infilling' then soil fills spaces as they form (Roksandic, 2002). The filling of space as soon as it becomes available results in limited movement of skeletal elements, with joints remaining articulated. Such infilling is only possible when the cadaver is interred in direct contact with the sediment, and that sediment is porous and fluid enough to infiltrate the spaces (Nilsson Stutz, 2003b). This underpins one of the main aspects of *anthropologie de terrain*; soil stabilises bone positions
and keeps elements articulated. If there is no soil present until after the decomposition of the soft tissues then skeletal elements will be free to move into the spaces formed by that decomposition, termed delayed or differential infilling (Roksandic, 2002). Differential infilling occurs when the sediment is less fine grained or there is a barrier between the soil and cadaver. The spaces created by the decomposition of soft tissues are not immediately filled, allowing elements to shift (Roksandic, 2002). The most common of these movements is the fall of the hands into the thoracic cage or pelvic cavity, and the collapse of the rib cage (Duday and Guillon, 2006) (Fig. 3.2). In time empty spaces are filled, with the encroaching soil maintaining the new position of the skeletal elements. Such movements occur inside the initial volume of the cadaver, however, it is important to remember that the initial volume of the cadaver extended outside the perimeter of the bones, where soft tissues once resided. This means that some limited lateral movement of the elements can occur within internal space (Roksandic, 2002). Such movements are distinguishable from cases where external space was present by the magnitude of movement, for instance slight disarticulation of the pubic symphysis can occur within internal space but complete flattening of the pelvis is indicative of external space.

Figure 3.2: Photograph of burial 178 showing flattening of the ribs.
**External Space**

If space is present external to the corpse during decomposition the skeletal elements will most likely show evidence of movement into that space (Duday and Guillon, 2006). This scenario allows for large-scale movement, as there is opportunity for the elements to fall both within internal space and the external space. If the space is wide enough, the pubic symphysis will disarticulate, with the result being a flattening of the os coxae. This will result in the acetabulum pushing the femoral heads, causing lateral rotation of the femora, and the fall of the patellae lateral to the lower limbs. This position of the patellae is an indicator of decomposition within external space (Duday and Guillon, 2006) (Fig. 3.3). Such an empty space must be wide enough to allow the fall of the os coxae. If the grave cut, coffin, or tight wrapping, is narrow then movement of the bones laterally will be limited. This phenomenon results in the skeletal elements resting against the limits of the grave structure termed *effet de parois* or 'wall effect'. This is the result of an architectural structure imposing limits on the space available for movement of the bones (Roksandic, 2002). For instance, if an individual is buried in a coffin the skeletal elements may move in the space to rest against its edges (Fig. 3.4). When the coffin disintegrates, the soil retains the positioning of the elements (Nilsson Stutz, 2003b). Objects that can cause an *effet de parois* include not only coffins but also the sediment itself, wrappings, and funerary goods (Nilsson Stutz, 2003b).
Figure 3.3: Photograph of burial 197 showing disarticulation of pelvis, lateral rotation of femora, and lateral fall of patellae indicative of decomposition in external space.

Figure 3.4: Photograph of burial 256 showing *effet de parois* (blue), caused by the edges of a coffin.

**Secondary External Space**

The decomposition of organic funerary goods inside the grave causes the formation of external spaces termed 'secondary external spaces' (Duday and Guillon, 2006). Such spaces can allow movement of the skeletal elements and may appear paradoxical to other observations, making interpretations difficult (Duday and Guillon, 2006). An example of this could be the movement of a humeral head into space lateral to the shoulder when there was no external
space present in the grave at the time of burial, shown by the articulation of the pelvis in a widely cut grave.

**Evidence for Constraint**
Constraint is identified by pressure on the shoulders, pelvis, ribs, and limbs. It is not associated with any one burial context in particular. Lateral constraint is the most common form of constriction and can be seen in movement of the lateral ends of the clavicles superiorly, termed verticalisation (Duday, 2006) (Fig. 3.5). Verticalisation of the clavicles results from pressure on both sides of the shoulders causing their acromial ends to move superiorly, the scapulae to rotate externally, and the humerii to move superiorly and rotate medially (Duday and Guillon, 2006). These phenomena are caused by a superior movement of the shoulders in an effort to make them narrower to fit into a tight space. Constraint through the sides of the body can also prevent the fall of the pelvis and the fall of the patellae.

![Figure 3.5: Photograph of burial 613 showing verticalisation of clavicles.](image)
3.3.3. Burial Position

In some cases, where there has been little movement of the skeletal elements, reconstruction of the original position of an individual is easily achieved through a visual inspection. Movement of skeletal elements since burial will always occur, even in the most pristine graves small movements take place because of spaces formed by the loss of soft tissues (Duday and Guillon, 2006; Nilsson Stutz, 2003b). When there has been significant movement of the elements deducing the original burial position can become more complicated and requires knowledge of the relative strength of articulations. In this section some of the more common movements of the skeletal elements will be mentioned. This will allow such movements to be identified and taken into account during analysis.

The common movements of the skeletal elements of lying individuals will first be examined; this includes those placed supine, prone, and on their sides. Movements during decomposition often occur at the head. Two types of movement generally occur at the head, a change in orientation, and movement of the chin towards the sternum, lifting the head (Duday, 2006). Both movements are caused by the interplay between ligaments, gravity, and the surrounding sediment.

In the first case, a change in orientation is caused when ligaments become so weak that, if the skull is on an uneven surface, it will move. The way to distinguish between a skull that has moved and one that has been placed in a particular position is by examining the cervical vertebrae. The atlanto-occipital ligaments are persistent in nature, while those between the cervical vertebrae more labile. So if the head was placed in the position in which it was found all the cervical vertebrae will be aligned along the same axis. Alternatively, if there is discontinuity between the cervical vertebrae it indicates that movement occurred after decomposition (Duday, 2006). The reasoning behind this is that
during life rotation of the head affects all of the cervical vertebrae, so if the head were moved when the soft tissues were present all the cervical vertebrae would be aligned. Because of this, it is important to record the position of the cervical vertebrae in situ by removing the mandible and skull (Duday and Guillon, 2006). If the cervical vertebrae are stuck to the skull it will also require detailed recording during cleaning. Burials from Ban Non Wat did not have the position of the cervical vertebrae sufficiently recorded for this analysis, meaning that the original position of the head will not be examined.

The second type of movement of the head is an anterior movement. This occurs when the ligaments of the thoracic cage decompose, usually among the first to do so. This causes the ribs to fall anteriorly and inferiorly. However, while the anterior costo-sternal ligaments are labile, the posterior costo-transverse are not. This results in the descent of the ribs causing a lifting of the thoracic vertebrae and subsequently the movement of the chin towards the sternum (Duday, 2006).

General characteristics of the movements observed in supine individuals include a flattening of the rib cage as the intercostal and sterno-costal joints disarticulate, causing the sternum to fall within the chest cavity and the ribs to follow in an anterior-inferior direction (Duday, 2006). In the pelvis, an anterior movement of the sacrum into the space once occupied by the pelvic viscera follows the decomposition of the sacroiliac ligaments. The pelvic bones tend to fall slightly posteriorly into the space previously occupied by the gluteal muscles (Duday and Guillon, 2006). If the hands of an individual were placed on areas of soft tissue, such as the chest or legs, the bones will tend to fall into the space formed when they decomposed (Duday and Guillon, 2006).

When an individual is placed on their side the upper os coxae tends to fall into the pelvic cavity (Duday and Guillon, 2006). Additionally, the lower ribs are usually held in place, while those from the other side of the body tend to fall into
the cavity (Duday, 2006). This is generally true of all skeletal elements, those on the bottom of the grave are held in place while gravity causes those above to fall into the spaces caused by decomposed soft tissues.

Nilsson Stutz (2003b) gives a thorough overview of the movements of the skeleton in individuals placed in a seated position from her work in Denmark. The vertebral column tends to either collapse completely or move inferiorly. The inferior movement of the vertebral column is linked to an anterior-inferior movement of the sacrum. Because of the bipedal posture of the human body, the weight of the upper body runs through the sacrum into the lower limbs, which can cause the sacrum to fall into the pelvic cavity. If the vertebral column is resting on the sacrum, it will follow the movement. The upper limbs and the skull tend to move into the spaces where once soft tissues resided. The proximal parts of the humerii and shoulder are more likely to move than the distal due to gravity. The ribs tend to collapse inferiorly and sometimes horizontally; this collapse often retains the order of the ribs, however. Nilsson Stutz believes the order of the ribs is maintained due to the surrounding sediment holding them in place. In contrast, based on the anatomy of the joints, I believe it is more likely that the persistent costo-transverse joints, which would not yet have disintegrated, keep the order.

### 3.3.4. Burial Context

This section will detail the ways burial context can be inferred. Burial context refers to the type of containers individuals were interred in. This builds on the previous sections concerning the original position of individuals and the types of empty space in the burials.

**Burials with No Container**

If an individual was inhumed with no container on a stable surface then little movement would occur, none outside the original confines of the body
(Roksandic, 2002). It is possible to say that if skeletal elements were maintained in their initial position when such a position was unbalanced, progressive infilling has taken place. As has been previously stated, progressive infilling is reliant on the body being in contact with the sediment, and such sediment must be fluid (Duday and Guillon, 2006). Therefore, these observations indicate interment without a container.

**Wrapped Burials**

Nilsson Stutz (2006) attempted to describe what factors distinguish a burial that has been tightly wrapped. She stated that bilateral pressure causes verticalisation of the clavicles and the outward rotation of the scapulae. The pressure on the thoracic cage causes the sternal end of the ribs to move towards the midline of the body. The upper limbs, particularly the humerus, are maintained in an unbalanced position (*effet de parois*) and medially rotated. In general an *effet de parois* can be traced along the body. However, not all of the indicators mentioned must be present, especially as it is likely that some wrappings would be too loose to present the characteristic patterns. Despite Nilsson Stutz’s efforts, rather than descriptors of wrapped burials these criteria describe evidence for constriction in general. The description does not allow differentiation between wrapped individuals, those placed in a narrow coffin, or those in a narrow grave without a container. In order to differentiate between the burial contexts the dimensions of the grave cut must be identified, proving it is wider than the *effet de parois* would suggest a container was used (Nilsson Stutz, 2006). Distinguishing between wrappings and narrow coffins can be difficult and relies on the slightly larger lateral movement coffins would allow. However, if the wrapping was loose little to no constriction will be seen and there will be no way to differentiate between wrapped burials that decomposed quickly and those with no containers where the soil matrix does not allow progressive infilling.
**Coffin Burials**

Coffin interments in general imply the presence of external space. As such, these commonly show the highest degree of disarticulation between the three contexts described here. Therefore, in order to positively identify a coffin burial, external space must be shown. The fall of the pelvic girdle, lateral rotation of the femora and resulting movement of the patellae lateral to the lower limbs are indicative of a wide coffin burial (Duday and Guillon, 2006). See Figure 3.3 for a classic example of a wide coffin burial, showing the characteristics outlined as well as the disarticulation of the skull along the cranial sutures, which can only occur in external space. As mentioned, narrow coffins show similar characteristics as tight wrappings and are differentiated by the magnitude of space present in the grave.

There is a phenomenon called 'tumbling' where burials are seen to display extensive disarticulation, particularly in the thoracic cage and vertebrae. First identified by Brothwell (1987) in a Jewish medieval burial ground, other parts of the skeletons such as the pelvis and skull also showed signs of this. In other aspects the burials were similar to their contemporaries, with the presence of coffin nails demonstrating burial context. Brothwell believed the disturbance too large-scale to be attributed to rodents, instead proposing the mechanism being relocation during decomposition. It had long been noted that mummies showed a similar pattern caused by the decomposition of the soft tissues allowing movement of the skeletal elements when tomb robbers moved the mummies. Brothwell applied the same reasoning to the medieval sample, attributing the tumbled appearance to the movement of the coffin after partial decomposition of the body inside. Such a process implies that the coffins were either not immediately buried or buried and then exhumed and later reburied (Brothwell, 1987). Evidence of tumbling may be present at Ban Non Wat where the fast rates of decomposition brought on by heat could mean that individuals had partially decomposed by the time of burial.
Duday (2009) mentions the possibility of smaller lighter bones floating from their original position when coffins are inundated with water, this may result in skeletal elements lining the edges of a container and is only identified when external space is present. Burials at Ban Non Wat could have been subjected to these changes because of its varying water table.

### 3.4.0. Anthropologie de Terrain and Prehistoric Southeast Asia

Pautreau and Mornais (2003) were the first to apply *anthropologie de terrain* methods to burials from Southeast Asia, identifying the use of log coffins made of hollowed out tree trunks at Ban Wang Hai in northern Thailand (Fig. 1.2). Willis (2005) was the first to use the method on burials from sites in the upper Mun Valley of Northeast Thailand, carrying out a comparative analysis of mortuary practices between Ban Lum Khao, Noen U-Loke, and a small sample from Ban Non Wat. Ban Lum Khao burials investigated were dated to the Bronze Age between 1300BC and 500BC, while Noen U-Loke were Iron Age interred between 300BC and 300AD. Only primary, extended supine burials were included in the investigation.

Willis examined forty-seven burials from excavation square 'A' at Ban Non Wat from the Neolithic, Bronze, and Iron Ages. Many of these showed evidence of constriction attributed to a tight durable wrapping. There were differences in the way rich individuals were interred compared to others, with the wealthier seeming to be buried in wider graves with no constractive wrapping. Additionally, some of the skeletons of richer individuals displayed disarticulated limbs, possibly the result of grave robbing where bracelets, necklaces, or belts were removed. Ban Non Wat showed differentiation in mortuary practices, which, Willis believes may contradict the concept of heterarchy in Bronze Age Southeast Asia.
Willis also looked at the sites of Ban Lum Khao and Noen U-Loke, however, the findings were reinterpreted in a later paper by Willis and Tayles (2009). Willis and Tayles identified evidence of the use of wrappings and coffins at Ban Lum Khao and the use of wrappings at Noen U-Loke. The authors interpreted the data as showing that burial practices became more uniform over time. The variation identified at Ban Lum Khao was attributed to sex, as all coffin burials except one were female, however, the sample consisted predominantly of females. There were no reliable links between wealth and burial context identified at either Ban Lum Khao or Noen U-Loke.

3.4.1. The Willis and Tayles Method for Discerning Burial Context

In addition to being the first to apply *anthropologie de terrain* to sites in Northeast Thailand, Willis (2005) was the first author in the English literature to compose comprehensive criteria for attributing burial context. This was constructed to allow the assignation of burial context to a large number of interments based on photographs and field drawings, and was in the form of a flow chart. Willis and Tayles (2009) modified this chart (Fig. 3.6), which will be the focus of this section. The chart will be critiqued, for while it represents a significant step forward in the English literature, it does have flaws. These weaknesses lie not so much in the methods used but rather in failures to comprehensively explain the criteria for each category. For instance, while Willis and Tayles mention that they only examined primary burials they do not state how they identified such interments. This is an issue encountered in virtually all the English literature on the topic, so they cannot be held accountable. However, it is one of importance, as the assignation of burial type can influence the characteristics of the sample examined and, therefore, the outcomes of the research.
A further example of where Willis and Tayles’s method could be strengthened by explaining categories is shown in the first row of Figure 3.6. The chart calls for burials to be separated into 'articulated', 'partially articulated', and 'disarticulated' groups. Willis and Tayles do not give definitions of these groups, leaving them somewhat open to interpretation. What constitutes an articulated burial as opposed to a partially disarticulated or fully disarticulated one? Does the term 'articulated' imply that every element was in the correct anatomical position? This would suggest that the thoracic cage did not collapse, the hyoid bone remained in place, and that all the bones of the hands were articulated even when placed on soft tissues. Does the disarticulated group consist only of fully disarticulated skeletons? Does the partially articulated group include everything in between the fully articulated and disarticulated groups? By giving brief descriptions of these terms this ambiguity could have been avoided.

Figure 3.6: Flow chart used to deduce burial context by Willis and Tayles (2009:550).

Correctly identifying constriction as originating from a container rather than the sides of the grave is an issue often complicated by the inability to accurately distinguish grave cuts. The characteristics of individuals in tight wrappings and those in narrow graves with no container are so similar that the only way to
differentiate them is by the cut of the grave. This is of special importance at Ban Non Wat as mentioned in Chapter One, where the grave cut could often not be identified. If the grave cut cannot be seen in the soil, it must be inferred by the location of grave goods. Willis and Tayles chose to use the placement of grave goods beyond the head and/or feet to indicate a tight non-durable wrapping, while the absence of items suggests a narrow grave cut and soft sediment. This argument can be augmented with the inclusion of grave goods to the sides of the individual to identify constriction caused by a container, as this also provides evidence that the grave cut was larger than the constriction.

The flow chart used by Willis and Tayles could be improved in relation to constricted individuals and the presence or absence of items beyond their head or feet. According to the chart if there were no items above the head or below the feet then the individual was placed in a narrow grave with soft sediment. Their argument implies that if there were no items above the head or below the feet, the individual must not have been wrapped, and does not take into account the possibility of being wrapped and interred with no mortuary goods. Following the Willis and Tayles methodology such an individual could be mistakenly identified as being buried in a narrow grave without a container.

The last major point to note about Willis and Tayles's method for the identification of burial context is that it does not take into account the presence of goods within the grave that have since decomposed. The decomposition of such items would cause spaces to form within the grave, into which skeletal elements could move giving the bones a distribution expected in a different context. Furthermore, they do not take into account other taphonomic factors such as movement by animals, floating, and bioturbation. This is largely due to the fact that such conditions create spatial distributions that mimic other burial contexts and would be extremely difficult to allow for in the methodology. In reality, these issues cannot be comprehensively addressed using such a method and instead must be identified on a case-by-case basis.
3.5.0. Summary

This chapter introduced basic concepts that are integral to the conduction of an anthropologie de terrain investigation. It began with an introduction to the method and then looked at the decomposition of the human body, an understanding of which is vital to the success of this approach. Next the four main steps in the conduction of an anthropologie de terrain investigation were described. The steps do not necessarily have to be carried out in the linear fashion described here; usually in the process of deducing one the others are also determined. The chapter concluded with an introduction to the use of anthropologie de terrain in Southeast Asia and a critique of Willis and Tayles's (2009) model for assigning burial context. Despite the limitations in the method that they put forth, it must be noted that they are largely due to a lack of definitions rather than the methods themselves, which will be incorporated into those described in the following chapter.
4.0.0. Methods

This chapter describes the design of a modified approach for the analysis of mortuary remains. Derived from the work of Duday (2006, 2009), Duday and Guillon (2006), Nilsson Stutz (2003a, 2003b, 2006, 2008), Roksandic (2002), Willis (2005), and Willis and Tayles (2009) it provides a systematic approach to the application of *anthropologie de terrain*. To date, previous research in English has been concerned with detailing the fundamental concepts behind the approach, however, has failed to present a detailed methodology for applying *anthropologie de terrain* to a large number of burials. This is with the exception of Willis (2005) and Willis and Tayles (2009) whose systems have been critiqued in Chapter Three. The objective of this chapter is to present a comprehensive approach for the application of *anthropologie de terrain* to a large number of burials, enabling it to be utilised for the analysis of burials from Ban Non Wat.

The methods used rely on secondary resources in the form of photographs and field drawings, as excavations had concluded when research began. It has been shown by Nilsson Stutz (2003a, 2003b, 2006), Willis (2005), and Willis and Tayles (2009) that *anthropologie de terrain* can be applied based on photographs and field drawings, however, it is expected that there will be a number of limitations. These limitations will be presented in the discussion in Chapter Six.

This chapter will begin by outlining what data was recorded in the form of 'mortuary profiles' for each individual before detailing how that information was obtained. Lastly, it will specify how the data was analysed.
4.1.0. Mortuary Profiles

Mortuary profiles were constructed in order to amalgamate those aspects of a burial that either characterise or have some relation to burial practices and, therefore, may be of consequence when it comes to an *anthropologie de terrain* analysis. With this in mind, context data was included as well as sex estimates, age estimates, the completeness of the skeleton, orientation, wealth score, burial type, burial position, type of space present in the grave, burial context, and any relevant additional comments. Figure 4.1 shows a completed mortuary profile form for burial 464.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>464</th>
<th>Sex</th>
<th>Female</th>
<th>Age</th>
<th>Young adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Era</td>
<td>Bronze</td>
<td>Phase</td>
<td>2</td>
<td>Wealth Score</td>
<td>32*</td>
</tr>
<tr>
<td>Square</td>
<td>F7</td>
<td>Layer: Spilt:</td>
<td>5:1</td>
<td>Depth</td>
<td>2.59</td>
</tr>
</tbody>
</table>

- **Completeness**: Essentially complete
- **Orientation**: 335 degrees
- **Burial Type**: Primary (with disturbance) - part of R hand and C vertebrae articulated. Disturbance to L pelvis and proximal L femur.
- **Burial Position**: Supine with L hand by side and R hand on pelvis.
- **Space**: Internal space - fall of thoracic cage and disarticulation of part of R hand into pelvic cavity. No evidence of external space as hips articulated and L patella articulated in unstable position. No effet de parois or evidence of constriction.
- **Burial Context**: Soft loose container. There is no evidence of external space or constriction so any container must have been soft and loose. The base of the grave seems to be concave (curvature of grave and slight medial movement of R humerus) this could be due to the base of the grave being cut unevenly or being laid on a curved object (e.g. hollowed out tree trunk). The R humerus has not moved much and there has been no other medial movement, suggesting presence of soil to stop such medial movements when the soft tissues of the torso had dissapeared.
- **Comments**: 11 pots - two by L arm, 1 by L knee, 8 superior to head
  1 marble bangle on L wrist
  11 trochanter bangles - 5 on L forearm, 6 on R
  402 shell disc beads
  90 shell beads on skull
  1 bivalve shell superior to head
  1 pig bone superior to head
  1 piece of red ochre superior to head
  5 shell earrings - 3 on R ear, 2 on L

*ankle area and beyond not in excavation area (so may have been more mortuary goods)*

Figure 4.1: Completed mortuary profile for burial 464 from Ban Non Wat.
Mortuary profiles were constructed for all 244 adult burials analysed from the Neolithic and Bronze Ages of Ban Non Wat. Subadult burials (those younger than approximately 18 years) were excluded from the assessment because many were interred in mortuary jars and time constraints. Context information concerning the layer, spit, and depth of each burial was recorded in the field and Professor Charles Higham assigned the burials to eras and phases. Dr Nancy Tayles assessed the sex, age, and completeness of the skeletons, as well as compiling these data with the spatial and temporal context information in a database. The orientation of each burial was given as a compass bearing and indicated the direction of the head taken from the feet of the individual. Most orientation data came from Higham (pers comm.), or from images supplied by Professor Charles Higham, which gave the orientation of the cranium, and from which a compass bearing was derived (Fig. 4.2). The comments section was used to add any information that was not encapsulated in the rest of the profile, most often describing the grave goods present. The ways the data for the remaining categories shown on the mortuary profile (mortuary wealth score, burial type, space, burial position, and burial context) were acquired will be outlined next.
4.1.1. Mortuary Wealth Score

Mortuary wealth scores were assigned to individuals in order to give some indication of their wealth, which will be used to indicate differences in social standing. The method employed was the same endorsed by O'Reilly (1999), Cawte (2007), and Higham and O'Reilly (2004). This approach assigned a single point for each item placed in the grave, with the points accumulated to give a wealth score for each individual. Items were each given one point regardless of
any assumed differentiation in value. Objects were not counted if there were questions over provenance, and those made up of multiple parts were only assigned one point, for example a bead necklace made up of 100 beads was given a single point. This method does not consider organic objects that have perished since burial, meaning that it, at best, gives an incomplete representation of the number of goods interred with an individual. Some burials at Ban Non Wat were only partially excavated or part of the graves were cut through by other graves, meaning wealth scores for these individuals were not complete and excluded from analysis.

One of the main strengths of this approach is also its main weakness. In assigning a single point to each object it avoids issues over disparities in the wealth of each item. For instance, the approach does not give more weight to a bronze axe than a bivalve shell regardless of any perceptions there may be concerning which is more difficult to attain. This is positive in that the values past people placed on these goods cannot be definitively known. This is, however, also the greatest weakness of the approach. As the value of each object is considered equal the approach does not actually assess wealth, but rather the number of goods each person was interred with. The inadequacy of this is shown in the fact that one individual with two crudely made pots may be considered wealthier than another with a single finely constructed bronze axe. This argument, in essence, sums up one of the problems when trying to identify wealth based on grave goods, a problem Tainter (1978) attempted to overcome with the 'energy expenditure principle'.

Tainter's model ranked the relative wealth of individuals based on the amount of energy expended on their grave. Similar approaches were taken by Shennan (1975) and Feinman et al (1981), in respect to the energy expended on grave goods in particular. By taking the perspective that an individual's wealth can be ranked relative to another based on the energy or time spent constructing the funeral, a bronze axe could be considered of more value than two crude pots.
This approach is, however, particularly vulnerable to the post-processual viewpoint mentioned in Chapter Two and further complicated when a temporal dimension is added, as would be applicable at Ban Non Wat, where the value attached to a good may change over time.

These arguments make reliably assessing the wealth of either an individual, a grave, or a particular grave good in relation to another, at best, an extremely difficult task. However, it does not make attempts to identify trends in mortuary wealth redundant. It is with this in mind, that the method used by O’Reilly (1999), Cawte (2007), and Higham and O’Reilly (2004) has been adopted. This does not completely negate the post-processual argument that actual differences in wealth are diminished or exacerbated by individuals or that the actual wealth of grave goods cannot be known, however, it does simplify the issue and will allow for basic comparisons between individuals. As mentioned in Chapter Two, this research takes the viewpoint that mortuary rituals are not a passive reflection of social status in the past, but that large disparities between individuals likely indicate differences in social standing. Therefore, mortuary wealth will only be used to infer differences in social status when variations are shown to be significantly large through statistical testing.

4.1.2. Burial Type

Nilsson Stutz (2003b) used four categories to describe burial type; primary, probably primary, unknown, and in multiple episodes. This criterion was enhanced for the analysis of burials from Ban Non Wat to provide a more comprehensive framework taking into account human interaction with the deposit after burial. Such an approach was deemed necessary due to the large number of burials showing evidence of human intervention. This resulted in the eight categories shown in Table 4.1.
Table 4.1. Burial type categories, descriptions, and criteria for their identification.

<table>
<thead>
<tr>
<th>Burial Type</th>
<th>Description</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>A burial that occurred before decomposition of labile joints and has not been modified since (Roksandic, 2002).</td>
<td>Articulation of a labile joint (Duday, 2006).</td>
</tr>
<tr>
<td>Primary (with disturbance)</td>
<td>A burial that occurred before decomposition of labile joints but has been unintentionally modified since.</td>
<td>Articulation of labile joints with evidence of disturbance interpreted as unintentional.</td>
</tr>
<tr>
<td>Primary (with manipulation)</td>
<td>A burial that occurred before decomposition of labile joints but has been intentionally modified since.</td>
<td>Articulation of labile joints with evidence of disturbance interpreted as intentional.</td>
</tr>
<tr>
<td>Most likely primary</td>
<td>A burial in which labile joints are not articulated, however, the burial is deemed to most likely have been primary.</td>
<td>Articulation of the major persistent joints of the skeleton and presence of skeletal elements.</td>
</tr>
<tr>
<td>Most likely primary (with disturbance)</td>
<td>A burial in which labile joints are not articulated, however, the burial is deemed to have been primary and has been unintentionally modified.</td>
<td>Articulation of the major persistent joints of the skeleton and presence of skeletal elements with evidence of disturbance interpreted as unintentional.</td>
</tr>
<tr>
<td>Most likely primary (with manipulation)</td>
<td>A burial in which labile joints are not articulated, however, the burial is deemed to have been primary and has been intentionally modified.</td>
<td>Articulation of the major persistent joints of the skeleton and presence of skeletal elements with evidence of disturbance interpreted as intentional.</td>
</tr>
<tr>
<td>Unknown</td>
<td>A burial in which burial context is unknown, most likely due to poor preservation.</td>
<td>Fragmentary skeletal remains that are deemed to be insufficient to determine burial context.</td>
</tr>
<tr>
<td>Most likely in multiple episodes</td>
<td>A burial that is unlikely to have been primary, however, cannot be definitively identified as occurring in multiple episodes.</td>
<td>Disarticulation between all or a large majority of joints and movement of skeletal elements from anatomical position.</td>
</tr>
</tbody>
</table>

As can be seen in Table 4.1, a primary burial was interred soon after death, with little or no decomposition of the body occurring before burial, and was not
subjected to human induced changes. In this scenario the decomposition of the body occurred in a single location and any taphonomic changes observed were not due to human interaction. Primary burials were identified by the articulation of a labile joint. Labile joints used to diagnose a burial as primary were the joints of the hands (Fig. 3.1), the metatarsal-phalangeal and interphalangeal joints of the feet (Fig. 4.3), and the cervical vertebrae (Fig. 4.4) (excluding the atlanto-occipital and atlanto-axial joints).

Figure 4.3 (left): Photograph of burial 201 showing articulation of metatarsal-phalangeal and interphalangeal joints.
Figure 4.4 (right): Photograph of burial 201 showing articulation of cervical vertebrae.

It was deemed necessary to add two categories dealing with human interactions of primary deposits, as this is a taphonomic process prevalent throughout Ban Non Wat. A burial deemed to have been 'primary with disturbance' is one where a primary deposit, identified as such by the articulation of labile joints, has been disturbed unintentionally by human activity. Attempting to infer intentionality when an act occurred hundreds of years previously is a difficult task. At Ban Non Wat unintentional disturbances were identified as the digging of postholes, pits, and other graves. In these scenarios it was assumed that the disturbance to the interment was an unintentional byproduct of another activity such as building a house, depositing midden, or preparing the grave of another individual. Alternatively, burials identified as being 'primary with
manipulation’ were those where disturbances were interpreted as intentional. These manipulations may have been part of the funerary procedure or the result of other individuals altering the deposit, for instance Willis (2005) tentatively proposed that graves at Ban Non Wat may have been opened in order to remove mortuary goods. The opening of graves for manipulation as part of the funerary procedure would take place after the burial had decomposed and involve movement of the skeletal remains. This differs from burials occurring in multiple episodes as the deposit itself has not moved, just been altered or reduced. An example of a primary burial that has been modified could be an individual with articulated labile joints who had their humerii inverted with the proximal end distal and distal end proximal.

Burials identified as 'most likely primary' were of particular importance at Ban Non Wat. This group included those burials that were more likely to have occurred in one deposit rather than multiple, but were not first identified as primary because the labile joints were either not articulated or not present. The reason these were of importance is because a large number of burials at Ban Non Wat either had their labile joints disturbed or the joints disarticulated because they were placed in potentially unstable positions, such as on the abdomen or pelvis. This meant that very few burials could be identified as primary using the labile joints as sole indicators. By including a 'most likely primary' group this effect was limited. A further reason for the importance of this classification is that skeletons interred in containers with external space often have disarticulated labile articulations. This is caused by a lack of soil holding the elements in place, and could result in primary burials in containers with external space being identified incorrectly as occurring in multiple episodes. Because Ban Non Wat is located in a tropical climate where decomposition is relatively quick, it was decided to include this 'most likely primary' group based on the articulation of the major persistent joints of the shoulders, elbows, hips, and knees, as well as the presence of the majority of the skeletal elements. This is in accordance with Duday (2009:28) who stated that
a burial should be identified as primary firstly by the articulation of labile joints and "...secondarily, from the adherence to the overall order of skeletal remains" (Fig 4.5). Those deposits most likely primary that had been unintentionally disturbed were termed 'most likely primary with disturbance', and those intentionally manipulated as 'most likely primary with manipulation'.

Figure 4.5: Photograph of burial 593, identified as primary by the articulation of persistent joints and presence of skeletal elements.

Deposits where burial type was unknown were usually very fragmented, with little skeletal material remaining. This resulted in a lack of confidence in any observations that could be made regarding burial type, and in burials classified as 'unknown' being excluded from later analysis.
Those burials that were deemed to have occurred 'most likely in multiple episodes' were distinguished by having most, if not all, of the joints disarticulated and not in the anatomically correct position, however, with the majority of skeletal elements present. As has been mentioned, it is difficult to positively identify a burial that occurred in multiple episodes which has not been cremated, as even those that appear disarticulated and in anatomically impossible positions may have been primary with the appearance due to taphonomic processes. It is for this reason that burials from Ban Non Wat were termed as occurring 'most likely in multiple episodes' rather than stating definitively that they took place in multiple episodes.

The system described enabled research to accurately state the situation that interment originally occurred in and the modifications made by people to the deposit since that time. This is important at Ban Non Wat where burials were often modified in some way, whether intentionally or unintentionally.

4.1.3. Space

This section is concerned with the identification of space present within the grave, as well as any limitations imposed on the skeleton by the grave or any container in which it was interred. The first aspect investigated was the type of space present in the grave, and is based on the movement, or lack of movement, of skeletal elements. Table 4.2 shows the type of space that could have been present in the graves and the criteria for identifying each.
Table 4.2: Types of space present in graves, descriptions, and criteria for their identification (after Duday and Guillon, 2006; Nilsson Stutz, 2003b; Roksandic, 2002).

<table>
<thead>
<tr>
<th>Space</th>
<th>Description</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Indicates progressive infilling where the soil filled spaces as they appeared in the grave.</td>
<td>Identified by the articulation of the hyoid bone and no flattening of the thoracic cage. In general only miniscule movements of skeletal elements.</td>
</tr>
<tr>
<td>Internal</td>
<td>Indicates delayed infilling where the soil did not immediately fill spaces as they appeared</td>
<td>Articulation of the pelvis, articulation of the patellae if in unstable positions on medial aspects of the lower limbs, fall of elements into pelvic cavity, fall of thoracic cage and hyoid bone, no movement of elements outside the original confines of the body. A lack of external space.</td>
</tr>
<tr>
<td>External</td>
<td>Indicates delayed infilling where the soil did not immediately fill spaces as they appeared</td>
<td>In addition to evidence of internal space; disarticulation of the pelvis, fall of patellae, superior movement of acromial end of clavicles, any movements of elements outside the original confines of the body.</td>
</tr>
<tr>
<td>Unknown</td>
<td>Type of space present in the grave unknown.</td>
<td>Most commonly due to poor preservation of skeletal elements or conflicting findings.</td>
</tr>
</tbody>
</table>

As Table 4.2 shows, progressive infilling can be identified by the lack of any space within the grave, meaning that skeletal elements moved minimally from their correct anatomical positions (Roksandic, 2002). The movement of skeletal elements when in an unstable position only within the original confines of the body indicated graves in which internal space was present (Roksandic, 2002). For a burial to be identified as having only internal space there must have been no indicators of external space. Burials with external space were identified by the fall of elements outside the original confines of the body, commonly seen in the disarticulation of the pelvis and fall of the patellae (Duday and Guillon,
2006). It is important to note that external space could exist between the lower limbs, meaning the fall of a patella into space between the lower limbs when placed apart indicated external space. In addition to noting what kind of space was present, the details of how space was identified for each burial were recorded in the mortuary profiles.

The second part of the analysis of space concerned any limits that the grave cut or a container might have enforced in the form of effet de parois and evidence of constriction. Although it can be argued that constriction is an example of a bilateral effet de parois, the two were separated in order to distinguish between an effet de parois due to the placement of an individual against a wall of the grave, and one that was due to a tight container or grave cut. The identification of constriction was important for the correct identification of burial context. Constriction was evidenced primary in the shoulders, where there was verticalisation of the clavicles, lateral rotation of the scapulae, and medial rotation of the humerii (Nilsson Stutz, 2003b). It was important when identifying constriction that the position of the hands was taken into account. The placement of the hands on the upper half of the body can cause the humerii to move proximally, giving the appearance of constriction in the shoulders. Therefore, the finding of constriction in the shoulders should be supported by constriction throughout the rest of the skeleton.

It was also important that where possible the edges of the grave cut were identified to show that constriction was not due to a narrowly cut grave but rather a tight container (Nilsson Stutz, 2006). The grave cuts from Ban Non Wat shown in photographs and field drawings were not used for analysis as there is some ambiguity regarding whether they were true grave cuts or estimates. The homogenous nature of the soil often made identifying reliable grave cuts shown in photographs and field drawings difficult, and this issue was compounded by a lack of documentation regarding which grave cuts were estimates and which were true. Therefore, it was necessary to identify the edges of the grave, where
possible, by the identification of grave goods outside of any constriction. Where there were no grave goods or any other evidence that the grave cut was wider than constriction the ability to identify burial context was limited.

4.1.4. Burial Position

Reconstructing the original position of a body when placed in a grave involved the careful examination of the spatial positioning of the skeletal elements. When assessing the original burial position it was important to take into account taphonomic processes that may have changed the appearance of the deposit. The taphonomic processes most likely to have affected the burials at Ban Non Wat are shown in Table 4.3.

Table 4.3: Taphonomic factors that most likely affected the final position of skeletal elements in graves at Ban Non Wat.

<table>
<thead>
<tr>
<th>Gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decomposition of the cadaver (decomposition rate, adipocere formation, etc)</td>
</tr>
<tr>
<td>Bioturbation</td>
</tr>
<tr>
<td>Predation</td>
</tr>
<tr>
<td>Human disturbances</td>
</tr>
<tr>
<td>Seasonally variable water table</td>
</tr>
<tr>
<td>Soil chemistry (may cause bones to disintegrate)</td>
</tr>
<tr>
<td>Sediment characteristics (granular, fine grained, etc)</td>
</tr>
</tbody>
</table>

Burial position was assigned based on the position of the majority of elements and did not include those movements which appeared to have occurred due to taphonomic factors. Burial position was recorded as either supine, prone, on the left side, on the right side, seated, or unknown. Burials placed in the unknown category were too disturbed or poorly preserved to assess position. It was also noted whether the lower limbs were extended or flexed. Lower limbs were considered flexed where the hip and knee joints were flexed approximately 45° (Table 4.4). The lower limbs were considered most important when assessing whether a burial was flexed or not as the upper limbs were often placed in a number of differing positions, sometimes partially flexed.
but with no flexion throughout the rest of the body. Flexion of the lower limbs was deemed to be more a more reliable indicator that the position was intentional.

<table>
<thead>
<tr>
<th>Position of Torso</th>
<th>Position of Lower Limbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>-</td>
</tr>
<tr>
<td>On left side</td>
<td>Flexed</td>
</tr>
<tr>
<td></td>
<td>Extended</td>
</tr>
<tr>
<td>On right side</td>
<td>Flexed</td>
</tr>
<tr>
<td></td>
<td>Extended</td>
</tr>
<tr>
<td>Prone</td>
<td>Flexed</td>
</tr>
<tr>
<td></td>
<td>Extended</td>
</tr>
<tr>
<td>Supine</td>
<td>Flexed</td>
</tr>
<tr>
<td></td>
<td>Extended</td>
</tr>
<tr>
<td>Seated</td>
<td>Flexed</td>
</tr>
</tbody>
</table>

4.1.5. Burial Context

Burial context is directly related to the space present in the grave and, as such, the identification of the type of space and constraints imposed by funerary structures are of vital importance to its correct identification. Table 4.5 shows the terms used to describe burial context in this thesis, as well as descriptions and identifiers for each.
Table 4.5: Burial context categories, descriptions, and criteria for their identification.

<table>
<thead>
<tr>
<th>Burial Context</th>
<th>Description</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loose non-durable wrapping</td>
<td>Body buried without a container or loosely wrapped in a material that decomposed quickly.</td>
<td>Internal or no space present, no constriction.</td>
</tr>
<tr>
<td>Tight non-durable wrapping</td>
<td>Body tightly wrapped in a material that decomposed quickly.</td>
<td>Internal space only, constriction evident with evidence that grave cut was wider than constriction.</td>
</tr>
<tr>
<td>Tight durable wrapping</td>
<td>Body tightly wrapped in a material that decomposed slowly.</td>
<td>Limited external space present, possibility that container so tight that no external space present except for between lower limbs. Evidence of constriction. Most commonly identified by constriction and the fall of patellae medial to lower limbs combined with an <em>effet de parois</em> that conforms to the shape of the body.</td>
</tr>
<tr>
<td>Narrow coffin</td>
<td>Body placed in a hard narrow container that decomposed slowly.</td>
<td>Limited external space present, possibility that container so tight that no external space present except for between lower limbs. Evidence of constriction. Most commonly identified by constriction and the fall of patellae medial to lower limb combined with a 'box' shaped <em>effet de parois</em>.</td>
</tr>
<tr>
<td>Wide coffin</td>
<td>Body placed in a hard wide container that decomposed slowly.</td>
<td>Internal and external space, no constriction. Most commonly identified by disarticulation of the pelvis and lateral fall of patellae.</td>
</tr>
<tr>
<td>Jar burial</td>
<td>Body buried inside a ceramic vessel</td>
<td>Skeletal elements found inside a mortuary vessel.</td>
</tr>
<tr>
<td>Unknown</td>
<td>Burial context unknown.</td>
<td>Two types of unknown category. 1. Those that could not have context assigned due to poor preservation, heavy disturbance, or conflicting findings. 2. Those that could not be assigned to one single context.</td>
</tr>
</tbody>
</table>

As Table 4.5 shows there were seven categories used in the analysis of burial context at Ban Non Wat. Loose non-durable wrappings were made out of a soft flexible material that decomposed quickly enough to allow soil to fill the
external space between the lower limbs before the persistent patellar ligaments disappeared. Or alternatively, was flexible enough to conform to the shape of the body, limiting external space. This means only internal space would be present and, therefore, minimal movement of skeletal elements would occur. The combination of a lack of external space and no constriction often allowed the easy identification of burials in loose non-durable wrappings (Fig. 4.6). It is unknown what these were made from, possibly a fibrous matting (Willis and Tayles, 2009) or tapa cloth, the remains of which were identified at Khok Phanom Di (Higham and Bannanurag, 1990). The non-porous nature of the soil at Ban Non Wat would most likely prevent progressive infilling, suggesting that internal space would be present even if an individual was buried without a container. This prevented the differentiation of burials that were interred in loose non-durable wrappings and those without containers. It is, therefore, plausible that burials defined as occurring in loose non-durable wrappings were in fact buried without a container, or on a wooden base with no covering (such as a coffin without a lid).

A tight non-durable wrapping described a container made of a flexible material that had been tightly wrapped around the body, causing constriction. As with loose non-durable wrappings, the material would decompose before the patellar ligaments, meaning there were no external spaces between the lower limbs. This meant that a tight non-durable wrapping had the same criteria as that of a loose non-durable wrapping, except that in tight wrappings there was evidence of constriction where the dimensions of the grave had been shown to be wider than the constriction (Fig. 4.7). This was accomplished by the identification of grave goods outside of the constriction. If there was no evidence that the grave cut was wider than the constriction then burial in a soft tight container could not be differentiated from one in a soft loose container placed in a narrow grave. Such burials could not be distinguished from one another, so were included in the unknown category.
Figure 4.6 (left): Photograph of burial 105 showing lack of constriction by the splayed position of the left hand, and no external space evidenced by the unstable position of the right patella, indicating a loose non-durable wrapping. Figure 4.7 (right): Photograph of burial 564 showing constriction of shoulders when the grave cut was wider than the constriction indicated by the placement of a ceramic vessel lateral to the left knee. The constriction combined with the lack of external space (shown by the articulation of the right patella in a potentially unstable position), indicates a tight non-durable wrapping.

As can be seen in Table 4.5, tight durable wrappings and narrow coffins shared many of the same characteristics in terms of the spatial positioning of the skeletal elements when excavated. Because of this they will described here together under the term 'durable rigid container' before the method used to differentiate the two is presented. Durable rigid containers allowed limited external space to form, most often between the lower limbs as the dimensions of the container usually limited the amount of external space present. Distinguishing between a durable rigid container and a tight non-durable
wrapping proved difficult at times. This was because a durable rigid container, although allowing for some, often displayed no evidence of external space. Due to the tightness of the container it was frequently the case that the pelvis disarticulated only very slightly and the patellae were often not placed in positions likely to allow their medial fall between the lower limbs. This meant that sometimes burials could not be placed in a single context and were therefore classified as unknown. The only way to make a distinction between durable rigid containers and tight non-durable wrappings was by the articulation of the patellae when placed in unstable positions of the medial aspects of the lower limbs. A durable rigid container would permit external space between the lower limbs, which, if the patellae were in unstable positions, would allow their fall into the space. Therefore, durable rigid containers were slow to decompose, lasting longer than the patellar ligaments. In contrast, a tight non-durable wrapping would disintegrate before the patellar ligaments, allowing soil to fill the external space, holding the patellae in place. Therefore, the fall of a patella medial to the lower limbs was indicative of external space, meaning burial occurred in a durable rigid rather than tight non-durable wrapping. A durable rigid container was identified by limited external space as well as constriction where there was evidence that the grave cut was wider than the constriction (Fig. 4.8). If there was no evidence that the grave cut was wider than constriction and no evidence of external space on the medial aspect of the lower limbs, then burial context could only be assigned to the unknown category (Fig. 4.9).
Figure 4.8 (left): Photograph of burial 446 showing constriction of shoulders with evidence that the grave cut was wider than the constriction in the form of pot sherds lateral to the right hand, and presence of external space medial to the lower limbs displayed by the medial fall of the patella. This combination of observations indicates that burial occurred in a durable rigid container.

Figure 4.9 (right): Photograph of burial 613 classified as interred in a loose non-durable wrapping, tight non-durable wrapping, or durable rigid container.

Burial context was assigned based on the presence of internal space with constriction and a lack of evidence that the grave cut was wider than the constriction, or that external space was not present between the lower limbs.

As mentioned, durable rigid containers came in one of two forms identified by characteristic *effet de parois*; tight durable wrappings and narrow coffins. Tight durable wrappings were differentiated from narrow coffins by an *effet de parois* that conformed to the shape of the body. Such a phenomenon can be seen in Figure 4.10 showing burial 194, where the container is tight throughout the lower and upper limbs, shown by a clear *effet de parois*, however allows the left
forearm to be placed lateral to the pelvis. This *effet de parois* seems to taper down the limbs ending in the constriction shown in the feet, with the left foot placed on top of the right. Tight durable wrappings were possibly made of tapa cloth (Higham and Bannanurag, 1990), fibrous matting, or the inner bark of a tree (Willis and Tayles, 2009). The second type of durable rigid container, narrow coffins, can be seen in burial 190 (Fig. 4.11), in which the *effet de parois* in the upper limbs retains a box shape with the left hand placed on top of the pelvis rather than beside it. These coffins were most likely made of wood, shown by the remains of such within some graves.

Figure 4.10 (left): Photograph of burial 194 showing *effet de parois* caused by a tight durable wrapping.
Figure 4.11 (right): Photograph of burial 190 showing *effet de parois* caused by a narrow coffin.
A wide coffin was identified by evidence of external space and no constriction. Disarticulation of the pelvis, lateral rotation of the femora, and the fall of the patellae lateral to the lower limbs most commonly identified this context (Fig. 4.12).

Figure 4.12: Photograph of burial 262 showing flattened pelvis and lateral fall of right patella.

Figure 4.13 is a flow chart depicting the process used to determine burial context for all individuals at Ban Non Wat except those that were interred in mortuary vessels and those burials that were too poorly preserved, heavily disturbed, or had conflicting evidence. These burials were excluded as they were assigned on a case-by-case basis. The chart shows the inability in many cases to assign burials to a single context, often due to questions concerning
whether constriction originated from a container or grave cut. This had the effect of increasing the number of burials ascribed to the unknown category.

Figure 4.13: Flow chart showing method used to assign burial context at Ban Non Wat.
Jar burials were those where bodies had been placed in a ceramic mortuary vessel and then inhumed, and were not included in Figure 4.12 as they were easily identifiable by the remains of the ceramic vessels in which the individuals were placed.

In addition to noting the containers used during the funerary process, the burial context section of the mortuary profiles was used to record additional phenomena of interest, as well as the arguments supporting the choice of burial context.

4.2.0. Analysis of the Data

The construction of mortuary profiles for each individual resulted in the generation of a huge amount of data. This section will detail how that data was analysed before the results are presented in the following chapter. Firstly, individuals’ age estimates were modified so that those placed in multiple groups (e.g. young to mid-aged) were in a single group by assigning them to the older of the two groups. This was required in order to simplify analysis and increase sample sizes. Similarly, individuals with ambiguous sex estimates were placed in the group data most strongly supported. These modifications allowed the composition of samples for each mortuary phase, and those individuals assigned burial contexts in the Neolithic and Bronze Age, to be considered in regard to whether or not they were true representations of the populations from which they came. Waldron (1994) states that the demographic profile of prehistoric societies will most likely be comparable to that of a developing country, giving a 'U' shaped distribution. In this thesis the subadults have not been included, meaning if the samples are true representations the graphs will appear more similar to exponential curves. Additionally, Waldron notes that the ratio of males to females will be near equal if the sample is a true representation.
The burials within each mortuary phase were investigated based on burial type. At this point the data was split into 'primary' and 'most likely in multiple episode' groupings, with the 'unknown' category excluded from analysis. This required the combination of all of the 'primary' and 'most likely primary' groups, including those that showed evidence of disturbance or manipulation, allowing sample sizes to be increased and for the analysis to consider funerary procedures rather than taphonomic factors. Those burials that most likely occurred over multiple episodes were scrutinised in more detail in an effort to identify why they may have been treated differently. Investigations were also made into the characteristics of individuals that were manipulated.

The burial positions of individuals from each mortuary phase were inspected. Any individuals placed in abnormal positions were inspected in more detail. Similarly, the burial contexts used within each mortuary phase were detailed, with those interred in abnormal contexts given more in depth consideration.

In addition to examining patterns within each mortuary phase, changes between the phases were examined. Mortuary wealth scores for each phase were compared using Graphpad Prism to carry out one-way ANOVA with Tukey's tests for comparing the mean scores of each mortuary phase. Standard error bars showing the accuracy of the sample means accompany figures showing mortuary wealth scores, with 68% of all sample means falling within the standard error bars. Trends in the proportions of manipulated individuals, burial positions, and burial context were also investigated.

An inquiry was conducted looking for links between mortuary practices and sex, age, wealth, or location. For this analysis burials were grouped according to whether they were from the Neolithic or Bronze Age. This was done to provide information concerning social complexity in prehistoric Thailand, specifically changes in patterns from the Neolithic to the Bronze Age. Additionally, it enlarged the sample sizes, increasing the chances that successful statistical tests
could be carried out. Individuals with unknown burial practices were excluded from analysis. Burial type and burial position were not considered because very few individuals were treated differently than the norm in these respects. Links between burial context and both sex and age were investigated using Graphpad Prism to conduct chi-squared tests at 95% confidence, when possible. Burial context was also compared in regard to mortuary wealth using Graphpad Prism to conduct one-way ANOVA tests with post hoc Tukey’s tests to compare the mean scores of the individuals in each burial context. Standard error bars were included in figures detailing the mean mortuary wealth scores in order to show the accuracy of the means. Lastly, the location of individuals with the same burial contexts was considered, looking for evidence of groupings. This was accomplished by adapting Higham’s (2009c) mortuary phase plans to show burial contexts used within each era and looking for patterns.

4.3.0. Summary

Chapter Four set out a method for applying anthropologie de terrain to a large number of burials using photographs and field drawings. It detailed how this was carried out at Ban Non Wat for each step of the analysis, including how the data was analysed. The following chapter will present the results of the application of these methods to the Neolithic and Bronze Age burials at Ban Non Wat.
5.0.0. Results

This chapter examines burial practices during the Neolithic and Bronze Ages at Ban Non Wat. It begins by describing the practices used throughout each of the nine mortuary phases. These sections are related to Hypothesis One and will include the results of analysis of burial type, burial position and burial context, as well as any additional findings of interest. This will provide a base from which the following section, concerning how these practices changed through time, can build. The chapter ends by assessing any possible links between the mortuary practices used and sex, age, wealth, or location during the Neolithic and Bronze eras in accordance with Hypothesis Two.

5.1.0. Flexed Burials

Table 5.1 shows the number of flexed individuals examined for each sex and age range at Ban Non Wat.

<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Mid</th>
<th>Old</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

Although there were equal numbers of males and females, the sample was not representative, as Figure 5.1 does not show the expected distribution of frequencies. This was most likely due to the small sample size, which when taken into account, means that the sample is relatively well distributed across the sexes and age groupings, with only old males not represented.
5.1.1. Burial Type of Flexed Individuals

Of the ten individuals placed in flexed positions, six were able to have burial type assessed. All of these were primary interments with no evidence of manipulation.

5.1.2. Burial Positions of Flexed Individuals

Three burials from the flexed mortuary phase were unable to have burial position identified due to poor preservation (Table 5.2). Five individuals were placed in a supine position on their backs with their lower limbs flexed (Fig. 5.2), and two were placed on their left sides with their lower limbs flexed (Fig. 5.3).
Table 5.2: Number of flexed individuals in each burial position, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Young</td>
<td>Mid</td>
</tr>
<tr>
<td>Supine, flexed</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Left side, flexed</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3</strong></td>
<td><strong>2</strong></td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>

Figure 5.2: Photograph of burial 639 showing the individual in a supine position with flexed lower limbs.

Figure 5.3: Photograph of burial 566 showing the individual on his left side with flexed lower limbs.
5.1.3. Burial Context of Flexed Individuals

All four individuals for whom burial context could be reliably assigned were interred in loose non-durable wrappings (Table 5.3). The remaining individuals could not have burial context allocated due to poor preservation or conflicting findings.

Table 5.3: Number of flexed individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
</tr>
<tr>
<td>Loose non-durable wrapping</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 5.4 shows the details of the four flexed individuals that were successfully assigned burial context. The term 'mortuary score' will be used in tables within this chapter to refer to 'mortuary wealth score'.

Table 5.4: Results of analysis of flexed burials for which burial contexts were assigned.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Sex</th>
<th>Age</th>
<th>Burial Type</th>
<th>Mortuary Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>438</td>
<td>Male</td>
<td>Mid</td>
<td>Primary</td>
<td>9</td>
</tr>
<tr>
<td>454</td>
<td>Female</td>
<td>Old</td>
<td>Primary</td>
<td>3</td>
</tr>
<tr>
<td>461</td>
<td>Female</td>
<td>Mid</td>
<td>Primary</td>
<td>6</td>
</tr>
<tr>
<td>566</td>
<td>Male</td>
<td>Mid</td>
<td>Primary</td>
<td>0</td>
</tr>
</tbody>
</table>

5.1.4. Additional Findings for Flexed Individuals

All flexed burials at Ban Non Wat were single interments except for one double burial in which burial 461 was inhumed with burial 462, a subadult. The two bodies appear to have been buried together, either simultaneously or within a very short time period. This was evidenced by the position of the left
articulated hand of burial 461 on top of the lower limbs of burial 462, and the position of burial 462’s right upper limb on the right upper limb and ribcage of burial 461 (Fig. 5.4).

Figure 5.4: Photograph of burials 461 and 462 showing their intertwined limbs.

5.2.0. Neolithic 1

Fifteen individuals assigned to the Neolithic 1 phase were examined; Table 5.5 shows the number of these across the sex and age groupings.

Table 5.5: Number of Neolithic 1 individuals examined, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Mid</th>
<th>Old</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Female</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>15</td>
</tr>
</tbody>
</table>
Although there were near equal numbers of individuals across the sexes, the frequencies shown in Figure 5.5 suggest that the sample was not representative. As with the flexed burials, this is most likely due to the small sample size, and with the exception of the mid-aged males all sex and age groupings are present.

![Figure 5.5: Frequencies of Neolithic 1 individuals, separated by sex and age.](image)

### 5.2.1. Burial Type in Neolithic 1

Of the fifteen individuals from the Neolithic 1 phase eight had burial type assigned, all were primary with no evidence of manipulation.

### 5.2.2. Burial Position in Neolithic 1

During the Neolithic 1 mortuary phase individuals were placed in one of two positions; supine with the lower limbs extended, or seated in ceramic vessels (Table 5.6).
Table 5.6: Number of Neolithic 1 individuals in each burial position, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Unknown</td>
</tr>
<tr>
<td>Supine, extended</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Seated</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2</strong></td>
<td><strong>0</strong></td>
<td><strong>2</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>

The supine extended position was clearly favoured, with only two individuals seated compared to nine lying supine. It appears that the seated position was a consequence of interring adults in ceramic vessels; they were only placed in such positions because they were in jars.

5.2.3. Burial Context in Neolithic 1

As Table 5.7 shows, two burial contexts were identified during the Neolithic 1 phase at Ban Non Wat; tight non-durable wrappings and jar burials.

Table 5.7: Number of Neolithic 1 individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Unknown</td>
</tr>
<tr>
<td>Tight non-durable wrapping</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Jar</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2</strong></td>
<td><strong>0</strong></td>
<td><strong>2</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>
Twelve of the fifteen burials examined were unable to have burial context confidently identified, predominantly because of poor preservation.

5.2.4. Additional Findings for Neolithic 1

Burials 28 and 292 were interred in mortuary vessels, which is very unusual for adults at Ban Non Wat. Throughout the site it was fairly commonplace for infants to be interred in ceramic vessels, however, burials 28 and 292 were the only adults. Table 5.8 shows the data accumulated on these two individuals, while Figure 5.6 shows the position of burial 292 when excavated. These have mortuary scores of three and nine, falling within the range of zero and twelve for the phase.

<table>
<thead>
<tr>
<th>Burial number</th>
<th>Sex</th>
<th>Age</th>
<th>Burial type</th>
<th>Burial position</th>
<th>Mortuary score</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Male</td>
<td>Old</td>
<td>Primary</td>
<td>Seated</td>
<td>9</td>
</tr>
<tr>
<td>292</td>
<td>Female</td>
<td>Mid</td>
<td>Primary</td>
<td>Seated</td>
<td>3</td>
</tr>
</tbody>
</table>

Figure 5.6: Photograph of burial 292, who was originally placed in a seated position before slumping forward inside her mortuary vessel.
5.3.0. Neolithic 2

The Neolithic 2 mortuary phase consisted of those individuals deemed to be the last Neolithic burials interred before the introduction of bronze, of which there were twenty-seven (Table 5.9).

Table 5.9: Number of Neolithic 2 individuals examined, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Mid</th>
<th>Old</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Female</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>9</td>
<td>12</td>
<td>1</td>
<td>27</td>
</tr>
</tbody>
</table>

There were near equal numbers of individuals across the sexes, and Figure 5.7 shows the expected pattern for adults identified by Waldron (1994) for a sample that is representative of the population from which it originated.

Figure 5.7: Frequencies of Neolithic 2 individuals, separated by sex and age.
5.3.1. Burial Type in Neolithic 2

All twenty-five individuals that could have burial type assigned in the Neolithic 2 phase were primary with no evidence of manipulation.

5.3.2. Burial Position in Neolithic 2

Of the burials from the Neolithic 2 mortuary phase, nine individuals could not have position assessed, the remaining eighteen were interred in supine extended positions.

5.3.3. Burial Context in Neolithic 2

Table 5.10 shows that burial context in the Neolithic 2 phase was successfully assigned for three individuals, with twenty-four unable to have burial context confidently designated, mainly because of poor preservation.

Table 5.10: Number of Neolithic 2 individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
</tr>
<tr>
<td>Loose non-durable wrapping</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tight durable wrapping</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Narrow coffin</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
The three individuals assigned burial context were interred in a loose non-durable wrapping, a tight durable wrapping, and a narrow coffin. Although there were no Neolithic 2 males assigned burial context, this is a reflection of the degree to which burials had been unintentionally disturbed rather than any sexual preference, shown by the fact that there were near equal numbers of males and females examined in the Neolithic 2 phase.

5.4.0. Bronze Age 1

Only three adults were assigned to the Bronze Age 1 mortuary phase, meaning the sample is not likely to be representative of the population from which it came. Because of the small number of burials the format in which the results are presented differs from previous sections. Table 5.11 shows the results of analysis of the three burials from the Bronze Age 1 mortuary phase.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Sex</th>
<th>Age</th>
<th>Burial Type</th>
<th>Burial Position</th>
<th>Burial Context</th>
<th>Mortuary Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>446</td>
<td>Male</td>
<td>Young</td>
<td>Primary</td>
<td>Supine</td>
<td>Unknown</td>
<td>17</td>
</tr>
<tr>
<td>470</td>
<td>Female</td>
<td>Young</td>
<td>Primary with disturbance</td>
<td>Supine</td>
<td>Unknown</td>
<td>10</td>
</tr>
<tr>
<td>569</td>
<td>Female</td>
<td>Mid</td>
<td>Primary</td>
<td>Supine</td>
<td>Wide coffin</td>
<td>26</td>
</tr>
</tbody>
</table>

As the table shows, two of the three individuals were female, and the same proportion was young. All burials were placed in a supine extended position and all were primary single interments. Burial context was assigned for burial 569 who was interred in a wide coffin and accompanied by the highest number of mortuary goods of the three individuals from Bronze Age 1, with a score of twenty-six.
5.5.0. Bronze Age 2

In total, eighteen individuals assigned to Bronze Age 2 were examined (Table 5.12).

Table 5.12: Number of Bronze Age 2 individuals examined, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Mid</th>
<th>Old</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Female</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>18</td>
</tr>
</tbody>
</table>

There were more males than females in this sample, which combined with the observed frequencies seen in Figure 5.8, suggest that the sample was not representative, again most likely due to the small sample size.

Figure 5.8: Frequencies of Bronze Age 2 individuals, separated by sex and age.
5.5.1. Burial Type in Bronze Age 2

During Bronze Age 2 the majority of individuals were primary, one of whom was manipulated, and three were most likely buried over multiple episodes (Table 5.13). This section will now examine the three burials that took place over multiple episodes, followed by the manipulated burial.

Table 5.13: Number of Bronze Age 2 individuals in each burial type, based on sex and age with the number of primary manipulated burials shown in brackets.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Unknown</td>
</tr>
<tr>
<td>Primary</td>
<td>3 (0)</td>
<td>2 (1)</td>
<td>3 (0)</td>
<td>13 (1)</td>
</tr>
<tr>
<td>Most likely in multiple episodes</td>
<td>0 0 0 0 0 1 0 0 0 1 0 1 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1 0 1 0 0 0 0 0 0 0 0 0 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4 2 4 0 3 2 1 0 0 1 0 1 18</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Interments Occurring Over Multiple Episodes

Table 5.14 shows the results of analysis of the interments that most likely occurred in multiple episodes.

Table 5.14: Results of analysis of most likely in multiple episode burials from Bronze Age 2.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Sex</th>
<th>Age</th>
<th>Burial Position</th>
<th>Burial Context</th>
<th>Mortuary Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>115</td>
</tr>
<tr>
<td>93</td>
<td>Female</td>
<td>Mid</td>
<td>Unknown</td>
<td>Unknown</td>
<td>39</td>
</tr>
<tr>
<td>553</td>
<td>Unknown</td>
<td>Mid</td>
<td>Unknown</td>
<td>Unknown</td>
<td>28</td>
</tr>
</tbody>
</table>
As the table shows, sex was known only for burial 93, which was female. Both individuals for whom age was known were from the mid range, and no individuals were assigned burial context due to the extensive manipulations. The mortuary scores for burials 93 (Fig. 5.9) and 553 (Fig. 5.10) easily fell within the range of scores of individual burials from Bronze Age 2 (between twenty-six and 102), albeit towards the lower end. Burial 20 was given a mortuary score of 115, however, this individual was interred near burial 90 and, therefore, the mortuary score is for both individuals. When this is halved the estimated mortuary score for burial 20 is 57.5, falling within the normal range of Bronze Age 2 interments. There is some ambiguity over whether burial 20 should be classified as occurring in multiple episodes or manipulated. This is because there are two groups of skeletal elements, one of which appears in its original location (Fig. 5.11). Careful examination of these, however, found that they were disarticulated and so were likely moved. It is unclear whether the three 'most likely in multiple episode' burials were intended to be so at the time of burial or if their appearance is due to other individuals manipulating the interments later, however, they have been moved from their original locations. The movement of each individual, with the exception of burial 93 for which the original location is unknown, involved the bundling of elements superior to the original position of their skulls.
The Manipulated Burial

Burial 90 was a mid-aged male with an unknown burial context, interred next to burial 20 (Fig. 5.11). Manipulation of burial 90 consisted of the exhumation of the upper body, pelvis and thighs, followed by the partial filling of the burial with sediment before the skeletal elements were placed in a bundle above where they were originally located. It is unclear whether burials 20 and 90 were interred simultaneously, however, a single row of ceramic vessels separating the two individuals suggests that their interment side-by-side may have been intentional. It was often common for individuals in this phase to have rows of pots to both sides of them. Therefore, it would be expected that if burials 20 and 90 were not intentionally buried side by side there would be two rows of pots between them. Alternatively, the fact that burial 20 was bundled
and placed towards the edge of the grave may suggest that it was interred first and burial 90 later.

Figure 5.11: Photograph of burials 20 and 90. Burial 20 is located in the left corner and burial 90 in the centre. The baulk shown between the individuals in the photograph did not exist, the grave was excavated over two seasons and the photographs for each burial have been amalgamated in this figure (image courtesy of Professor Charles Higham).

5.5.2. Burial Position in Bronze Age 2

Of the seventeen individuals from Bronze Age 2, fourteen were assigned burial position, all of which were interred in supine extended positions. The burial
positions of the three individuals buried over multiple episodes were not indentified due to disarticulations of the skeletal elements.

5.5.3. Burial Context in Bronze Age 2

Table 5.15 shows the census information for burials from Bronze Age 2 assigned burial context.

Table 5.15: Number of Bronze Age 2 individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th></th>
<th></th>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th></th>
<th>Unknown</th>
<th></th>
<th></th>
<th></th>
<th>Unknown</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loose non-durable wrapping</td>
<td>Young</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wide coffin</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Six individuals could not be assigned burial context due to human alterations to the deposits or poor preservation. Seven were interred in loose non-durable wrappings, and five in wide coffins.

5.5.4. Additional Findings for Bronze Age 2

This section presents characteristics of burials from Bronze Age 2 not already examined. Three observations will be examined, a possible example of tumbling in a burial, the presence of wood in graves, and the existence of burials with multiple individuals.
**Tumbling of Elements**

Burial 570 shows the effects that tumbling can have on the appearance of an interment (Fig. 5.12). The figure shows that a large number of skeletal elements have moved from their original positions, making the skeleton appear very disarticulated. This has been attributed to tumbling where the individuals’ soft tissues began to decompose before burial occurred. When the wide coffin the individual was interred in was moved elements shifted into spaces within the container. This suggests that in some burials at Ban Non Wat partial decomposition of the skeleton took place before burial. An alternative explanation for the observed spatial positioning is that the rising of the water table caused elements to float from their original positions. However, this seems unlikely as the skull and pelvis have both moved, two of the heavier bones that are, therefore, unlikely to float.

![Figure 5.12: Photograph of burial 570 showing tumbling of the skeleton and effet de parois down the right side of the body. The large amount of external space indicates the use of a wide coffin.](image-url)
**Wood in the Graves**

In a number of cases the observations made in this study differ from the archaeological findings. In the past, the presence of wood, and at times large amounts of clay, in graves has been interpreted as the remnants of a coffin. The current investigation raised the need to re-evaluate this explanation, as some of those burials that had wood present in the graves also showed evidence for the presence of soil. It is possible that these individuals were interred in closed coffins that decomposed quickly, allowing soil to infiltrate the burial and hold the elements in place. More likely, the wood represents either the remains of grave goods or an open container such as a coffin without a lid or a bier. However, in this scenario the individual would have been buried on the structure rather than only carried to the grave as the term 'bier' denotes.

**Multiple Burials**

Two double burials were identified as coming from Bronze Age 2, however, there is some doubt as to whether one of these was in fact a multiple burial. The first of these consisted of burials 20 and 90. Both of these burials have been briefly looked at, and so will not be examined here. Burials 105 and 106 may have been interred together, however, as Figure 5.13 shows they were spaced quite widely apart, preventing the assessment of whether they were interred simultaneously of not. Burial 105 was an old female, and 106 a mid-aged female. Burial context for burial 105 was found to be a soft loose container, while burial 106 was not assigned a burial context because of its poor preservation. The two burials have been placed in the same mortuary phase but as that phase covers one hundred years it is entirely possible that they were not intentionally buried together. Because there is no evidence to suggest that they were in fact interred simultaneously, they will be considered here to be two separate interments.
Figure 5.13: Photograph of burial 105 (left) and 106 (right).

5.6.0. Bronze Age 3A

Table 5.16 shows, the distribution of Bronze Age 3A burials across the sex and age ranges.

Table 5.16: Number of Bronze Age 3A individuals examined, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Mid</th>
<th>Old</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1</strong></td>
<td><strong>7</strong></td>
<td><strong>5</strong></td>
<td><strong>1</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>
The ratio of males to females was slightly higher than would be expected if the sample was representative and the distribution of individuals across the sexes and age ranges, as shown in Figure 5.14, does not contradict this finding. As with previous phases, this distribution is probably the result of the small sample.

![Figure 5.14: Frequencies of Bronze Age 3A individuals, separated by sex and age.](image)

5.6.1. Burial Type in Bronze Age 3A

All burials from Bronze Age 3A were primary interments, with one showing evidence of manipulation. Table 5.17 shows the information gathered for this individual, burial 631.
Table 5.17: Results of analysis of burial 631, the only manipulated burial from Bronze Age 3A.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Sex</th>
<th>Age</th>
<th>Burial Position</th>
<th>Burial Context</th>
<th>Mortuary Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>631</td>
<td>Male</td>
<td>Mid</td>
<td>Supine</td>
<td>Tight durable wrapping</td>
<td>22</td>
</tr>
</tbody>
</table>

Burial 631 was a mid-aged male, interred in a tight durable wrapping with twenty-two mortuary goods. Manipulation of the burial consisted of externally rotating the right upper limb at the glenohumeral joint while articulated, as well as moving the left humerus so it was on the abdomen, and moving a number of articulated metatarsals onto the distal ends of the tibiae and fibulae (Fig. 5.15).

Figure 5.15: Photograph of burial 631 showing manipulated upper limbs and metatarsals.
5.6.2. Burial Position in Bronze Age 3A

All individuals from Bronze Age 3A were interred in supine extended positions.

5.6.3. Burial Context in Bronze Age 3A

Bronze Age 3A burials were interred in one of three burial contexts. Of the fourteen individuals only one was not assigned burial context. Nine individuals were interred in loose non-durable wrappings, two in tight durable wrappings, and two in wide coffins (Table 5.18).

Table 5.18: Number of Bronze Age 3A individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Unknown</td>
</tr>
<tr>
<td>Loose non-</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>durable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wrapping</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tight durable</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>wrapping</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wide coffin</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Loose non-durable wrappings were favoured in Bronze Age 3A, with a clear majority of individuals interred in them (Fig. 5.16).
5.7.0. Bronze Age 3B

Burial practices during the Bronze Age 3B mortuary phase will now be scrutinised. Table 5.19 shows the number of individuals in each sex and age group.

Table 5.19: Number of Bronze Age 3A individuals examined, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Mid</th>
<th>Old</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>11</td>
</tr>
</tbody>
</table>

As the table shows, there were near equal numbers of male and females, however, Figure 5.17 shows that the sample is not representative of the population from which it came, with a large percentage of young individuals and a small percentage old.
5.7.1. Burial Type in Bronze Age 3B

All burials from Bronze Age 3B for which burial type could be assessed were primary interments, with no evidence of manipulation.

5.7.2. Burial Position in Bronze Age 3B

Of the eleven individuals from Bronze Age 3B, ten were able to have burial position assigned, all of which were interred in supine extended positions.

5.7.3. Burial Context in Bronze Age 3B

Bronze Age 3B individuals fell into four categories of burial context; loose non-durable wrappings, a tight non-durable wrapping, a narrow coffin, and wide
coffins (Table 5.20). Two individuals were not assigned contexts due to disturbances of the burials.

Table 5.20: Number of Bronze Age 3B individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
</tr>
<tr>
<td>Loose non-durable wrapping</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Tight non-durable wrapping</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Narrow coffin</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wide coffin</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

The distribution of individuals across the four burial contexts can be seen in Figure 5.18.
5.8.0. Bronze Age 4

In total, 111 individuals from Bronze Age 4 were examined, with a near equal distribution across the sexes and age ranges (Table 5.21).

Table 5.21: Number of Bronze Age 4 individuals examined based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Mid</th>
<th>Old</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18</td>
<td>13</td>
<td>12</td>
<td>3</td>
<td>46</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>14</td>
<td>19</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Unknown</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>29</td>
<td>32</td>
<td>15</td>
<td>111</td>
</tr>
</tbody>
</table>
Figure 5.19 shows the frequencies of Bronze Age 4 individuals across the sex and age ranges. With the exception of the young males it appears that the distribution is similar to that expected from a prehistoric population. This, combined with the balanced sex ratio suggests that the sample may be similar to the original population from which it came.

![Bar chart](image)

Figure 5.19: Frequencies of Bronze Age 4 individuals, separated by sex and age.

### 5.8.1. Burial Type in Bronze Age 4

All the burials for which burial type could be assessed were primary burials, however, a high number of these showed evidence of manipulation. Therefore, this section will focus on the manipulated burials of Bronze Age 4 (Table 5.22).
Table 5.22: Results of analysis of manipulated burials from Bronze Age 4.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Sex</th>
<th>Age Range</th>
<th>Burial Position Code</th>
<th>Burial Context Code</th>
<th>Wealth Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Male</td>
<td>Old</td>
<td>Supine</td>
<td>Unknown</td>
<td>13</td>
</tr>
<tr>
<td>17</td>
<td>Male</td>
<td>Mid</td>
<td>Supine</td>
<td>Tight non-durable wrapping</td>
<td>22</td>
</tr>
<tr>
<td>21</td>
<td>Female</td>
<td>Old</td>
<td>Supine</td>
<td>Unknown</td>
<td>17</td>
</tr>
<tr>
<td>29</td>
<td>Male</td>
<td>Mid</td>
<td>Supine</td>
<td>Tight durable wrapping</td>
<td>7</td>
</tr>
<tr>
<td>59</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Supine</td>
<td>Unknown</td>
<td>1</td>
</tr>
<tr>
<td>69</td>
<td>Male</td>
<td>Young</td>
<td>Supine</td>
<td>Unknown</td>
<td>7</td>
</tr>
<tr>
<td>145</td>
<td>Male</td>
<td>Old</td>
<td>Supine</td>
<td>Narrow coffin</td>
<td>20</td>
</tr>
<tr>
<td>150</td>
<td>Male</td>
<td>Old</td>
<td>Supine</td>
<td>Unknown</td>
<td>17</td>
</tr>
<tr>
<td>233</td>
<td>Male</td>
<td>Unknown</td>
<td>Supine</td>
<td>Loose non-durable wrapping</td>
<td>13</td>
</tr>
<tr>
<td>234</td>
<td>Female</td>
<td>Old</td>
<td>Supine</td>
<td>Unknown</td>
<td>9</td>
</tr>
<tr>
<td>257</td>
<td>Female</td>
<td>Old</td>
<td>Supine</td>
<td>Unknown</td>
<td>8</td>
</tr>
<tr>
<td>272</td>
<td>Male</td>
<td>Young</td>
<td>Supine</td>
<td>Unknown</td>
<td>4</td>
</tr>
<tr>
<td>288</td>
<td>Female</td>
<td>Young</td>
<td>Supine</td>
<td>Narrow coffin</td>
<td>11</td>
</tr>
<tr>
<td>522</td>
<td>Male</td>
<td>Young</td>
<td>Supine</td>
<td>Unknown</td>
<td>6</td>
</tr>
</tbody>
</table>

As the table shows, there were fourteen individuals from Bronze Age 4 manipulated. Individuals appear to have been manipulated regardless of sex, age, wealth, or burial context. There may be a link between manipulation and location. As Figure 5.20 shows, burials from Bronze Age 4 that showed evidence of manipulation were often grouped near other burials with manipulation.
Figure 5.20: Location of Bronze Age 4 burials showing evidence of manipulation in excavation square 'A', manipulated burials shown in red (adapted from Higham, 2009c).

Burials were manipulated in a number of different ways, usually involving the upper limbs. Table 5.23 shows the different ways that individuals from Bronze Age 4 were manipulated.
Table 5.23: Manipulations of Bronze Age 4 individuals.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Description of Manipulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Upper limbs moved and placed next to right lower limb.</td>
</tr>
<tr>
<td>17</td>
<td>Upper limbs externally rotated so that humeral head faced laterally.</td>
</tr>
<tr>
<td>21</td>
<td>Upper limbs moved inferiorly from original position.</td>
</tr>
<tr>
<td>29</td>
<td>Left fibula moved to a position lateral to lower limbs and manipulation of the ribs and vertebrae.</td>
</tr>
<tr>
<td>59</td>
<td>Skull moved and placed between the lower limbs of burial 55.</td>
</tr>
<tr>
<td>69</td>
<td>Right humerus inverted and mandible reversed.</td>
</tr>
<tr>
<td>145</td>
<td>Upper limbs moved inferiorly from original position.</td>
</tr>
<tr>
<td>150</td>
<td>Movement of skull back into grave when disturbed by digging of a pit.</td>
</tr>
<tr>
<td>233</td>
<td>Upper limbs moved inferiorly from original position.</td>
</tr>
<tr>
<td>234</td>
<td>Right upper limb lengthened.</td>
</tr>
<tr>
<td>257</td>
<td>Upper limbs lengthened.</td>
</tr>
<tr>
<td>272</td>
<td>Left foot disarticulated and lengthened.</td>
</tr>
<tr>
<td>288</td>
<td>Upper limbs and right femur disarticulated.</td>
</tr>
<tr>
<td>522</td>
<td>Ulnae moved so that distal ends were under pelvis while radii were on top of pelvis.</td>
</tr>
</tbody>
</table>

Included in the manipulations were those that lengthened the upper limbs by repositioning the skeletal elements of the forearms. The manipulation of burial 234 involved the movement of the right radius so that it was inferior to the distal end of the right ulna (Fig. 5.21). Manipulation of burial 257 involved a similar movement, however, in both upper limbs rather than just the right (Fig. 5.22).

Burial 29 had the left fibula moved lateral to the lower limbs as well as what appeared to be tumbling in the upper body (Fig. 5.23). The ribs and vertebrae were disarticulated, however, when this is considered with the manipulation of the left fibula, it is likely that people disturbed the upper body, possibly to retrieve grave goods around the chest or waist.
In addition to the movements of the upper limbs, four burials were manipulated in different parts of their skeletons. Burial 272 had his left foot positioned in a row (Fig. 5.24), with the effect similar to the lengthening seen in the upper limbs of burials 234 and 257. Burial 150 had the skull placed in the grave in an unarticulated position after the digging of a pit superior to the head disturbed it (Fig. 5.25). Lastly, burial 59 had the skull moved and placed between the lower limbs of burial 55 (Fig. 5.26). There is some doubt about the provenance of this skull, based on its size it could belong to another individual (Tayles, pers comm.), however, as burial 55 cut through burial 59 it seems likely that the skull belonged to burial 55.
Figure 5.24 (left): Photograph of left foot of burial 272 showing the placement of skeletal elements in a row.
Figure 5.25 (centre): Photograph of burial 150 showing the movement of the skull due to a pit.
Figure 5.26 (right): Photograph of burial 55 showing position of burial 59’s skull between the lower limbs of burial 55.

5.8.2. Burial Position in Bronze Age 4

Burials from the Bronze Age 4 phase of Ban Non Wat were interred in one of three positions. The vast majority were placed in supine positions with their lower limbs extended, however, there was also one individual placed on his left side and one on her right (Table 5.24).
Table 5.24: Results of analysis of Bronze Age 4 individuals placed on their left and right sides.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Burial Position</th>
<th>Sex</th>
<th>Age</th>
<th>Burial Type</th>
<th>Burial Context</th>
<th>Wealth Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Right side</td>
<td>Female</td>
<td>Old</td>
<td>Primary</td>
<td>Loose non-durable wrapping</td>
<td>62</td>
</tr>
<tr>
<td>306</td>
<td>Left side</td>
<td>Male</td>
<td>Mid</td>
<td>Primary with disturbance</td>
<td>Unknown</td>
<td>38</td>
</tr>
</tbody>
</table>

As the table shows, both burials were primary interments. Burial 30 was an old female in a loose non-durable wrapping with a mortuary score of sixty-two, which was the highest from Bronze Age 4. Burial 306 was a mid-aged male whose burial context was unknown (Fig. 5.27). Burial 306 also had a relatively high mortuary score with thirty-eight goods placed in the grave with him (the fourth highest in this phase).

5.8.3. Burial Context in Bronze Age 4

As Table 5.25 shows individuals from Bronze Age 4 were interred in four different burial contexts.
Table 5.25: Number of Bronze Age 4 individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th></th>
<th></th>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th></th>
<th>Unknown</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Unknown</td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Unknown</td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Loose non-durable wrapping</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>29</td>
</tr>
<tr>
<td>Tight non-durable wrapping</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Tight durable wrapping</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Narrow coffin</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Wide coffin</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Unknown</td>
<td>9</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>16</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>65</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
<td>11</td>
<td>11</td>
<td>4</td>
<td>13</td>
<td>13</td>
<td>19</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>111</td>
</tr>
</tbody>
</table>

Of the 111 individuals, forty-six had burial context assigned, the remaining could not have context identified because of poor preservation, disturbances, conflicting findings, and the inability to place the burials in a single context. The most frequently used burial context by far was a loose non-durable container, followed by wide coffins, tight durable wrappings, narrow coffins, and tight non-durable wrappings (Fig. 5.28).
5.8.4. Additional Findings in Bronze Age 4

Burials 410 and 416 have been interred side by side and may be a double burial (Fig. 5.29). Burial 410 was a mid-aged female with a wealth score of five interred in a loose non-durable wrapping, while burial 416 was a young female with a wealth score of four with an unknown burial context. Burial context was unknown for burial 416 because there was no evidence that the grave cut was wider than the constriction. Although the two individuals were spatially very close it cannot be confidently stated that they were interred simultaneously.
Figure 5.29: Burials 410 (left) and 416 (right) showing adjoining humeri. The constriction evidenced in burial 416 suggests a tight container, however, because the relative chronology of interments cannot be ascertained, it is possible that this individual was interred in a narrow grave with a loose non-durable wrapping, with burial 410 interred at a later date.

5.9.0. Bronze Age 5

There were twenty-nine individuals examined from Bronze Age 5 (Table 5.26).

Table 5.26: Number of Bronze Age 5 individuals examined, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Mid</th>
<th>Old</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>11</td>
<td>6</td>
<td>5</td>
<td>29</td>
</tr>
</tbody>
</table>
There was a near equal distribution across the sexes; however, as Figure 5.30 shows the frequencies of individuals across the sex and age ranges does not suggest that the sample was representative. The sample is of a sufficient size for the expected distribution to be seen so the reason for this is unknown, possible explanations will be discussed in Chapter Six.

![Figure 5.30: Frequencies of Bronze Age 5 individuals, separated by sex and age.](image)

**5.9.1. Burial Type in Bronze Age 5**

All Bronze Age 5 individuals were primary, with burial 265 the only to show evidence of manipulation (Table 5.27). Manipulation of the burial included the movement of the left femur, right humerus, and pelvic bones to be bundled on the upper body with the mandible (Fig. 5.31).
Table 5.27: Results of the analysis of Burial 265.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Sex</th>
<th>Age</th>
<th>Burial Type</th>
<th>Burial Position</th>
<th>Burial Context Code</th>
<th>Mortuary Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>265</td>
<td>Male</td>
<td>Young</td>
<td>Primary with manipulation</td>
<td>Supine</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Figure 5.31: Photograph of burial 265 showing bundled humerus, femur, and pelvis with disarticulated mandible. The edge of the excavation square can be seen in the right third of the image, with the deeper area excavated in previous years before the photograph was taken.

5.9.2. Burial Position in Bronze Age 5

During Bronze Age 5 all individuals except one were placed in a supine position, the remaining burial was placed in a prone position. Table 5.28 shows the
details relating to burial 121, the only individual from the Neolithic and Bronze Age phases at Ban Non Wat to be interred in a prone position.

Table 5.28: Results of analysis of burial 121, the only Bronze Age 5 burial placed in a prone position.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Sex</th>
<th>Age</th>
<th>Burial Type</th>
<th>Burial Context</th>
<th>Mortuary Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>121</td>
<td>Female</td>
<td>Young</td>
<td>Primary with disturbance</td>
<td>Loose non-durable wrapping</td>
<td>2</td>
</tr>
</tbody>
</table>

Burial number 121 was a young female interred in a soft loose container. Two mortuary goods accompanied her; a pot and a trochus shell bangle fragment (Fig. 5.32).

Figure 5.32: Photograph of burial 121, a young female placed in a prone position.
5.9.3. Burial Context in Bronze Age 5

Table 5.29 shows the number of individuals in Bronze Age 5 interred in each burial context for both sexes and each age range. Seventeen individuals from Bronze Age 5 were unable to have burial context assigned, most commonly because of poor preservation, disturbance of the burials, and an inability to assign them to only one context.

Table 5.29: Number of Bronze Age 5 individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
<th>Unknown</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Unknown</td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
</tr>
<tr>
<td>Loose non-durable wrapping</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Tight durable wrapping</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Narrow coffin</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Wide coffin</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2</strong></td>
<td><strong>4</strong></td>
<td><strong>3</strong></td>
<td><strong>2</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

In total, twelve individuals were assigned burial context, spread out over four types. The most popular burial context seems to have been a loose non-durable wrapping, followed by tight durable wrappings and narrow coffins, and then a wide coffin (Fig. 5.34).
5.9.4. Additional Findings for Bronze Age 5

This section will look at two individuals from Bronze Age 5 interred together. Burial 186, an old female, was interred with a child lateral to her right lower limb (Fig. 5.34). It was impossible to tell if they were interred simultaneously or at different times, however, based on the position of the child by the lower limbs rather than near the upper limbs it may be more likely that they were interred separately. This hypothesis is based on the fact that when children where interred simultaneously with adults at Ban Non Wat they were usually placed by the upper limbs (for example see burials 461 and 462 on page 96).
5.10.0. Changes Through Time

This section examines the ways mortuary procedures changed through time over the Neolithic and Bronze Age phases at Ban Non Wat. It will start by examining differences in mortuary wealth between the mortuary phases, before turning to changes in burial type, burial position, and burial context. Where statistical tests were possible they are included, however, often they were not feasible due to the small sample sizes.

5.10.1. Changes in Mortuary Wealth

Figure 5.35 shows the mean mortuary scores of individuals from each mortuary phase.
Figure 5.35: Mean mortuary wealth of individuals in each mortuary phase (Flexed n=9, Neolithic 1 n=13, Neolithic 2 n=25, Bronze Age 1 n=3, Bronze Age 2 n=14, Bronze Age 3A n=12, Bronze Age 3B n=8, Bronze Age 4 n=95, Bronze Age 5 n=19, ±1 standard error).

As the figure shows, mortuary wealth was universally low throughout the Neolithic before an increase in Bronze Age 1, and another sharp increase in Bronze Age 2. Bronze Ages 2 and 3A were similar in terms of mortuary wealth before it dropped in Bronze Age 3B, followed by a further fall and subsequent leveling out in Bronze Ages 4 and 5. A one-way ANOVA with post hoc Tukey’s test found statistically significant differences between Bronze Age 2 and all other phases except for Bronze Age 3A, while an analysis of Bronze Age 3A found the same in regard to Bronze Age 2 (1 factor ANOVA, F_{8,189}=55.31, p<0.0001). This suggests that the mean number of goods placed in a grave during Bronze Age 2 and 3A burials was significantly higher than those from all other phases.
5.10.2. Changes in Burial Type

This section will not examine changes in burial type in detail as, with the exception of the three individuals from Bronze Age 2, all burials at the site were primary. Instead, the focus will be on the relative frequencies of individuals within each phase that showed evidence of manipulation (Fig. 5.36).

![Bar chart showing frequencies of individuals in each mortuary phase that showed evidence of manipulation (Fig. 5.36).](chart)

As the figure shows, the highest frequency of manipulated individuals belonged to Bronze Age 2. Bronze Age 4 had the second highest frequency and highest number, with fourteen burials manipulated. Bronze Ages 2, 3A, and 5 each had only a single individual manipulated each. No burials were manipulated prior to Bronze Age 2.
5.10.3. Changes in Burial Position

The flexed phase had individuals interred in flexed positions either placed on their backs or left sides (Fig. 5.37). In Neolithic 1 individuals were predominantly placed on their backs with two individuals placed in seated positions inside ceramic vessels.

![Bar chart showing burial positions](chart.png)

Figure 5.37: Frequencies of individuals in each burial position for the flexed (n=7), Neolithic 1 (n=11), and Neolithic 2 (n=18) mortuary phases.

From the Neolithic 2 phase through to Bronze Age 4 all individuals were placed in supine extended positions, so the burial position used during Bronze Ages 1, 2, 3A, and 3B will not be looked at in more detail.

Bronze Ages 4 and 5 saw low levels of individuals interred in different positions. In Bronze Age 4 there was one individual placed on his left side and one on her right, while Bronze Age 5 had one female in a prone position (Fig. 5.38). Clearly, after the flexed phase the majority of individuals were placed in supine extended positions, with those placed in alternative positions very rare.
5.10.4. Changes in Burial Context

This section examines how burial context changed through time, starting first with the mortuary phases of the Neolithic, before moving onto the Bronze Age. The Bronze Age mortuary phases will be presented in two parts, first the Early Bronze Age (Bronze Ages 1, 2, 3A), followed by the Late Bronze Age (Bronze Ages 3B, 4, and 5). The frequencies were calculated for each phase and then arranged next to each other on the graphs to allow comparisons.

*Burial Context in the Neolithic*

Figure 5.39 shows the frequency of individuals across the different burial contexts for each of the three mortuary phases of the Neolithic. Because of the small numbers of individuals assigned burial context it appears that being interred in a jar was commonplace for adults in the Neolithic 1 phase, this was
not the case. Because of such problems this comparison is of limited value. Despite this it can be clearly seen that the flexed phase utilised loose non-durable wrappings, Neolithic 1 used loose non-durable wrappings and mortuary jars, while the Neolithic Two 2 individuals were buried in loose non-durable wrappings, tight durable wrappings, and narrow coffins.

![Figure 5.39: Frequencies of individuals in each burial context of the Neolithic, separated by mortuary phase (flexed n=4, Neolithic 1 n=3, Neolithic 2 n=3).](image)

**Burial Context in the Early Bronze Age**

Figure 5.40 gives the relative frequency of individuals in each burial context for each mortuary phase of the Early Bronze Age. Wide coffins were used through each phase, with use highest in Bronze Age 1. Loose non-durable wrappings were used from the second Bronze Age phase onwards, and would most likely have been represented in Bronze Age 1 if not for the small sample size. Tight durable wrappings were used only in Bronze Age 3A.
Figure 5.40: Frequencies of individuals in each burial context of the Early Bronze Age, separated by mortuary phase (Bronze Age 1 n=1, Bronze Age 2 n=12, Bronze Age 3A n=13).

**Burial Context in the Late Bronze Age**

As Figure 5.41 shows, Bronze Age 3B had a higher percentage of individuals interred in wide coffins and lower percentage in loose non-durable wrappings than the later phases. Comparisons between Bronze Age 4 and five highlight the fact that although the numbers of individuals in each burial context changed markedly, the frequency of individuals in each context remained quite similar. Loose non-durable wrappings appear to have been the favoured burial context during the Late Bronze Age, with low frequencies of individuals interred in the alternative contexts.
5.11.0. Mortuary Practices in Relation to Social Identity and Location

This segment of the chapter presents the results of analyses looking for links between mortuary practices and social identity for burials from the Neolithic and Bronze eras. Because of the small number of burials occurring over multiple episodes and in positions other than prone, burial type and burial context were not investigated in regard to sex, age, mortuary wealth, or location. The small numbers would limit the ability to confidently identify any correlations. This is with the exception of the flexed burials. Because the flexed burials have already been grouped according to position they will not be examined here, the data required for an interpretation of their positioning was presented at the start of this chapter. Therefore, this section will be concerned with testing for correlations between burial context and social identity. As with the previous section, statistical tests are included where the samples allowed.
5.11.1. The Neolithic

Table 5.30 shows the results of the analysis of burial context of individuals interred during the Neolithic period of occupation at Ban Non Wat.

Table 5.30: Number of Neolithic individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
</tr>
<tr>
<td>Loose non-durable wrapping</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Tight non-durable wrapping</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Tight durable wrapping</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Narrow Coffin</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Jar</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Neolithic burials were interred in one of five containers. Figure 5.42 shows the distribution of the Neolithic individuals assigned burial context across the sex and age ranges.
Although there were near equal numbers of males and females assigned burial context in the Neolithic, the distribution of the sample suggests that it is not representative of the population from which it came.

**Burial Context in Relation to Sex**

Figure 5.43 shows the frequency of individuals in each burial context based on sex. Females were more highly represented in the loose non-durable wrappings and tight durable wrappings, but absent from tight non-durable wrappings. Both sexes had one individual each interred in a mortuary jar. One female was interred in each of the tight durable wrapping and narrow coffin contexts, while one male was buried in a tight non-durable wrapping. It cannot be confidently stated that there were links between sex and burial context observed during the Neolithic at Ban Non Wat. This is mostly because of the small size of the sample.
Figure 5.43: Frequencies of Neolithic individuals in each burial context, separated by sex.

**Burial Context in Relation to Age**

Figure 5.44 shows the frequency of individuals buried in each context across the age ranges. As with burial context in relation to sex the small sample sizes limit any interpretations one can make.
**Burial Context in Relation to Mortuary Wealth**

Figure 5.45 shows the mean wealth scores of individuals in each burial context. There was little difference in mortuary wealth between burial contexts, with jar burials having slightly wealthier individuals on average than the other contexts. An ANOVA test was unable to be carried out due to the fact that the tight non-durable wrapping, tight durable wrapping, and narrow coffin contexts only had one individual each, however, based on the minimal differences in the mean wealth scores there appears to have been no correlation between the container an individual was interred in and wealth.
Figure 5.45: Mean mortuary wealth of individuals in each burial context during the Neolithic (loose non-durable wrapping n=4, tight non-durable wrapping n=1, tight durable wrapping n=1, jar n=2, ±1 standard error).

**Burial Context in Relation to Location**

Figure 5.46 shows the location of the individuals assigned burial context across excavation square 'A'. There are no clear groupings shown in the figure. Because of the small number of burials assigned contexts any possible grouping cannot be identified and it is not possible to state that burial context was linked to location.
8.11.2. The Bronze Age

This Bronze Age group includes all burials from each Bronze Age mortuary phase that were assigned burial context. Table 5.31 shows the numbers of individuals across the sexes and age ranges.
Table 5.31: Number of Bronze Age individuals in each burial context, based on sex and age.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Mid</td>
<td>Old</td>
<td>Unknown</td>
</tr>
<tr>
<td>Loose non-durable wrapping</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Tight non-durable wrapping</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tight durable wrapping</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Narrow coffin</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Wide coffin</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>13</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

A large number of burials from the Bronze Age were able to have burial context assigned, which gave a near equal ratio of males to females (44 males: 42 females). The relative frequencies of individuals across the sexes and age ranges, as shown in Figure 5.47, however, do not show the expected distribution of a sample that is representative of its population.
Figure 5.47: Frequencies of Bronze Age individuals assigned burial contexts, separated by sex and age.

**Burial Context in Relation to Sex**

Figure 5.48 shows the distribution of Bronze Age individuals across the assigned burial contexts in relation to sex. As can be seen in the figure, there were near equal numbers of males and females across the burial contexts. A chi-squared test backed up this statement, finding no significant differences in burial context depending on sex (p=0.6083), which suggests that burial context was not linked to sex.
**Burial Context in Relation to Age**

Figure 5.49 shows the distribution of Bronze Age individuals across the burial contexts for each age range. Statistical tests could not be carried out because of the small number of individuals interred in tight non-durable wrappings. Despite this, the figure shows near equal numbers of young, mid, and old aged individuals in each burial context. This implies that burial context was not linked to age during the Bronze Age.
**Burial Context in Relation to Mortuary Wealth**

Figure 5.50 shows the mean wealth scores of individuals interred in each burial context during the Bronze Age. The figure shows that those placed in wide coffins were the wealthiest followed by the loose non-durable wrappings, tight non-durable wrappings, narrow coffins, and tight durable wrappings. A one-way ANOVA test found no statistically significant differences in the mean mortuary wealth of individuals between the burial contexts (1 factor ANOVA, $F_{4,77}=1.296, p=0.2792$), suggesting that there were no links between wealth and burial context during the Bronze Age.
Figure 5.50: Mean mortuary wealth of individuals in each burial position during the Bronze Age (loose non-durable wrapping n=50, tight non durable wrapping n=3, tight durable wrapping n=7, narrow coffin n=4, wide coffin n=18, ±1 standard error).

**Burial Context in Relation to Location**

Burial context in relation to location in the Bronze Age was examined, the results of which can be seen over the next two pages. The mortuary plans used to show burial context in relation to location were all adapted from Higham (2009c). Figure 5.51 shows the location of individuals in each context for Bronze Ages 1 and 2, which were amalgamated for this assessment; the same was carried out in Figure 5.52 in respect to Bronze Ages 3A and 3B. Bronze Ages 4 and 5 were given separated plans because of the comparatively large number of burials in each phase (Fig. 5.53 Fig. 5.54). A single figure showing the location of burials from the Bronze Age as a whole, as was produced for the Neolithic, was not possible due to the complex superpositioning of the burials.
Figure 5.51 (left): Burial context of Bronze Age 1 and 2 individuals shown by location in excavation square 'A'.

Figure 5.52 (right): Burial context of Bronze Age 3A and 3B individuals shown by location in excavation square 'A'.
Figure 5.53 (left): Burial context of Bronze Age 4 individuals shown by location in excavation square 'A'.
Figure 5.54 (right): Burial context of Bronze Age 5 individuals shown by location in excavation square 'A'.
The figures show no relationship between location and burial context. There were no clear groupings throughout the Bronze Age. This suggests that the possible descent groups identified by Higham (pers comm.) were not interred under the same conditions.

5.12.0. Summary

This chapter presented the results from the application of the methods described in Chapter Four to Neolithic and Bronze Age burials from Ban Non Wat. A summary of these practices can be seen in Table 5.32. There were no links identified between mortuary practices and social identity in the Neolithic or Bronze eras. The following chapter will discuss these results, as well as addressing the original hypotheses.
Table 5.32: Summary of the mortuary practices used in each phase of the Neolithic and Bronze Ages at Ban Non Wat.

<table>
<thead>
<tr>
<th>Mortuary Phase</th>
<th>Burial Position</th>
<th>Burial Type</th>
<th>Burial Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexed (n=10)</td>
<td>Supine and on left side, with flexed limbs</td>
<td>Primary</td>
<td>Loose non-durable wrapping</td>
</tr>
<tr>
<td>Neolithic 1 (n=15)</td>
<td>Supine with extended limbs, and seated</td>
<td>Primary</td>
<td>Mortuary jars and tight non-durable wrapping</td>
</tr>
<tr>
<td>Neolithic 2 (n=27)</td>
<td>Supine with extended limbs</td>
<td>Primary</td>
<td>Loose non-durable wrapping, tight durable wrapping, narrow coffin</td>
</tr>
<tr>
<td>Bronze Age 1 (n=3)</td>
<td>Supine with extended limbs</td>
<td>Primary</td>
<td>Wide coffin</td>
</tr>
<tr>
<td>Bronze Age 2 (n=17)</td>
<td>Supine with extended limbs</td>
<td>Primary (one with manipulation) and three in multiple episodes</td>
<td>Loose non-durable wrapping, wide coffin</td>
</tr>
<tr>
<td>Bronze Age 3A (n=14)</td>
<td>Supine with extended limbs</td>
<td>Primary (one with manipulation)</td>
<td>Loose non-durable wrapping, tight durable wrapping, wide coffin</td>
</tr>
<tr>
<td>Bronze Age 3B (n=11)</td>
<td>Supine with extended limbs</td>
<td>Primary</td>
<td>Loose non-durable wrapping, tight non-durable wrapping, narrow coffin, wide coffin</td>
</tr>
<tr>
<td>Bronze Age 4 (n=111)</td>
<td>Supine, on left side, and on right side, with extended limbs</td>
<td>Primary (some with manipulation)</td>
<td>Loose non-durable wrapping, tight non-durable wrapping, tight durable wrapping, narrow coffin, wide coffin.</td>
</tr>
<tr>
<td>Bronze Age 5 (n=29)</td>
<td>Supine and prone, with extended limbs</td>
<td>Primary (one with manipulation)</td>
<td>Loose non-durable wrapping, tight durable wrapping, narrow coffin, wide coffin</td>
</tr>
</tbody>
</table>
6.0.0. Discussion

The original aims of this thesis were to examine burial practices at Ban Non Wat during each mortuary phase preceding the Iron Age, assess how these changed over time, and test for links between mortuary practices and social identity. It was hypothesised that mortuary practices would change over time and that they would be linked to sex, age, mortuary wealth, or location. This chapter will begin with a discussion of the burial practices used during the Neolithic mortuary phases before moving to the Bronze Age, and then looking at how they changed through time. The limitations of this investigation will be presented, after which an assessment of the proposed hypotheses will be given. Following this, future avenues for research will briefly be reviewed and concluding remarks made.

6.1.0. Discussion of Mortuary Practices at Ban Non Wat

This section offers a discussion of the mortuary practices used during the Neolithic and Bronze Ages at Ban Non Wat, including mentioning when the findings for specific burials from this research differ to those of Willis (2005). In most cases this thesis is complementary to the work done by Willis, however, there are a number of burials where the interpretations of the mortuary practices used differs, all from Bronze Age 4, and so these will be mentioned.

6.1.1. Flexed Burials

The small number of flexed individuals made analysis difficult. Flexed adult burials at Ban Non Wat were interred either placed on their backs or their left sides, with the lower limbs flexed at both the hip and knee joints. All were
primary burials interred in loose non-durable wrappings. The flexed position of the lower limbs was most likely retained by soil holding the bones in place and the cut of the grave, as in some instances the lower limbs can be seen to be resting against the sides of the grave (Fig. 6.1). Alternatively, straps could have maintained the positions as Peressinotto et al. (2004) have previously suggested were used at prehistoric Nubian sites. All burials were singular, with the exception of one double burial consisting of burial 461 and 462, which may have been a mother with her child. This was the only simultaneous burial positively identified at Ban Non Wat, shown by the intertwined and articulated upper limbs (Fig. 5.4).

Figure 6.1: Photograph of burial 633 with black line showing estimated grave cut that allowed the lower limbs to keep their upright position and the position of the skull.
At Ban Non Wat there is no clear evidence that flexed individuals were interred earlier than any others prior to the Bronze Age. Therefore, at this stage it is unclear whether they represent hunter-gatherer occupation or a subsection of the Neolithic population. There is little evidence to suggest that they were not Neolithic individuals who chose to be buried in flexed positions to honour their ancestors or for some unknown reason not linked to sex, age, or wealth. Flexed burials have been found in other sites throughout Thailand and were more common in pre-agricultural rather than agricultural societies (Pietrusewsky and Douglas, 2002). However, the evidence from Ban Non Wat supporting the hypothesis that the flexed individuals were distinct is reliant on only three grave goods. Based on these goods Higham (2009c) has suggested that a hunter-gatherer group shared the site for a time with Neolithic immigrants, a concept which implicitly relies on the two-layer model concerning the origins of the Neolithic in Southeast Asia.

An alternative explanation, which could be applied regardless of the origins of the Neolithic, is that the flexed individuals were in fact hunter-gatherer immigrants from a nearby region. Although Cox (2009) found no evidence that the Neolithic individuals were migrants to the area, her research did not include any of the flexed interments from Ban Non Wat. It is possible, therefore, that the flexed individuals represent hunter-gatherer migrants from other locations, lured by the benefits of agriculture. This concept is reliant on the concept that agriculture was not adopted at the same time throughout Southeast Asia. Some regions may have adopted agriculture later than others, suggesting that those places that did, could have been viewed as attractive places to live, drawing hunter-gatherers to those locations. These migrants may have chosen to be interred in the flexed positions seen at the earlier sites of Nong Nor, Tham Lod, and Ban Rai because they held on to the mortuary practices of their original villages rather than adopting the customs of those from Ban Non Wat.
The fact that both sexes and all adult age ranges were represented in the flexed burials at Ban Non Wat suggests that they could have been from an autonomous group or that they were Neolithic individuals chosen by some determining factor other than sex or age. Some flexed individuals were accompanied by mortuary goods, however, five of the ten individuals had no grave goods and those that did had between one and nine. This does not necessarily suggest that they were a poor subsection of the Neolithic, however, the mean mortuary wealth score of Neolithic burials was not significantly higher. At this stage, both the superpositioning of interments and radiocarbon dates give no suggestion that the flexed burials represent an early population displaced by Neolithic immigrants, however, neither do they preclude the possibility that they were migrants or a subsection of the Neolithic population.

6.1.2. Neolithic 1 Burials

All burials from the first Neolithic phase for which burial type could be assessed were found to be primary. These were placed in one of two positions, either supine with no flexion of the lower limbs or seated in large mortuary vessels. In total, only three individuals were assigned burial context, of which two were the jar burials and the other interred in a tight non-durable wrapping.

The two individuals interred in mortuary jars were unusual as they were adults, while the remaining jar burials at Ban Non Wat contained infants. Upon examining the details of these two burials there was no clear reason for such an unusual mortuary practice. Both were primary interments, as shown by the articulation of labile joints (Fig. 6.2). One individual was an old male and the other a mid-aged female. As with the flexed burials, the adult jar burials were accompanied by a similar number of mortuary goods as their contemporaries, giving no indication why they were treated differently. They were found in different parts of the site, not together, however it is unknown how close temporally they were interred. An explanation put forth by Cox (2009), for
burial 28 is that of migration. Cox hypothesised that burial 28 may have been an immigrant, suggested by isotope analysis, an investigation of non-metric traits, and the atypical burial context. At this point in time burial 292 has not been examined in this way. It is therefore possible that the two adults interred in mortuary jars were immigrants to Ban Non Wat.

Figure 6.2: Photograph of burial 28 showing articulated labile joints of the hands and cervical vertebrae, indicating a primary burial.

6.1.3. Neolithic 2 Burials

Neolithic 2 burials were primary interments placed in supine extended positions. They were interred in one of three forms; a tight durable wrapping, a narrow coffin, or a loose perishable wrapping, each of which had one individual interred in them.
6.1.4. Bronze Age 1 Burials

Only three individuals representing Bronze Age 1 were analysed. These were primary interments placed in a supine position, only one of which had burial context identified; a wide coffin. The average mortuary score for this phase was 17.67 and included, for the first time, objects made of bronze.

Research carried out by Willis and Tayles (2009) showed that Mortuary Phase 1 burials from Ban Lum Khao were either tightly wrapped or in coffins. A brief examination of a number of burials from Ban Lum Khao using the methods presented in Chapter Four was in agreement with their assessment. Although definitive dates are not available for Mortuary Phase 1, the burials are likely to have been interred sometime between 1280BC and 1000BC (Higham and Thosarat, 2004). This means the Mortuary Phase 1 burials were contemporary with those from Neolithic 1, Neolithic 2, and Bronze Age 1 at Ban Non Wat. The findings from each site, therefore, appear to correlate, with the exception of the two adult jar burials from Neolithic 1, and the use of loose non-durable wrappings at Ban Non Wat.

6.1.5. Bronze Age 2 Burials

The majority of Bronze Age 2 individuals were primary interments in supine positions. One burial showed evidence of manipulation and three appear to have occurred in multiple episodes. These were disarticulated with the skeletal elements placed in bundles. Two of these interments were single burials, while the other was a double with the individual whose remains had been manipulated. It is unknown whether this double interment of burials 20 and 90 was originally intended to include both individuals or not. Manipulation of burial 90 consisted of an exhumation of the torso and thighs, the partial filling of the grave with soil, and then the placement of the removed bones back in the grave. It is possible, as Willis (2005) has previously hypothesised, that wealthy
individuals were being exhumed in order to retrieve their grave goods. Such a practice would result in an individual having a lower mortuary score than they would otherwise. This scenario seems likely as the manipulated burial and three that took place over multiple episodes were accompanied by less than the mean number of goods, despite all being placed in relatively large graves which could suggest high status if Tainter’s (1978) energy expenditure principle is used.

Burial 570 was interpreted as showing evidence of tumbling throughout the skeleton (Fig. 5.13). This suggests that burial was delayed, with decomposition advanced by the time of interment. Willis (2005) identified two other interments, burials 97 and 155, at Ban Non Wat as experiencing tumbling. Burial 97 was located in excavation square ‘Y’ so was not included in this thesis. Although Willis identified burial 155 (Fig. 6.3) as experiencing tumbling, I believe the appearance of the upper body is more likely the result of normal decomposition in a hard narrow container. Despite this, it appears that a small number of individuals had partially decomposed before burial. Why such a delay might occur is unclear, possibly because an individual died away from Ban Non Wat and tumbling occurred when being transported back.

Of those individuals for whom burial context could be assigned, seven were assessed as having been interred in loose non-durable wrappings and five in wide coffins. As previously mentioned, the wide coffins used were most likely made of wood based on its presence in some graves. It must be noted, however, that the presence of wood in a grave is not sufficient evidence to assign an individual as having been interred in a coffin. In a number of cases fragments of wood have been found in graves where the individuals were interred in loose non-durable wrappings. This suggests that wood may have formed another aspect of the mortuary ritual besides that of a closed coffin, such as a grave good or an open container in which the body was placed.
6.1.6. Bronze Age 3A Burials

Bronze Age 3A burials were all primary supine interments buried in loose non-durable wrappings, tight durable wrappings, and wide coffins. One burial showed evidence of manipulation. Burial 631 had his upper limbs disturbed, as well as the metatarsals of his left foot moved to rest on top of his tibiae and fibulae (Fig. 5.16). This burial is peculiar at Ban Non Wat because it is the only to show evidence of the body being cut before decomposition had taken place. There are examples of burials that were cut through by the digging of postholes or grave cuts, but burial 631 appears to have his metatarsals cut from his foot. They are articulated, suggesting they were moved when still connected by soft
tissues. Additionally, the right upper limb has been rotated to a degree not possible during life. This also occurred when soft tissues were present, shown by the articulation of the elbow joint. It is unclear why these manipulations took place, possibly to retrieve goods around the ankle and upper limbs.

6.1.7. Bronze Age 3B Burials

Bronze Age 3B burials were all primary, with the individuals placed in supine positions. No burials showed any evidence of manipulation, however, as with each mortuary phase, some showed evidence of disturbance interpreted as an unintentional byproduct of having a population living on a cemetery site. Burial context of the Bronze Age 3B individuals included loose non-durable wrappings, tight non-durable wrappings, wide coffins, and a narrow coffin.

As mentioned in Chapter Two, Hauman (2009) has shown Bronze Ages 2, 3A, and 3B to be contemporary with Mortuary Phase 2 at Ban Lum Khao. This means that the findings of Willis and Tayles (2009) at Ban Lum Khao can be directly related to burials from Ban Non Wat. Mortuary Phase 2 burials at Ban Lum Khao were interred either in coffins or tight wrappings, with no relationships identified between burial context and grave wealth or location. This is similar to the findings of the contemporary phases at Ban Non Wat, again with the additional use of loose wrappings at Ban Non Wat.

6.1.8. Bronze Age 4 Burials

All burials from Bronze Age 4 were primary interments in one of five burial contexts. Loose non-durable wrappings were the most common, followed by wide coffins, tight durable wrappings, narrow coffins, and tight non-durable wrappings. Fourteen individuals showed evidence of manipulation. This came in a variety of forms; however, most often involved the upper limbs. It appears that, because the upper limbs were frequently manipulated some of this was for
the retrieval of grave goods, most likely the bangles often placed on an individual's arms and forearms. The clustering of some manipulated burials would, therefore, imply that people were targeting specific parts of the cemetery in order to take grave goods.

Other manipulations identified during Bronze Age 4 suggest respect towards the dead, with burial 150 having his skull placed back in the grave after the digging of a pit disturbed it. There were two individuals identified whose upper limbs had been lengthened, one of these involved the lengthening of the right forearm and the other of both forearms. It seems likely that these manipulations occurred when bangles were dragged from the forearms of these individuals. Similarly, burial 272 had the elements from his left foot lengthened, possibly caused by the removal of grave goods from around the ankles. Burial 55 had a skull placed between her lower limbs. It was unclear whether this was the skull of burial 59 whose grave had been disturbed when burial 55 was interred, or if the skull belonged to another individual. If the skull belonged to burial 59 its placement would make sense, as the position was close to that which the skull would have been in before the grave for burial 55 was dug. If the skull belonged to a second individual, which has been suggested (Tayles, pers comm.) due to its small size, it would appear that the placement of the skull is for some symbolic reason, possibly to honour burial 55.

During Bronze Age 4 burials were most commonly placed in a supine position with their lower limbs extended. The exceptions to this were two individuals, one placed on his left side, one on her right. As only two individuals were placed in these alternative positions it is difficult to determine the reasons for this. Both had high mortuary wealth scores for this phase, which may have played a role in their position. Alternatively, Talbot (2002) has mentioned the possibility that burial position may have been obscured during interment by wrappings around the body. Burial 30, placed on her right side was interred in
a loose non-durable wrapping so this explanation may apply, while burial 306 was unable to have his burial context assigned.

The assignation of burial context in this thesis does not correlate to that of Willis (2005) in respect to four burials (burials 14, 64, 68, and 159). All of these Willis identified as occurring in tight durable wrappings, which I contest. An example is burial 68 (Fig. 6.4), whose burial context Willis identified based on the plantarflexed position of the feet. In contrast, I believe burial 68 was interred in a loose non-durable wrapping based on the lack of external space, shown by the articulation of the pelvis despite potential space between the pelvis and forearms and the absence of constriction throughout the skeleton (with the position of the feet caused by the original position being altered slightly by the pressure of the soil). For arguments against the findings in respect to the other three burials see the appendix.

Figure 6.4: Photograph of burial 68 showing the lack of constriction and articulated pelvis.
6.1.9. Bronze Age 5 Burials

Bronze Age 5 burials were all primary. The most common burial context used during Bronze Age 5 was a loose non-durable wrapping, followed by tight durable wrappings, narrow coffins, and wide coffins. Burial 265 was the only burial to show evidence of manipulation, which consisted of the bundling of the left femur, right humeri and pelvis together with the mandible on the chest. This was most likely done out of respect, as the grave was accidentally disturbed by some activity, with much of the burial poorly preserved. This burial, along with all others from the phase, except one placed prone, was interred in a supine position.

The single individual interred in a prone position was a young female buried in a loose non-durable wrapping and accompanied by meagre mortuary goods. The lack of significant mortuary goods and the position of the individual may indicate that she was on the outskirts of society and thus was not privy to comprehensive mortuary practices. The interpretation that prone burials were outcasts has been made at other sites across the world including Roman Britain, where they were usually interred on or near the edge of the cemetery without proper grave goods or coffins (Taylor, 2008). The prone individual from Ban Non Wat was not interred at the edge of the cemetery; in fact she was near the centre of the Bronze Age 5 interments. She was interred with few grave goods and no coffin, however, this was not uncommon in this phase. Talbot (2007) has suggested that prone individuals at the nearby Iron Age site of Noen U-Loke were interred in that position because of shared conditions of death, possibly injury. Tayles and Buckley (2004) furthered this interpretation by suggesting, based on skeletal lesions, that two of the prone burials identified from Noen U-Loke may have had leprosy, with a third burial having a spearhead lodged in their spine. It may be possible, therefore, that the prone individual at Ban Non Wat was placed in that position due to health reasons and the stigma attached, or a violent death. It could also be possible that the prone position was
unintentional caused by wrappings obscuring the position, as was mentioned for burials placed on their sides during Bronze Age 4.

There was one double burial from Bronze Age 5 in which an old female was interred with an infant. It seems plausible that burial 186 was the mother, or grandmother, of burial 189, explaining why they were interred close to each other. It is unknown whether they were interred at the same time or if there was a significant period of time between their respective burials.

Higham and Thosarat (2004) have previously placed Mortuary Phase 3 at Ban Lum Khao in the Late Bronze Age. As Hauman (2009) has shown Bronze Ages 2, 3A, and 3B at Ban Non Wat to be contemporary with Mortuary Phase 2 at Ban Lum Khao, it appears that Mortuary Phase 3 was contemporaneous with Bronze Ages 4 and 5 at Ban Non Wat. In Mortuary Phase 3 at Ban Lum Khao, burials were interred only in tight wrappings, there was no evidence that coffins were used (Willis and Tayles, 2009). This differs to the Late Bronze Age at Ban Non Wat, where the highest diversity in burial context was observed, including the use of both wide and narrow coffins. This may be explained by the smaller area excavated at Ban Lum Khao or the smaller number of individuals in Willis and Tayles's sample.

6.1.10. Changes Through Time

Interpreting the differences between the three phases of the Neolithic is made largely redundant due to the small numbers of individuals and, in many cases, an inability to assign mortuary practices. There were no clear differences between the flexed and other phases besides burial position. Additionally, the mean wealth scores between the flexed and Neolithic individuals were not significantly different.
Changes through time can be compared between the Neolithic 1 and Neolithic 2 individuals, as they have been shown to be chronologically sequential unlike the flexed individuals, whose position in the chronological sequence is unclear, and will be excluded here for simplicity. There was no statistically significant change in mean mortuary wealth between the two phases and burial positions between them were uniform, with the exception of the two unusual interments in mortuary jars from the Neolithic 1 phase. Burial context between the two phases appears to differ with the earlier Neolithic 1 phase individuals interred in a tight non-durable wrapping (or jars) and the later Neolithic 2 burials in a loose non-durable wrapping, tight durable wrapping, and a narrow coffin. There were no links between mortuary practices and social identity at any stage in the Neolithic. It cannot necessarily be stated that there was any increase in the complexity of the mortuary procedures used during the Neolithic 1 and 2 phases, however, there were new burial contexts introduced in the form of tight durable wrappings and narrow coffins.

Comparing the late Neolithic with Bronze Age 1 holds little value, as there were so few individuals in Bronze Age 1. However, Bronze Age 1 does see the first use of wide coffins, which were used throughout the Bronze Age. Bronze Age 2 had three burials that may have occurred in multiple episodes and one that was manipulated. There was still no link between burial context and mortuary wealth; however, this may be due to the removal of grave goods from graves, which is believed to have been occurring in the 'manipulated' and 'most likely in multiple episode' burials, as well as the decomposition of organic grave goods. Bronze Age 2 burials were interred in either loose non-durable wrappings or wide coffins and there was a significant increase in mean mortuary wealth from Bronze Age 1. Such increases are common in transitional stages as the introduction of bronze prompted changes in social structure (Muhly, 1988).

Bronze Age 3A saw a slight drop in mortuary wealth from the preceding phase, as well as the reemergence of tight durable wrappings being used along with
loose non-durable wrappings and narrow coffins. There was a decrease in the frequency of manipulated individuals. Mortuary wealth dropped in the Bronze Age 3B burials, and in addition to the burial contexts used in Bronze Age 3A one individual was interred in a tight non-durable wrapping. From the mortuary data accumulated it is not clear whether Bronze Age phases 3A and 3B were contemporary or not, there were few differences between the two apart from the average mortuary wealth which was significantly reduced. This may suggest that they were in fact contemporary and separated into two groups by social status, with a wealthy group to the north and poorer to the south.

The progression to Bronze Age 4 saw a continued decrease in mortuary wealth as it has been calculated, as well as an increase in both the number of burials that had been manipulated and different burial contexts used. Fourteen individuals from Bronze Age 4 had been manipulated, many in the upper limbs for the retrieval of grave goods. Loose non-durable wrappings continued to be the most common burial context, followed by tight durable wrappings or narrow containers, wide coffins, and tight non-durable wrappings.

Bronze Age 5 saw a slight drop in mortuary wealth from Bronze Age 4; however, this was so minimal that it was too small to draw any conclusions from. There was also a drop in Bronze Age 5 in the number of burials that had been manipulated, with the only burial manipulated in Bronze Age 5 seemingly done so to pay respect to the dead after unintentionally disturbing it. There were no significant differences between Bronze Ages 4 and 5 in respect to burial contexts, with loose non-durable wrappings remaining the most common, followed by tight durable wrappings, narrow coffins, and wide coffins.

The distribution of individuals in Bronze Ages 4 and 5 may indicate that certain burial practices were reserved for certain individuals. The vast majority of individuals were interred in loose non-durable containers and it may be that the other contexts were being reserved for individuals of high status. The lack of
any links between burial context and mortuary wealth in the Bronze Age does not, however, support this theory.

**6.2.0. Research Limitations**

This section will detail the limitations imposed on the research from the time of burial to the production of this thesis. In many ways these limitations can be seen as originating from the sample used, its size, and whether or not it represents the original population. Chapter Five included brief assessments of whether or not the samples for each mortuary phase, as well as the Neolithic and Bronze Ages, were representative of the populations from which they came. Only the Neolithic 2 sample had the expected demography for such a sample, with Bronze Age 4 a close approximation. This does not make this research irrelevant, however it is important to note that the samples are not representative, possibly altering the results. Small sample sizes are a common issue when investigating human remains and in comparison to many sites Ban Non Wat has a large sample size. In fact, it is this large sample that has allowed changes through time to be charted over such small periods.

Reasons for the samples not being representative include possible errors in the methods used to assign the burials to mortuary phases, or those that determined sex and age. Further limitations will be discussed, and are summarised in Figure 6.5, which shows how the sample size decreased at each step from the original interment to recovery and analysis.
Figure 6.5: Limitations imposed on the current investigation (adapted from Waldron, 1994).
6.2.1. Limitations Imposed During Prehistory

The first way this study has been limited is by the fact that there may have been individuals that were not being buried during the Neolithic and Bronze Ages at Ban Non Wat. It is possible that a number of the dead were being disposed of in some other way that never resulted in burial of the remains, or that groups were interred in some other area outside of the mound on which the site sits. It seems possible that some individuals, most likely social outcasts, were being interred in more liminal environments off the mound itself.

Of those burials that were interred on the mound at Ban Non Wat there may have been some burials that were completely destroyed by taphonomic factors. These could have included human interactions and natural taphonomic factors, such as destruction by animals or the soil. Animals could destroy the remains through scavenging, while the soil’s acidity may have dissolved the skeletal elements, most likely occurring in infants. The complete destruction of burials by taphonomic processes would be less likely the more elaborate the burial, however, it has been shown that some individuals were interred with very little or nothing.

6.2.2. Limitations Imposed During Excavation

A universal restriction related to archaeological material concerns constraints over the excavation, more specifically, the fact that only part of the site was excavated. This is good practice in research archeology and it would not have been feasible to excavate the entire site in any case due to its size and the resident population. However, because only a small percentage of the site was excavated the data produced can only be an indication of what was happening in that part of the site. All burials analysed in this excavation came from excavation square 'A'. It is possible that individuals in other parts of the site were being interred differently.
The next limitation imposed by the excavation concerns the fact that some burials were not completely excavated. This was occasionally carried out when burials were at the edges of the excavation. These sometimes left only grave goods in the ground, particularly beyond the skeleton, and intermittently left parts of the skeletons. In respect to this thesis, the problem this posed was most commonly in regard to the mortuary scores of individuals who were located on the edge of the excavation square as the scores were often incomplete and, therefore, redundant.

There were limitations imposed by the excavations themselves and the ways that data was recorded. These limitations largely originated from the fact that excavations were not carried out with *anthropologie de terrain* in mind. Therefore, fewer height measurements were taken than is ideal and photographs do not always clearly show the areas of interest. Additional limitations involved the nature of the data being used. Photographs and field drawings are secondary data and therefore influenced by the values and perspectives of the individuals who collected them. These values and perspectives may not always be conducive to an *anthropologie de terrain* analysis. For instance, the pubic symphysis is very important when assessing the manner in which an individual was interred, however, the photographs may not clearly show the pubic symphysis as the photographer instead focused on an abnormality in the skeleton such as a broken limb.

There is the additional problem in excavations which take a number of seasons as it is likely for there to be a number of individuals in charge of photography and field drawings during that time, further clouding issues surrounding values and perspectives. Despite these concerns the majority of the burials excavated at Ban Non Wat have multiple photographs taken from a variety of angles focusing on different aspects. In addition, the individuals in charge of the photography and drawing were mostly constant throughout excavations.
One further limitation was originally imposed by the environment and exacerbated by the way data was collected. The homogeneity of the soil at Ban Non Wat made it difficult to reliably identify the edges of graves during excavations, resulting in excavators often estimating the dimensions of the grave cut. The effects of this limitation were compounded as no mention was made in field notes about whether the grave cuts shown in photographs and field drawings were reliable or estimates. The result of this oversight has been the decision to treat all grave cuts shown as unreliable and accordingly of no use during analysis. This has reduced the number of individuals that were able to have burial context, in particular, successfully assigned. More specifically it has limited the identification of the use of tight or narrow containers, as of grave goods were not present in the grave to prove the constriction originated from a container, they were placed in the unknown category. This has likely biased the results and may be the reason for the low numbers of individuals identified as buried in narrow containers.

6.2.3. Limitations Imposed During Analysis

A number of limitations were imposed by the methodology used and the way that burials were analysed. The methods used required the majority of the burial to have been preserved. This has been separated from the limitation concerning the complete destruction of the remains mentioned earlier as in this case elements of the burial were present, and so the limitation largely resides in the methods. The excavation area at Ban Non Wat was used intensely for a significant period of time meaning that disturbance of graves by later inhabitants was common, resulting in a large number of graves containing remains too poorly preserved to confidently make inferences about. Along with gravity and the decomposition of the cadaver, human disturbances were one of the main taphonomic factors identified in Table 4.3 to affect the burials at Ban Non Wat.
Linked to these issues of poor preservation and burial context was the inability to assign some burials to a single burial context. This occurred in a number of cases, most commonly between 'soft loose and soft tight containers', or 'soft loose, soft tight, and hard tight containers'. When this happened such burials were treated as having unknown burial contexts, which limited sample numbers and may have caused bias. This arose due to poor preservation and because the edge of the grave cuts could often not be identified. As this study required a large number of burials to be examined it was not possible to conduct the in-depth analysis that would be carried out on a single burial. Instead, methods had to be constructed that could be carried out on a large number in a relatively short time. This meant that some burials that could have been assigned burial context if examination was conducted on a one-by-one basis were not.

A possible limitation, the impacts of which are unable to be assessed, is the effects rates of decay may have played in the assignation of burial context. The rate of decomposition of the human bodies was assumed to be relatively quick due to the high temperatures; however, the methods used do not take into account the effects of burials that decomposed at slower rates. In particular, the formation of adipocere may have drastically slowed the decomposition of soft tissues, and as has been shown in Chapter Three, the buried environment at Ban Non Wat may have promoted its formation. If adipocere was to form, the body may have taken longer to decompose than any container in which it was placed, meaning that burial context may have been erroneously assigned. Even without the formation of adipocere there is the possibility that containers partially decomposed before the soft tissues of the corpses allowing soil to infiltrate the spaces, resulting in erroneous results.

A significant limitation concerning the construction of mortuary wealth scores was the fact that organic grave goods decompose quickly in the grave and, therefore, were not included in the computation of mortuary scores. This may
have resulted in some individuals appearing wealthier than they should and others poorer. Additionally, there is the fact that mortuary goods cannot be considered only in light of their economic value, they also likely had symbolic or sentimental value.

The last limitation examined here concerns the placing of individuals in each mortuary phase for analysis. This made the sample sizes smaller than if the phases were grouped, for instance, into Neolithic, Early Bronze Age, and Late Bronze Age. This would, however, have drastically limited the ability of this research to assess changes through time and thus would be inappropriate in light of Hypothesis One for which changes over time are the primary concern. Mortuary phases were amalgamated for the investigation into burial practices and social identity. This was done in order to allow a direct comparison between the Neolithic and Bronze Ages and to identify possible trends supporting either hierarchy or heterarchy.

6.3.0. Hypotheses

The hypotheses originally proposed in Chapter One will now be revisited in light of the accumulated data.

6.3.1. Hypothesis One: Mortuary practices will change over time

In an effort to assess whether burial practices changed over time individuals from each mortuary phase prior to the Iron Age were examined. The ways individuals were treated in relation to burial type, position, and context were investigated.

Burial type proved to be constant throughout the phases, with the exception of three individuals from Bronze Age 2. Although these burials were labeled as
occurring 'most likely in multiple episodes' the reasons why they were treated differently are not known. Associated with burial type is the manipulation of individuals. Individuals were manipulated from Bronze Age 2 onwards, in most cases this was interpreted as being for the removal of grave goods. Perhaps the most striking of which was burial 631 who had his foot cut apart and right upper limb disarticulated for the retrieval of grave goods. However, there was also evidence that burials were being manipulated out of respect, such as the bundling of burial 265’s skeleton during Bronze Age 5 after it had been heavily disturbed.

The flexed phase had the highest number of individuals in differing positions. If the flexed burials were interpreted as a hunter-gatherer group it would seem that their burial customs in respect to burial position were phased out before bronze was introduced to Thailand. If, instead, the flexed interments were a subsection of the Neolithic group it is unclear why they were treated differently. After the flexed phase burial position became largely uniform, with the exception of five unusually positioned burials, two of which were seated in mortuary jars, two placed lying on their sides, and one in a prone position. It has been previously proposed that the adult jar burials may be migrants (Cox, 2009). The remaining individuals placed in positions other than supine may have been left like this by accident, with the containers in which they were interred obscuring the view of those burying the dead. No clear reasons were found for the individuals to be interred in these unusual positions.

Burial context appears to have become more variable over time, particularly from Bronze Age 3B onwards. The earliest phases of the Bronze Age included individuals interred in both wrappings and coffins, complementing the findings of Willis and Tayles (2009) who found that individuals from contemporary phases at Ban Lum Khao were also interred in coffins or wrapped. The findings of Willis and Tayles differ in the Late Bronze Age, however, where they identified only wrapped burials this thesis found the highest diversity of burial
contexts. It must be noted that Willis and Tayles had a much smaller sample size, with less than 14 burials from the time period included. They tentatively suggested that burial context was related to sex, which the current research does not support. They also examined burial context at the Iron Age site of Noen U-Loke where burial context was observed as less variable in comparison to Ban Lum Khao, with all individuals from Noen U-Loke wrapped in non-durable material. When their findings are taken into account with the results of this thesis, it seems that burial context became more variable during the Bronze Age, peaking in the Late Bronze Age after which burial contexts became more uniform.

The hypothesis that mortuary practices changed over the time period examined seems to be supported. The only burials to occur in multiple episodes were in Bronze Age 2 and there is evidence of manipulation out of respect for the deceased in Bronze Age 4. Although more flexed individuals were interred in multiple positions than any other mortuary phase, the use of different positions in low numbers throughout the Neolithic and Bronze Ages did take place. When this is considered with the increased variability of burial contexts towards the end of the Bronze Age, the hypothesis can be accepted.

6.3.2. Hypothesis Two: Mortuary practices will be linked to social identity

There was no evidence that mortuary practices were linked to social identity during either the Neolithic or Bronze Age. Attempts to investigate links between burial type or burial position and social identity were limited by the small numbers of individuals. All burials except three at Ban Non Wat were primary interments making the identification of links redundant. A similar situation was encountered in regard to burial position. The flexed individuals were investigated in relation to social identity and there was no indication that they were being placed in the flexed position because of sex, age, mortuary wealth, or location. The reasons for their positions remain an enigma. Apart
from the flexed burials only three individuals from Ban Non Wat were placed in positions other than supine. One individual was placed in a prone position, one on their left side, and one on their right. The small numbers meant that the reasons for their positions remain unknown, however the possibility of the woman placed in the prone position being a social outcast was raised.

The variation previously noted in burial context presented the best opportunity to identify links between mortuary practices and social identity. No links were identified for the Neolithic or Bronze Age burials with sex, age, mortuary wealth, or location. This differs from the findings of Willis (2005) who proposed, on the basis of her research, that individuals in wide coffins were wealthy. In light of the research presented in this thesis, which used a larger sample than Willis, it seems her assertion does not hold true.

If the aspects of social identity examined in this thesis were not determining burial context at Ban Non Wat, the question must be asked of what was? There could be a variety of reasons from personal choice to a lack of resources. Possibly the most compelling was suggested by Cawte (2007) who believed that the time of year that an individual died might have had an effect on the interment. The theory being that in the dry season people had more time available to spend on the funerary process than in the wet season when their efforts were required in the rice fields. This can be applied to the containers individuals were interred in. In the dry season when time was available individuals may have been interred in more elaborate containers that took more time to make, such as wooden coffins. In contrast, in the wet season when time was more precious individuals may have been merely wrapped or placed in the ground with no container.

The hypothesis that mortuary practices were linked to the aspects of social identity examined in this thesis cannot be proven. No links were found between burial type or burial position with social identity due to the small numbers of
individuals treated differently than the norm. The lack of correlations between burial context and social identity suggests that burial context in regard to social complexity is redundant and, therefore, not a reliable indicator for either hierarchy or heterarchy.

6.4.0. Future Research

A detailed investigation of the mortuary practices carried out at Ban Non Wat in its entirety could be very interesting, particularly concerning how practices changed when iron was introduced, and how subadults were treated. Further research looking at how individuals were treated across the rest of the site could be carried out. This would include burials from squares 'X' and 'Y' as well as from more recent excavations. Excavations have been carried out since 2007 under the Environment Change and Society Before Angkor: Ban Non Wat and the Upper Mun River Catchment in Prehistory research project in other parts of the site. For an analysis of mortuary practices at Ban Non Wat to be encompassing these need to be included. Such a synthesis of information would provide an unparalleled account of how people were treated in death in prehistoric Thailand.

There is the possibility that the method used to infer wealth does not give an accurate representation. This is particularly relevant concerning the decomposition of organic grave goods, and the fact that some of the burials seem to have had goods removed. This is a hurdle that will be difficult to overcome, and the only way to circumvent the issue is by identifying 'high status items' that can be considered indicative of social standing. Such an approach is fraught with difficulties and it is rare for such to be applied with conviction.
In addition to the ways future research in this area can be applied to Ban Non Wat, it can also be used in other locations both within Southeast Asia and further afield. The *anthropologie de terrain* based method that has been synthesised here can be applied to cemetery sites all over the world. The method was constructed in order to allow the analysis of a large number of burials after excavations have been completed based on photographs and field drawings. Therefore, it could potentially be used on burials from any sufficiently recorded and preserved site. The ability to carry out this type of research using the records kept during an archaeological excavation make it a valuable and accommodating tool for the accrual of knowledge on past societies.

6.5.0. Conclusion

The primary aim of this thesis was to examine mortuary practices at the site of Ban Non Wat from the initial stages of occupation through to the end of the Bronze Age. This was accomplished by adapting the *anthropologie de terrain* methodology for use on a large sample using secondary materials in the form of photographs and field drawings. The detailed methods described in Chapter Four can be applied to any sufficiently recorded site anywhere in the world to investigate how people in the past treated their dead. By applying these methods to burials from Ban Non Wat, trends in the use of mortuary practices over time were identified. The results showed that the ways individuals were treated in death evolved, seeming to become more variable towards the end of the Bronze Age. There were no links identified between mortuary practices and the aspects of social identity examined, suggesting that the use of such practices was not dictated by sex, age, wealth, or burial location; and that the burial practices investigated should not be used to infer social organisation at Ban Non Wat.
This appendix provides justification for my assessment that a number of burials Willis (2005) deemed to have been buried in tight durable wrappings where in fact interred in other burial contexts. Each of the three burials not examined in Chapter Six will be looked at, with justifications and evidence for my findings provided.

7.1.0. Burial 14

I believe that burial 14 was interred in either a tight durable wrapping as Willis (2005) contests, a tight non-durable wrapping, or a narrow coffin (Fig. 7.1). I believe the contexts cannot be differentiated in this instance as the patellae are not in unstable positions. The burial is shown to be tight by the constriction in the shoulders. If the patellae had fallen between the lower limbs it would be possible to say the individual was interred in a tight durable wrapping or narrow coffin. Similarly, if the patellae were in unstable positions on the medial aspects of the knees but articulated it would be possible to say a tight non-durable wrapping was used.
Figure 7.1: Photograph of burial 14 showing constriction in the shoulders and lack of external space between the lower limbs.

7.2.0. Burial 64

Burial 64 was not assigned a burial context due to conflict concerning the types of space present in the grave (Fig. 7.2). The pelvis was articulated despite potential external space between the upper limbs and the pelvis, while the presence of external space is shown by the position of the patella between the knees.
7.3.0. Burial 159

I contend that burial 159 was interred in a loose non-durable wrapping (Fig. 7.3). This finding was made based on the position of the right hand, which shows no evidence of any constriction, placed in a splayed position away from the body. This suggests that the apparent constriction seen in the lower limbs (particularly around the knees) was caused by the original position in which the individual was interred, kept in place by the surrounding soil rather than any container.
Figure 7.3: Photograph of burial 159 showing the position of the right hand away from the body and the apparent constriction in the lower limbs.
8.0.0. References


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