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# Understanding the Bones: The Human Skeletal Remains from Tombs I, II and III at Vergina

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UNIVERSITY OF CALGARY

Understanding the Bones:

The Human Skeletal Remains from Tombs I, II and III at Vergina

by

Jolene McLeod

A THESIS

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## **Abstract**

This thesis presents an examination of the publications about the human remains from Tombs I, II, and III at Vergina. An overview of the controversy surrounding this topic presents a starting point, and explains why the bones have become so contentious. Since most arguments about identity propose either Philip II or his son Arrhidaios, I have examined the historical context of both their murders and burials, and those of their wives Kleopatra and Adea-Eurydike. I assess whether it is possible to identify the occupants of these tombs from osteological evidence alone, as most current scholarship asserts. Special emphasis has been given to the skeletal remains from Tomb II, to determine if either Philip II or Arrhidaios can be confirmed as the occupant of the main chamber. Anatomical analysis of Philip II's known battle injuries finds that proof of identity cannot be reached through examination of the cremains alone.

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## List of Abbreviations

### Ancient Authors

Arr.	Arrian
Athen.	Athenaeus
Curt.	Curtius (Quintus Curtius Rufus)
Diod.	Diodorus of Sicily
Plut. <sup>1</sup> <i>Alex.</i>	Plutarch, <i>Alexander</i>
Plut. <i>Eum.</i>	Plutarch, <i>Eumenes</i>
Plut. <i>Mor.</i>	Plutarch, <i>Moralia</i>

### Modern Works

<i>ABSA</i>	<i>The Annual of the British School at Athens.</i>
<i>Anc Soc</i>	<i>Ancient Society</i>
<i>CJ</i>	<i>Classical Journal</i>
<i>CQ</i>	<i>Classical Quarterly</i>
<i>FGrH</i>	F. Jacoby, <i>Die Fragmente der griechischen Historiker</i> . Berlin and Leiden, 1923.
<i>GRBS</i>	<i>Greek, Roman, and Byzantine Studies</i>
<i>RFIC</i>	<i>Rivista di Filologia e Istruzione Classica</i>
<i>RhM</i>	<i>Rheinisches Museum für Philologie</i>
<i>RSA</i>	<i>Rivista Storia Antica</i>

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<sup>1</sup> Numbering for Plutarch throughout follows the Loeb system.

## Chapter One: Introduction

The Macedonian tombs at Vergina have been the subject of a decades-old discussion. The site is extensive with several impressive finds from the Pre-Hellenistic era of Greece,<sup>1</sup> and since 1977 Vergina has been officially associated with the Macedonian royal family, including Alexander the Great. Naturally, this has generated an enormous amount of public and scholarly interest along with dozens of books and articles about the finds, as well as museums,<sup>2</sup> exhibits, and a substantial amount of press. The primary significance of Vergina centres around a group of tombs found under a large burial mound called the Great Tumulus.<sup>3</sup> These tombs were discovered by a team of Greek archaeologists led by Manolis Andronikos in 1977, and excavation revealed that two monumental Macedonian tombs within were unlooted. One of these, designated Tomb II, has become the focus of not only interest but a heated controversy which continues to the present day. Interest in this tomb is so high that in the words of scholar Elizabeth Carney, “Many of us have become somewhat obsessive on the vexed question of the identity of the male buried in the main chamber of Tomb II”.<sup>4</sup>

The reason such substantial interest has been focused on the Great Tumulus tombs in particular is the claims for identity made about the human remains found there. Manolis Andronikos, the original excavator of Tomb II, declared his opinion that the skeletal remains found in a chamber of this tomb were those of Philip II (*regn.* 360/59-336)<sup>5</sup>, a famous

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<sup>1</sup> Figure 3.

<sup>2</sup> Figure 1.

<sup>3</sup> Figure 2.

<sup>4</sup> Carney 1992, 1.

<sup>5</sup> All dates from antiquity should be noted as BCE unless otherwise stated.

Macedonian king and father of Alexander the Great (356-323). One of Philip II's known wives, thought to be either Meda or Kleopatra, is therefore assumed to be interred in the adjoining chamber of Tomb II, which contained the bones of a second individual. This claim has proven to be intensely controversial among scholars and non-scholars alike, since the evidence supporting this assertion is not conclusive despite the supposedly objective scientific methods used to analyze the remains. Additional candidates have been proposed, with the foremost individual being Arrhidaios, a son of Philip II and later known as Philip III, along with Arrhidaios' only known wife, Adea-Eurydike. However, it has also been argued by some that the human remains found in Tomb I were those of Philip II or Arrhidaios and their respective wives. The nearby Tomb III contained the remains of a single individual, and has been claimed as the grave of Alexander IV, the teenage son of Alexander the Great and Rhoisane. Arguments for these individuals have been supported in several ways, including the date of the tombs, the grave goods, the artistic interpretation of painted walls and other details, including the identification of Vergina as the ancient Macedonian capital of Aigai, which involves topographical arguments. The osteological evidence from Tombs I, II and III has become a special point of contention, particularly because the published findings are difficult for non-experts to assess. This complicated assemblage of arguments is necessary because no inscription or other indication of names for those interred has been found anywhere on the tombs that have been unearthed in the Great Tumulus group, or for any other Macedonian tomb at Vergina. Lack of clear identification continues to be the central focus of the disputes surrounding these tombs, leading many scholars to emphasize the importance of the skeletal remains.

In 2008, Miltiades Hatzopoulos published a comprehensive evaluation of the “unending controversy about the identity of the occupants of Tomb II”<sup>6</sup> in which he detailed the various aspects of the site, the arguments, and some of the reasons behind the debate. Hatzopoulos’ excellent reconstruction of the three decades of arguments, rebuttals, and reinterpretations summarizes the controversy while, interestingly, raising one further problem. In a brief section dealing with the human remains from Tomb II, Hatzopoulos takes Antonis Bartsiokas, a paleoanthropologist who examined the bones, to task for suggesting some of the military paraphernalia from Tomb II might have belonged to Alexander the Great.

“Such an assertion goes well beyond the scope of a paper on the skeletal evidence from the tomb and also beyond the competence of a forensic anthropologist, which is the field of expertise of the author; moreover...<sup>7</sup> [A]n historian, such as the writer of the present paper, cannot choose between conflicting verdicts by forensic anthropologists concerning the evidence of an arrow wound in the dead man’s right orbit.”<sup>8</sup>

This stance, that an expert in one field cannot, and perhaps should not, express an opinion on a matter from another discipline begs the question of how any non-anthropologist or anatomist scholar can use the published osteological reports as part of a historical argument. Indeed, Hatzopoulos himself demonstrates how difficult this is by discussing Bartsiokas’ interpretation of how the bones were cremated and concluding that Bartsiokas’ findings were based on “incomplete and partial documentation.”<sup>9</sup> If, as Hatzopoulos asserts, specialists should remain in their own fields and keep opinions about other evidence to themselves, how can any scholar expect to be informed on the meaning of the osteological evidence from the Vergina tombs? Despite this perspective, many historians have in fact used the osteological

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<sup>6</sup> Hatzopoulos 2008, 109-10.

<sup>7</sup> Ibid. 109.

<sup>8</sup> Ibid. 110.

<sup>9</sup> Ibid. 111.

analyses to support or challenge Andronikos' assertion that the Vergina bones belong to specific members of the Macedonian royal family, especially Philip II. There are, in fact, numerous problems of interpretation.

The osteological evidence as reported is often unclear, inconsistent, and highly technical. Presented without explanatory guidance for non-specialists, it leads to misunderstandings about the nature of the evidence and what it can reveal. Further complicating the issue are the skeletal analyses themselves, some of which have been dismissed as methodologically flawed or conducted by investigators with insufficient expertise or preparation. Published reports made by experts who have examined the remains, especially those of the male from Tomb II, are strikingly contradictory. With such polemicized opinions about the human skeletal remains from these tombs driving the discussion, an objective assessment of what the bones actually reveal is difficult to extract. The nature of the published reports is such that clear sides have materialized, with historians and archaeologists choosing one or the other based on their understanding of the analyses, but without any way to confirm the validity of the osteological remarks.

In fact, the analyses of the human skeletal remains from Tombs I, II, and III have been performed by a limited number of people, and no international team of experts has ever been assembled to produce a definitive and nonpartisan report. Nikolaos Xiotiris was the first physical anthropologist to examine the remains, along with Franziska Langenscheidt and a team of additional specialists.<sup>10</sup> This initial and detailed osteological study, published

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<sup>10</sup> Xiotiris and Langenscheidt 1981. They list D. Mathios for casting moulds of the bones, L. Kelekis for making x-ray radiographs, S. Tsawdaroglou for photography of the remains, and Professor Heuck for microradiographic examination. This technique can be used in two ways: in analytical chemistry, this is the study of surfaces of solids by monochromatic-radiation (such as x-ray) contrast effects shown via projection or enlargement of a contact radiograph. Microradiography can also be used to radiograph small objects that have details too fine to be seen by the unaided eye, with optical enlargement of the resulting negative. In



in 1981, was followed up in 1984 by the work of Jonathan Musgrave, an anatomist at Bristol University, in conjunction with classicist John Prag and medical artist Richard Neave.<sup>11</sup> This group produced further studies,<sup>12</sup> and their conclusions, which contradicted Xirotiris' work in significant ways, dominated the scholarly discussion for decades. Their view was upset in 2000, when a new analysis opposing Musgrave's claims was published in the journal *Science* by Antonis Bartsiokas, a paleoanthropologist at the University of Thrace.<sup>13</sup> No further hands-on examination was undertaken until recently. A new analysis has been underway for several years under the direction of Chryssoula Saatsoglou-Paliadeli, the director of the Aristotelian University of Thessaloniki's excavation at Vergina. This team is conducting a full study of the contentious male bones from Tomb II is being completed by this team, with detailed measurements and photographs, as well as a complete history of all interactions with the skeletal remains since the time of discovery in 1977.<sup>14</sup> The bones themselves are being analyzed and measured by Laura Wynn-Antikas, who is also compiling the history of the site and taking the measurements and photos. Once this most recent analysis is concluded, the intention is that the remains will be stored and not accessed for examination again.<sup>15</sup>

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addition to this work, Xirotiris, Langenscheidt, and M. Schultz also produced an unpublished histological study of the cremated remains from Tomb II, which remains unavailable.

<sup>11</sup> Musgrave, Prag, and Neave 1984b.

<sup>12</sup> Musgrave, Jonathan H; Neave, R. A. H. 1984; Musgrave 1985; 1991; Prag 1990a; 1990b; Musgrave and Rice 1994.

<sup>13</sup> Bartsiokas 2000.

<sup>14</sup> Further details about the team and its findings were announced at the annual meeting of The Archaeological Work in Macedonia and Thrace, held every March at the Aristotle University of Thessaloniki since 1987. This year's conference was held on Thursday, March 13, 2014. The findings were presented in a paper by T. G. Antikas, L.K. Antikas, I. Maniatis, A. Kyriakou and A. Tourtas, entitled "New Finds on the Skeletons in Tomb II at the Great Tumulus of Aegae: Morphological and Pathological Changes." Although a full report is not yet available, the preliminary results are discussed in Chapter Three.

<sup>15</sup> Information about the recent analysis was obtained in private conversation with Laura Wynn-Antikas over two meetings in Seattle in September 2013.

Xirotiris and Langenschiedt concluded that, although it was not possible to definitively attribute the remains in Tomb II to Philip II or his last wife, Kleopatra, there was no evidence against the theory either, and the ages at death and sex of the examined individuals supported it. This mild and reasoned view was exploded by Musgrave's assertion that evidence in support of Philip II and Kleopatra could not only be found on the remains, but was extensive and completely obvious. Musgrave cited a number of apparent antemortem injuries on the male bones from Tomb II which he believed strongly supported Philip II. Musgrave and his team even produced a wax portrait of the male from Tomb II based on a forensic reconstruction made by Prag and Neave, which, although first accepted widely, was later plagued by severe criticism largely due to their choice to include a livid scar slashing across the face, a detail not possible to acquire from the skeletal remains. The views of Musgrave, Prag, and Neave were upheld by many historians and there seemed to be a general consensus that the matter was settled, until Bartsiokas' new examination in 2000 which contradicted almost all of their findings.

Opinion shifted again, this time in support of Bartsiokas, who asserted that not only could no evidence of injury be found on the bones of the male from Tomb II, but that Musgrave had mistaken a particular feature of normal anatomy for an injury site, an accusation which seemed to call into question Musgrave's competence. A rather inflammatory response was penned ten years later by Musgrave, Prag, Neave, who were joined by Hugh White, a pathologist, and Robin Lane Fox, a well-known ancient historian and ardent advocate of the Philip II hypothesis. Their detailed response included such remarks as,

“**Bartsiokas** made it all sound so simple,” and “In **Bartsiokas**’ opinion, ‘it is not as yet clear what happens to the flat bones.’...As far as the cranium is concerned, **we** know.”<sup>16</sup>

This use of bolding in their article to distinguish between the two sides is unusual to say the least, and perhaps unhelpful in the context of promoting further discourse. The lack of objectivity and hints of ill temper which can be detected here are unfortunately not limited to this one example. Much of the scholarship which discusses the Vergina tombs and the bones in particular has taken on a rather aggressive tone, creating antagonism between scholars and miring the topic even further in dispute. This increasing sense of friction can partly be explained by professional pique, but has roots in a more complicated explanation, which has influenced the Vergina tomb finds since at least the 1970s, and continues to do so.

### *Politics and the Vergina Tombs*

Explaining the highly polemicized opinions surrounding this topic is a complicated task. The influences of Greek nationalistic sentiment, professional ownership of archaeological finds in Greece, and the ethics of examining ancient human remains must all be taken into account when seeking to clarify the various controversies. Hatzopoulos cites the explanation for certain scholars rejecting Andronikos’ claim that Tomb II belonged to Philip II,

“...can only be understood within the context of the then raging quarrels between factions of university professors and of the long-standing antagonism between Andronikos and Petsas, dating from their student years and subsequently rekindled by their rival excavations of the Vergina “Necropolis of the Mounds.”<sup>17</sup>

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<sup>16</sup> Musgrave, Prag, Neave, Lane Fox, and White 2010, 5; 8.

<sup>17</sup> Hatzopoulos 2007, 94

This bit of unsourced trivia injects a sense of battle and vindictiveness to the subject, which Hatzopoulos extends to other aspects of the debate, noting that political motives for the identification of the male in Tomb II with Philip II were raised as early as 1978 when a scholar at the University of Paris offered Philip III Arrhidaios as an alternative candidate, and attempted to tie Andrónikos' Philip II hypothesis to the New Democracy Party elections in 1977, although Andrónikos' announcement, as Hatzopoulos notes, took place before the elections occurred.<sup>18</sup> This demonstrates that the often intense political and personal beliefs about the meaning and importance of the site which color so many of the opinions of the professionals involved can partly be traced back to the larger political situation of Greece.

Jonathan Hall presents a concise summary of the problem in a 2014 chapter dealing with the Vergina tombs,<sup>19</sup> narrating the nationalistic difficulties which have influenced the Greek citizens working on the site. In brief, this aspect of the debate must begin with the amalgamation of the area Vergina is located into Greece in 1913, after the end of the Balkan War during the downfall of the Ottoman Empire.<sup>20</sup> A flood of refugees to the Macedonia region from the Greece-Turkey conflict in 1923 resulted in the creation of the modern village of Vergina, which had formerly been two different settlements, Koutles and Barbes.<sup>21</sup> This produced a population that was not historically Macedonian, and the area became subject to claims from a Slavic-speaking population from north of Greece, in what was then called Yugoslavia and Bulgaria, who identified as themselves as descended from the ancient Macedonians and from Alexander the Great.<sup>22</sup> Such an identification was not acceptable to

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<sup>18</sup> Hatzopoulos 2007, 94.

<sup>19</sup> Hall 2014, 103-104.

<sup>20</sup> Clogg 2002, 79-81.

<sup>21</sup> Andrónikos 1984, 17; Galanakis 2011, 50.

<sup>22</sup> Danforth 1995, 56-69; 2010 574-76.

Greece, which had encompassed family of Alexander the Great, especially Philip II, in its national cultural identity since 1860.<sup>23</sup>

When Yugoslavia dissolved in 1991, a new state which declared itself the Republic of Macedonia emerged, taking as its flag the so-called “Macedonian sunburst” or star found in the Vergina tombs. The new state was recognized and admitted to the United Nations, but only under the title Former Yugoslav Republic of Macedonia (FYROM) as a result of pressure from Greece, which also forced the removal of the starburst from the flag. This, they claimed, was a symbol unique to Greek history and its use was part of a larger scheme representing the “theft” of national identity.<sup>24</sup> Sentiments such as these can be found in publications and many online forums which are full of invective and accusations of cultural theft, often by both sides of the issue. As Peter Green notes in his own detailed study of “The Macedonian Connection”,<sup>25</sup> Andronikos himself was one of the refugees who was displaced in the 1922 resettlement program, and was therefore considered to have been influenced by Greek nationalistic sentiment to the detriment of his field work.

The connection between such complex political maneuverings and the ancient skeletal remains found in three dusty tombs might be explained by the need to link Philip II and the royal family, paragons of impressive dynastic history, to one’s chosen country, whether Greece or the newly minted FYROM. Philip II was a dynamic figure associated with high cultural achievements and battlefield innovations, the military and political precursor of his son Alexander the Great. This figure was infinitely more impressive than his other son, Arrhidaios, who was said to suffer from an incurable mental affliction and did nothing

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<sup>23</sup> Koliopoulos and Veremis 2002, 233-35, 245-46; Hamilakis 2007, 115-17.

<sup>24</sup> Hamilakis 2007, 130.

<sup>25</sup> Green 1989, 153-54.

notable in his life aside from being murdered. The link to Alexander, whose image and identity had long been a part of Greek propaganda, is an important factor in the cultural and political ideologies of both these states as well as the various scholars who work with the site. Additionally, the possession of the remains, advertised worldwide as those of the Macedonian royal family, has created a sort of ‘Vergina industry’ in Greece, with millions of euros generated annually from the Vergina museum, souvenirs, and sale of tightly restricted photographs. Placing Arrhidaios at the center of such an industry would certainly not produce the same level of interest, scholarship, or revenue for Greece. Identification of the skeletal remains as belonging to specific individuals, especially confirmation of Philip II, would cement the connection between Greece and a historical dynasty, while fueling the claims of the FYROM for their own Argead connection. Considering the serious nature of this issue, it is understandable that the bones have assumed such importance; why then are they also the subject of such intense disagreement? It seems reasonable to surmise that either evidence of Philip II’s identity can be observed on the bones or not, and that all experts should be able to agree on the nature of the osteological findings. However, that is distinctly not the case. The nature of Philip II’s known injuries, the effects of cremation on human bones, the methods used for determining sex and age for the individuals from Tombs I, II, and III, and the condition of the bones themselves are each essential to navigating this material, and are all subject to a certain degree of subjectivity.<sup>26</sup>

This analysis presents both the historical accounts surrounding the deaths of Philip II and Philip III and their respective last or only wives, as well as a detailed study of how the various experts who have examined the bones reached their conclusions, along with an

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<sup>26</sup> See Appendix I: Methods of Determining Sex and Age in Human Osteology, for a discussion of the specific methodological techniques used to assess these factors in human skeletal remains.

narrative explaining some of the osteology for a non-specialist audience. I have attempted to refrain from applying assumptions of importance to the individuals from Tomb II, whose remains were found in what are usually referred to as the ‘main’ and ‘antechamber.’ Instead, I prefer to use the more impartial designations of Chamber I (the antechamber) and Chamber II (the main chamber). Without knowing the identities of those interred within, deciding which chamber was meant to be the ‘main’ in a double burial is impractical. Finally, this examination discusses whether the current published osteological analyses of the human remains from the Macedonian tombs at Vergina can be considered valid in the context of the available evidence.

## Chapter Two: The Assassinations and Burials of Philip II and Philip III

### *A Wedding and a Funeral: Philip II*

Philip II of Macedon reigned from 360/59<sup>27</sup> until his assassination in 336. While the events of his death are known, the reasons behind his murder are still not clear. In the autumn of 336, Philip II was attending the wedding of Kleopatra (c.354 – 308), his daughter by his fifth wife Olympias (c.375-316), to Kleopatra's maternal uncle, Alexander I of Epirus (c.370 – 331).<sup>28</sup> Alexander I had spent several years in Philip II's court as a youth, gaining considerable favor, and after Philip II dethroned Alexander I's uncle Arybbas in 342/1,<sup>29</sup> Alexander I was made king of Epirus.

A year before the wedding, Philip had married a Macedonian noble woman called Kleopatra, a niece of Philip's general Attalos. She was possibly known after the marriage as Eurydike (or Kleopatra-Eurydike).<sup>30</sup> This was to be the seventh and last marriage of Philip II, and it seems to have upset Olympias deeply.<sup>31</sup> During his wedding feast, Philip and his son Alexander III (the Great) quarreled. This resulted from a perceived insult or slur by

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<sup>27</sup> The beginning date of Philip's reign has now been established by Hatzopoulos' study of the Oleveni Inscriptions, see Hatzopoulos 1982.

<sup>28</sup> See Appendix II, Stemma 1, for a Macedonian royal family tree.

<sup>29</sup> Arybbas was the brother of Neoptolemus I, the king of Epirus. He was not killed after Philip placed Alexander I on the throne, but exiled, and it is not clear when he died afterward. Heckel 2009, 56. See also Errington 1975, against Reuss 1881; Heskell 1988.

<sup>30</sup> Müller 2010. For details on the possible political background of Philip's seventh marriage, see Elizabeth Carney 2000, and Heckel 1978, 1983; Errington 1990. The acceptance of the name "Eurydike" as being a dynastic marker is still a much debated topic (see Badian 1982).

<sup>31</sup> Although the sources tell us that Philip married Kleopatra out of love (Athen. 13.557d-e) "despite the age of the maiden", (Plut. *Alex.* 9.4), this explanation has been rejected by most historians in favor of more political motives. However, there is no reason the sources should be dismissed simply because some have seen this as a "midlife crisis"; see Müller 2010. Other examples of apparently "irrational" behavior such as Alexander's insecurity are frequently used by scholars to explain his actions (see Heckel, Miller, and Howe, forthcoming) and even as a motive for the murder of Philip, so "irrational" or non-political motives are used as explanations for his actions.



Attalos, Philip's new father-in-law (he had adopted Kleopatra).<sup>32</sup> As recounted in the sources (Plut. *Alex.* 9.6-11; Athen. 13.557d; Justin 9.7.3-4.), Attalos commented (or perhaps prayed) that he hoped legitimate kings would be born to the Macedonian royal house, which Alexander took to be a personal slight against his own legitimacy. He hurled a goblet at Attalos, who responded in kind. In the quarrel that ensued, Philip drew his sword and rushed at his son, but he stumbled and fell, likely from a combination of drink, an old leg injury, and his own anger. Plutarch (*Alex.* 9.5) tells us that Alexander then mocked his father by saying Philip was preparing to invade Asia but could not even cross from one banquet couch to another. Since his mother Olympias was evidently already incensed by Philip's marriage to Kleopatra (Plut. *Alex.* 9.10-11, Justin 9.7.4-7), Alexander took her back to Epirus when he left the court, then continued on to Illyria.<sup>33</sup> The dispute was temporary, and seems to have been a result of volatile emotions rather than any true political motivation, but marked a negative change in the relationship between father and son. Philip recalled Alexander (and possibly Olympias)<sup>34</sup> after Demaratos of Korinth acted as mediator, but further tensions between Philip and Alexander and Olympias' circle arose during the so-called Pixodaros Affair.<sup>35</sup>

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<sup>32</sup> Women without fathers or husbands come under the control of the nearest male relative. Hence, since her father was dead and her brother, Hippostatos, died in 344, Attalos was the closet kinsman.

<sup>33</sup> Gilley and Worthington 2010, 190 n.14 observe that although Athenaeus 13.557d says that Philip wanted his new bride Kleopatra to take the place of Olympias, whether that meant literally or symbolically, this does not seem likely. Olympias and Philip had a tumultuous relationship which had already been under strain by the time he married young Kleopatra. In addition to this, part of Olympias' concern may have been the fear that any potential offspring of the new marriage might displace her own son as future king of Macedon. See Carney 2000 for an examination of Olympias' personality.

<sup>34</sup> Plut. *Mor.* 179b-c.

<sup>35</sup> For detailed discussion of this incident, see Hatzopoulos 1982 *contra* French and Dixon 1986 and 1987. Plut. *Alex.* 10.1 is the only source who attests to Alexander's anxiety over the proposed marriage.

This incident arose when Pixodaros, the Persian satrap of Karia, suggested to Philip II that their families intermarry. Philip replied by offering his other son, Arrhidaeus, to Pixodaros' daughter Ada. Sabine Müller notes that this was likely part of Philip's preparations to invade Asia Minor, with Karia acting as a staging ground.<sup>36</sup> However, the proposed marriage never took place, as Alexander III received word of it through either his mother or his friends (Plut. *Alex.* 10.1), and he immediately offered himself in his brother's stead. Alexander (or his advisors) seems to have regarded this as a further attack on his status as heir, since the move was seen as promoting Arrhidaios over Alexander with the help of a well-positioned marriage. When Philip discovered Alexander's interference, he immediately blocked the wedding, banished Alexander's friends, and withdrew his offer of Arrhidaios as well, informing Alexander that he intended to make a more worthy match for him.<sup>37</sup> This incident, so soon after the earlier quarrel over Philip's trust in Alexander, evidently caused lingering tensions that would eventually lead some to suspect Alexander and Olympias of instigating Philip's assassination.<sup>38</sup> In an attempt to reconcile with his wife and son, Philip proposed his and Olympias' daughter Kleopatra marry her uncle, Alexander I. It was the day after this wedding, in October of 336, that Philip would be killed.<sup>39</sup>

The wedding was held not at Pella, the capital of Macedon where both Philip and Alexander had been born, but Aigai, the old capital and site of the royal necropolis. According to Diodorus 16.91.4-6, the wedding was an extremely lavish and large celebration,

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<sup>36</sup> Müller 2010; Ruzicka 2010.

<sup>37</sup> Plut. *Alex.* 10.1-2.

<sup>38</sup> Badian 1963. Diodorus does not mention this suspicion, which can be found in Plut. *Alex.* 9-10, and Justin 9.7.1-4; Arr. 3.6.5 speaks only of distrust between father and son.

<sup>39</sup> For modern literature on the vexed problem of Philip's death and its causes (excluding publications from the 19<sup>th</sup> century) see Badian 1963 and 2007; Hamilton 1965; Kraft 1971; Ellis 1971 and 1976, 211-27; Fears 1975; Cawkwell 1978, 177-83; Develin 1981; Heckel 1981; Fredricksmeyer 1990; Worthington 2008: 172-86.

with great numbers of nobles and dignitaries attending. Games were to be held in the theatre in honour of the marriage at dawn the day after the wedding, and after a grand opening procession which included thirteen golden statues of the gods (and the last one of himself), Philip entered the theatre flanked by his son Alexander III and his new son-in-law Alexander I. Philip was unarmed and unattended by his personal bodyguards to publicly display that he was safe among the assembled crowd (Diod. 16.91.1-2). As they entered, a member of Philip's own royal bodyguard, the *somatophylakes basilikoi*, ran out and stabbed him "between the ribs" before the royal court and spectators in the theatre.<sup>40</sup> Philip apparently died almost immediately, while the murderer, one Pausanias of Orestis,<sup>41</sup> ran for horses he had prepared by the city gates. Pausanias did not get very far, as he tripped when fleeing and was killed by several fellow members of the *somatophylakes basilikoi* who killed him before he could escape. In the wake of the murder, Alexander Lyncestes, the son of Antipater, one of Philip's *hetairoi*, was the first to proclaim Alexander III as the new king.<sup>42</sup>

Ancient sources which detail Philip's funeral are extremely limited. We are told by Diodorus 17.2.1-2 that Alexander immediately turned his attention to capturing the alleged

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<sup>40</sup> Plut. *Alex.* 10.4, Diod. 16.91-95, Justin 9.6-7, Aristotle, *Politics*, 1311b<sup>2</sup>.

<sup>41</sup> The reasoning behind Pausanias' act has been widely interpreted as revenge (see esp. Fears 1975). Earlier in his service to Philip, Pausanias was once the king's lover, but was displaced by another young man, also named Pausanias. The first Pausanias, jealous, insulted the second young man by calling him effeminate or a hermaphrodite, who according to Diod. 16.93.1-6, apparently killed himself or intended to prove his masculinity by hurling himself in front of Philip during battle with the Illyrians (which battle is a matter of dispute). If Justin is correct in calling the insulted Pausanias *primis annis pubertatis*, "in the early years of puberty" at the time of his death, he would have been a boy or around thirteen or so, and would not have been in battle with the king (see Heckel, Müller, and Howe, forthcoming). It is not clear when his death took place, but it seems to have angered Attalos, who revenged Pausanias by inviting the first Pausanias to a dinner party where he got the boy helplessly drunk and subjected him to a group sexual assault. The abused Pausanias complained of the attack to Philip, who we are told took no action against Attalos since Philip had recently married his niece and adopted daughter Kleopatra and was about to send Attalos to Asia Minor with Parmenion. Philip's refusal to enact justice on behalf of his former lover is given as the motive for Pausanias' actions less than a year later.

<sup>42</sup> Arr. 1.25.2; Curt. 7.1.6-7; cf. Pseudo-Callisthenes. 1.26; Justin 11.2.2.

co-conspirators<sup>43</sup> of his father's murder, and then arranged Philip's funeral, but Justin 11.2 has Alexander tending to the funeral first, before or concurrently with the execution of the conspirators, and he does not specify if any of this was at Aigai.<sup>44</sup> Justin 11.2 does not make a clear division between the funeral and the executions, stating that Alexander tended to his father's funeral as his "first care . . . When he caused all who had been privy to the murder to be put to death at his burial-place." There are no real indications of how much time passed between the assassination of Philip, the execution of his accused, and Philip's burial. Scholars have assumed it was a brief span of time, since Alexander was immediately forced to deal with the executions, a political council, and rebel uprisings. However, his actions following Philip's assassination are recorded by two sources, Diodorus and Justin, who each give opposing accounts of when Alexander tended to his father's funeral. Diodorus 17.2.1 states that Alexander first dealt with the "co-conspirators" of the murder then tended to the funeral, while Justin 11.2.1 states that Alexander arranged Philip's funeral first, and ordered the executions of the co-conspirators at the same time. Additionally, Alexander had to have been officially sworn in as the new king before he could give any orders or proclamations, and the funeral might have been the first act of his reign, as it was later on for Kassandros.<sup>45</sup> The

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<sup>43</sup> In Diodorus' account of Philip's murder, there was no mention of anyone else being involved in the assassination, and as he states that Pausanias was killed immediately without any interrogation, it is not clear how these individuals were identified. All those whom Alexander killed were considered rivals or threats, and are recorded as contributing to the suspicion that Alexander himself instigated his father's murder. See Plut. 10.4; *On the Fortune of Alexander* 1.3; Curt. 6.9.17 and 10.24; Justin, 11.2.1-3 and 12.6.14.

<sup>44</sup> In fact, none of the sources specifies that Philip II was buried at Aigai. The accounts of his murder all take place in the theatre of Aigai on the morning after the wedding of his daughter, and then immediately discuss Alexander's ascension to the throne, execution of the "co-conspirators" and burial of Philip, in various order according to different sources. Justin also has Olympias honoring Pausanias the assassin over top of Philip's tomb, of which the location is not specified.

<sup>45</sup> See below, n.87, and Diod. 19.52.5; Athen. 4.155a.

timeline presented by the sources is therefore imprecise and approximate only, and does not present a specific number of days between the death of Philip and his burial.

This has direct bearing on the discussion surrounding the skeletal remains, as the length of time his body remained unburied would have dictated how the remains were treated beforehand. If Philip was buried immediately, there would have been no practical reason for it to have been cremated, whereas the longer his body remained unburied while the nobles discussed the future of the kingdom, Alexander was crowned, and the co-conspirators executed, the greater need for cremation. In fact, despite many scholars asserting that Philip was cremated,<sup>46</sup> none of the sources specify this is what happened to him, instead using terms such as “buried” and “tomb” without mentioning a pyre. The only source which does refer in any way to a cremation or pyre is Justin. Justin 9.7 tells the story of Olympias rushing to Philip’s funeral and venerating the assassin, including burning the remains of Pausanias “on the remains of her husband” but even this does not specify that Philip has been cremated, rather it was his assassin’s body which was burned. Justin 11.1.4 refers to some who lamented that the torch lit at the daughter’s wedding should have lit the funeral pyre of her father as well. As noted by Borza and Palagia, this is not a literal interpretation of an event, but a poetic simile known from other literary sources.<sup>47</sup> Many scholars have assumed Philip’s cremation as a fact<sup>48</sup> despite this paucity of evidence, since the Argead House is associated with heroic lineage and mythology which includes grand funeral pyres and cremation.<sup>49</sup> However, Maria

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<sup>46</sup> For example, Worthington 2008, 188-89 describes Philip’s funeral in detail, including the entire Macedonian army marching past his pyre. This description cites no sources, and no details of this kind exist in the primary sources. Worthington appears to have invented this scenario from nothing.

<sup>47</sup> Borza and Palagia 2007, 84.

<sup>48</sup> Hammond 1978; 332; Musgrave 1991, 7. Kottaridi 1999, 637-38 argues that Macedonian royals had been subjected to cremation since the late sixth century.

<sup>49</sup> Serena Mirto 2007, *passim* and 84.

Serena Mirto notes<sup>50</sup> that the practice of cremation, whether followed by inhumation or not, was not a consistent event and varied from place to place and through different times. Furthermore, cremation following tragic heroic deaths was centered in Greek mythology, and is not supported as a uniform practice by archaeological evidence, since not all elaborate burials involved cremation, even at Vergina. There is no further evidence stating Philip was cremated. From the above points, it can be established that Philip was murdered and died almost immediately (unable to be saved by medical intervention), then was interred in a tomb (no source specifies where) at some indeterminate point within a few weeks afterward, either before Alexander left to pursue the alleged co-conspirators, or after he returned. No other details of his treatment or funeral exist. The difficulties of establishing a definitive timeline for Philip also apply to Olympias' involvement in his funeral, as well as her supposed actions toward Philip's surviving wife Kleopatra.

Justin is the only source who gives a detailed scenario of Olympias' involvement, but his description of her actions is so bizarre and problematic the reliability of the story must be questioned. Justin 9.7 relates that Olympias heard the news about Philip's assassination and rushed to crown the murderer as he hung dead after being crucified. Olympias therefore was not at Aigai (she could have been at nearby Pella) and might not have attended the wedding, since women traditionally did not take part in *symposia* although Macedonian noblewomen might have.<sup>51</sup> In this scenario, Olympias arrived the night of his funeral after learning Philip

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<sup>50</sup> Serena Mirto 2007, 85.

<sup>51</sup> The appearance of Persian women at dinner was described by Herodotus 5.17-21 as foreign to Amyntas I, who informed the Persians that women, whether concubines or wives, did not join them during such occasions. Two scholars have cast doubt this particular *symposium* really occurred; see Errington 1981 and Borza 1990, 101-3. The argument for Macedonian women being present at *symposia* is made by Sawada 2010, who derives this conclusion from the large amount of drinking vessels found in the tombs of female elites at Vergina.

was dead, allowing the possibility that the funeral did not take place the same day he died, which would have been the case if Alexander had to wait for the nobles to crown him king before proceeding with the funeral. “A few days later,” after the assassin’s body had been removed from the cross, Justin asserts that Olympias cremated it “on the remains of her husband”, and then made Pausanias a tomb “in the same place.”<sup>52</sup> No other sources place Olympias at the funeral or otherwise involved in Philip’s burial. Her participation encompasses a final act which is also disputed in the sources: the murder of Philip’s last wife Kleopatra and their child.

That the murders occurred does not seem to be in question, but the nature of how they were carried out and even how many children died are debatable. Justin 9.7 states that Philip’s young wife Kleopatra and her daughter were murdered by Olympias, which enraged Alexander when he discovered what she had done, as he was evidently away when this happened. Justin asserts that Olympias had Kleopatra and the child killed because Philip had divorced Olympias in favor of Kleopatra, but as Elizabeth Carney notes,<sup>53</sup> there is no indication Philip divorced any of his previous wives when he took a new one, and polygamy was an accepted practice. Furthermore, if we are to believe that Olympias acted purely out of jealousy when she had Kleopatra killed, why is there no mention of similar actions toward

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<sup>52</sup> Although this story seems extremely unlikely considering the extreme disrespect this would demonstrate toward the murdered king, as well as directly implicate Olympias in his murder, it remains the only source indication we have that Philip was cremated at Aigai. However, even here Justin does not expressly state that this is what occurred. See above, n.28. The reliability of Justin as a narrator of these events has been called into question by Yardley and Heckel 1997, and Hammond 1991. Justin is probably the most unreliable source we have for the death of Philip II, as his source material was extracted in pieces from a *Historiae Philippicae* of Pompeius Trogus, written under the reign of Augustus, and his is the only version of the assassination that recounts specific details such as Olympias crowning the dead Pausanias, which seems an extraordinary event to go unrecorded by anyone else, including Aristotle, who was an eye-witness to the murder. For additional discussion of how the sources for Philip and Alexander are problematic, see King 2010.

<sup>53</sup> Carney 2000, 80-1.

Meda, Philip's sixth wife who came before Kleopatra.<sup>54</sup> We are not told what happened to either Kleopatra or the infant after their deaths — whether they were cremated or not, interred with Philip or not, buried together or not, and we are not told where they were buried, whether at Aigai or elsewhere. The timing of their deaths is also unclear, since we do not know exactly when they were killed after Philip's death. It may have been days, weeks, or several months, depending on where Olympias was at the time of Philip's assassination and where Alexander had gone while the murders were carried out. If she was close by at Pella, she could have murdered the pair as soon as it was safe to do so, when Alexander was occupied with state matters or other duties, if we accept that the new king was entirely unaware of Olympias' intentions. As noted above, Justin's account of her activities at Philip's funeral is unreliable, so his other chronology detailing her actions may be as well. In addition, Kleopatra-Eurydike may have had more than one child: both Justin (9.7) and Satyrus (*ap. Athen.* 13.557e) claim she had a girl, Europa; but Justin 11.2 also adds a son, Karanos, who was killed later on Alexander's orders.<sup>55</sup> Pausanias 8.7.7. states Philip's infant *son* by Kleopatra was burned to death after being dragged over a brazier, while Justin 9.7 says Olympias killed Kleopatra's daughter in her lap, then forced the new mother to hang herself. Plutarch (*Alex.* 10.8) says only that Alexander was angry with his mother for her "savage treatment" of Kleopatra "during his absence" while he was out punishing those who plotted to murder his father, but does not clarify what the treatment of Kleopatra was or how long he was gone.<sup>56</sup> Establishing

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<sup>54</sup> Athen. 13.557b-e, repeating a fragment of Satyrus' *Life of Philip*, lists all of Philip II's wives and children, in partially accurate chronological order. See Carney 2000 *passim*, and 51-82.

<sup>55</sup> Justin 11.2 states that Alexander ordered his half-brother Karanos to be killed after tending to the funeral of Philip II, although Justin does not specify who the mother of Karanos was. The existence of a boy (either additional to the daughter Europa or instead of her) is a disputed topic, and often dismissed by scholars. See Tarn 1948; 2002.

<sup>56</sup> Presumably while he was pursuing and arranging the executions of the alleged co-conspirators. However, although this is the meaning one would take from the translation, the Greek does not actually imply this. It



how and when Kleopatra and her child were killed is almost impossible given the disparity and lack of detail in the sources, which becomes further complicated if the existence of a second child must be dealt with.<sup>57</sup> What the sources do agree on is Kleopatra and her child, evidently an infant, were both killed soon after Philip himself was assassinated, likely by Olympias, and that Alexander denounced her actions. Plutarch's description of Olympias as treating Kleopatra and the child with "savagery" would characterize the next murders we are told Olympias committed, those of Alexander's half-brother Arrhidaios and his wife Adea-Eurydike.<sup>58</sup>

### *A Failed War: Arrhidaios and Eurydike*

After Alexander assumed the throne, he began his campaign of first subduing problem areas then expanding the empire, and marched east across much of the known world.<sup>59</sup> When he died in Babylon in June 323, the succession to his kingship was still undecided. Arrhidaios, who was at Babylon when Alexander died, might have seemed the obvious choice. He was the son of Philip II, he was Alexander's half-brother, and he was there. However, Alexander's

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says that Alexander sought out the assassins (i.e. he had them investigated and arrested) but it does not say that his absence was due to the arrest of the murderers. This passage from Plutarch implies Alexander was away from Aigai for some indeterminate amount of time, if Justin is correct and Olympias did not arrive until a night during Philip's funeral. This would mean several days passed between Philip's murder, his funeral (and possible cremation) and then his interment.

<sup>57</sup> This is discussed below at length in *The Ages of Kleopatra, Europa, Karanos, and Adea-Eurydike*.

<sup>58</sup> However, Olympias may be characterized incorrectly here. Considering some of the outlandish stories which circulated about her, such as she slept with snakes or gave honors to the assassin of Philip II (as discussed above in n.30), some of the sources seem inclined to be biased toward her. Elizabeth Carney has made an extensive study of this issue; see 1987; 1993; 1994. Additional considerations here are the attitudes of some modern historians, who extrapolate conclusions about her behavior based on the attitudes of the primary sources. Green 1991, 107, for example, states that, "Her subsequent behavior, indeed, suggests that she not only planned her husband's death but openly gloried in it". While it is not clear whether she truly behaved in such an incautious display or if she really was involved in Philip II's murder, some modern opinions gravitate toward a less impartial reading of her reported actions.

<sup>59</sup> The discussion that follows highlights the main points of the Succession Crisis. For an in-depth treatment of this topic, see Romm 2011; Waterfield 2011, and Alonso Troncoso and Anson 2013.

pregnant wife Rhoxane was also present, and a dispute arose between the commander of the cavalry, Perdikkas, and the general of the phalanx, Meleager, over whether they should wait to see if she gave birth to a son,<sup>60</sup> or install Arrhidaios as king, as the closest adult male relative of Alexander. Part of Perdikkas' objection to Arrhidaios seems to have involved his apparent unfitness to rule.

Arrhidaios was born perhaps in 358 or 357<sup>61</sup> to Philinna of Larissa, Philip II's fourth wife according to the list given by Satyrus in *Athen.* 13.557. Several sources indicate that Arrhidaios suffered some form of mental difficulty, and was not entirely capable to rule. Diodorus 18.2.2 states that he had an "incurable mental illness", while Plutarch (*Alex.* 77.5) says Olympias poisoned Arrhidaios as a child, causing his difficulties. Justin at 13.2.11 and 14.5.2 relates that Arrhidaios suffered some kind of weakness or disability, which made Perdikkas reluctant to support him as king and which made Arrhidaios' wife Adeia-Eurydike take his duties upon herself. Elizabeth Carney made an extended study of the problem, and concluded it was likely Arrhidaios suffered from a mild developmental disability which impaired some of his cognitive functions but did not impede him physically.<sup>62</sup> Although he

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<sup>60</sup> Although Curt. 10.6.10-12 mentions a brief discussion of claim for Barsine's son Herakles, these were quickly rejected. See Errington 1970.

<sup>61</sup> Heckel 2009, 52. See Greenwalt 1985 for the argument that he was almost the same age as Alexander.

<sup>62</sup> Carney 2001. Although Justin does not specify in either part what the nature of Arrhidaios' weakness is, it has been suggested that he may have suffered from a form of epilepsy; Justin's version of Pompeius Trogus uses the phrase *valetudinem maiorem*, which might be equivalent to *morbus maior*, which Celsus 3.23.1 lists as one of the terms used to refer to epilepsy as preserved in Origen, *Contra Celsum*. However, epilepsy was a known disease in the ancient world although the causes were unknown, and a person suffering from this affliction was not considered unfit to rule, as noted in Yardley, Wheatley, and Heckel 2011, 72. The theory which posits some type of mental condition is supported by several ancient sources, which describe his variously as poisoned in childhood by Olympias (Plut. *Alex.* 77.8), 'childlike' (Plut. *Mor.* 377d) or suffering an 'incurable' illness (Diod. 18.2.2). Further attestations of Arrhidaios' affliction can be found in Plut. *Alex.* 10.2; Appian, *Syrian Wars* 52; Plut. *Mor.* 337d; and Porphyry of Tyre 260 F2 *FGrH*. Descriptions of Arrhidaios' difficulty are somewhat unique in the ancient world; aside from the famous 'madness' of Cambyses II (d. 522) attested in Herodotus 3.38, and the possible deformities of the 18th Dynasty pharaoh Akhenaten (attested only in artistic depictions), almost no accounts of members of the aristocracy suffering mental or physical afflictions can be found. This seems to indicate that if such a person did experience some type of disability, it was either not considered noteworthy or deliberately not recorded. For a detailed

was not entirely suitable for the throne when a more competent heir like Alexander was available, he does not appear to have caused any particular problems until the issue of succession arose after Alexander's death. In the face of a potential war between Meleager and Perdikkas, Eumenes, a former secretary and general of both Philip II and Alexander, suggested that Arrhidaios and the expected son of Rhoxane could share the kingship, while Meleager and Perdikkas could share a regency of the throne until Rhoxane was delivered.<sup>63</sup> Arrhidaios was duly made king, and he took the name of Philip III.<sup>64</sup> However, Perdikkas in fact acted as sole regent despite the terms of the settlement,<sup>65</sup> and Meleager became Perdikkas' lieutenant instead.<sup>66</sup> Perdikkas took over the pressing business of the empire and had Meleager put to death,<sup>67</sup> while Arrhidaios was left in place as a puppet king.

During this time, Perdikkas discovered the so-called "Last Plans" of Alexander, a list of tasks he had evidently intended to complete, such as building a fleet of warships and erecting temples.<sup>68</sup> In the end, although they were discussed in council, Perdikkas and the Diadochi decided not to carry out any of the plans, citing a lack of funds. One of the projects was the construction of a tomb for his father Philip II which was to "match the greatest of the pyramids of Egypt, buildings which some persons count among the seven great works of man."<sup>69</sup> This is of particular interest, as it tells us at least that Philip II had likely been interred

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treatment of afflictions in the ancient world which emphasizes the general population rather than specific individuals of high status, see Garland 1995.

<sup>63</sup> Plut. *Eum.* 3.1-2. See Green 1990.

<sup>64</sup> Curt.10.7.1-7; Diod. 18.2.2; Justin 13.2.6-8, 3.1, 4.2; Arr. *Succ.* 1.1; Pausanias 1.6.2; Appian, *Syrian Wars* 52.

<sup>65</sup> This division is often referred to as the Partition of Babylon (on which see Errington 1970).

<sup>66</sup> Dexippus, *FGrH*, 100.8.4; Arr, *FGrH*, 156.1.1-3; Justin 13.4.5.

<sup>67</sup> Curt. 10.6-9; Justin 13.2-4; Diod. 18.2.

<sup>68</sup> Tarn 1939 and Robinson 1940.

<sup>69</sup> Diod. 18.4.5.

in a tomb structure rather than any other type of burial, and implies Alexander did not consider it to be sufficient.<sup>70</sup>

Arrhidaios meanwhile, existed in the background while events moved around him. Kynnane, a daughter of Philip II by Audata (an Illyrian princess) and the half-sister of Arrhidaios, learned of his ascension to the throne and left Macedon, which was being governed by Antipater, a general and former regent of Philip II. Kynnane's husband Amyntas, the son of Perdikkas III, had been killed by Alexander in 336/5,<sup>71</sup> leaving her and her young daughter Adea undefended after Philip's assassination. Kynnane proposed Adea as Arrhidaios' bride, and fled Macedonia with a small accompaniment of troops. Her journey to Babylon was interrupted near Ephesus by Perdikkas' brother, Alcetas. He advised her to turn back, but she refused and was murdered by him in 323 BC.<sup>72</sup> This did not sit well with Alcetas' army, as she was part of the royal family and a daughter of Alexander's father, and they mutinied, demanding Kynnane's wishes to be fulfilled and Adea brought to Arrhidaios.<sup>73</sup> We are not told what happened to her body at the time of her death, if she was cremated or entombed or buried with any ceremony, but some years later her remains were eventually buried at Aigai.<sup>74</sup> Adea and Arrhidaios were married not long after he became

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<sup>70</sup> For an example of the way Alexander approached the memorialization of important people, see accounts of the death and subsequent spectacular pyre edifice of Hephaistion. This was a gigantic stepped structure some sixty meters high, with golden ships, golden wreaths, and golden scenes from mythology. It is not clear if this was also meant to serve as Hephaistion's tomb, but it was vastly different from any of the tombs or pyre remnants discovered at Vergina, which is only to be expected since Diodorus tells us Hephaistion's funeral "surpassed all those previously celebrated on earth". Plut. *Alex.* 72.3-4; Arr. 7.14.6-9, 7.15.1, 7.23.8; Diod. 17.115.1-5; Justin 12.12.11. See also Rice 1993, 243-4; McKechnie 1995.

<sup>71</sup> Alexander accused his cousin Amyntas of conspiring to usurp the throne. Plut. *Mor.* 327c; Curt. 6.9.17, 10.24; Justin. 12.6.14; *FGrH* 156 F 9.22.

<sup>72</sup> *PolStrat.* 8.60; *ASucc.* 1.22.

<sup>73</sup> *PolStrat.* 8.60; *ASucc.* 1.23.

<sup>74</sup> Diyllus, *FGrH* 73 F1 = Athen. 4.155a; Diod. 19.52.5. The importance of whether she was buried alone or together with her daughter and son-in-law and in what condition her remains might have been in at the time of

king, perhaps in 323/22 BC, possibly in Pisidia. After the marriage Adea took the name Eurydike, and began a campaign to sway the allegiance of the army away from the control of the various generals, but her efforts were halted by Antipater and she, Arrhidaios, and Rhoxane's new son, the infant king Alexander IV, returned to Greece.<sup>75</sup> Adea had been raised by her mother Kynnane to be warlike and militant, as Kynnane herself had been raised,<sup>76</sup> while the mentally limited Arrhidaios was content to remain essentially uninvolved in politics and evidently condoned his new wife's actions. This lack of control on Arrhidaios' part was to cause difficulties for the pair as Adea-Eurydike continued her political and military maneuvering. Her efforts were strengthened by news of the continuing struggles of Alexander's Diadochi, who had erupted into a war after Perdikkas married Nikaia<sup>77</sup> and another of his generals, Ptolemy, stole Alexander's body en route to Aigai.<sup>78</sup> Perdikkas was killed and Antipater was made regent of the entire empire, with Arrhidaios and Alexander IV removed to Macedon. During the Second War of the Diadochi, Antipater died and named Polyperchon to succeed him as regent, bypassing his own son Kassandros, who commanded an army of his own. Polyperchon fled to Epirus with Rhoxane and the young second king Alexander IV, then allied with Olympias and invaded Macedon. In an attempt to defeat

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this second (or perhaps first, if she was never buried properly) burial is relevant when examining the question of identity for the tombs beneath the Great Tumulus at Vergina. See Heckel 2009, 100-101.

<sup>75</sup> Diod. 18.39.2-4; *FGrH* 156 F 9.31, 156 F 11.42, 44.

<sup>76</sup> Carney 2000, 114-152.

<sup>77</sup> Perdikkas seems to have gone through with the marriage to Nikaia and then became Kleopatra's suitor. News of this was enough to start the war with Antipatros, Nikaia's father.

<sup>78</sup> Aelian, *Varia Historia* 12.64. Diod. 18.28.2-4. Pausanias 1.6.3.

Olympias, Adea-Eurydike and Arrhidaios led an army against her,<sup>79</sup> but their forces defected and the royal pair were captured in October 317.<sup>80</sup>

Diodorus 19.11.4 states that Olympias maltreated the couple by walling them up in a small space for many days before ordering them both killed. Diodorus, Justin, and Aelian all record that Arrhidaios was stabbed to death, but Diodorus says that Adea-Eurydike was subjected to a more drawn-out demise after first arranging Arrhidaios' body for burial (including cleaning his wounds, indicating he was stabbed several times or perhaps tortured before death) then being forced to hang herself, echoing the forced death of Philip II's last wife Kleopatra.<sup>81</sup> The method of their deaths lends support to the hypothesis that Olympias was involved in both deaths, or that the sources thought she was. The location of these activities is not known, since the sources do not mention if Olympias returned to Pella or Aigai after capturing the pair, or was stationed elsewhere. Olympias then murdered many friends and family members of Kassandros, and destroyed the tomb of Iolas in revenge for Alexander's death.<sup>82</sup>

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<sup>79</sup> While both Arrhidaios and Adea-Eurydike were technically in command of the army, there is some indication in the sources that Adea led it herself, as she had been trained to do by her mother. Diodorus also informs us that by this point Adea-Eurydike had also assumed control of Arrhidaios' regency. Justin 14.5.9; Diodorus 19.11.1-2; Athenaeus 13.560f.

<sup>80</sup> It is not clear why the Macedonian army abandoned Adea-Eurydike and Arrhidaios. Diodorus 19.11.12 says they recalled the various ways Alexander had supported them, and since Olympias was his mother and controlled his now six-year old son Alexander IV they felt duty-bound to help her, while Justin 4.5.10 also asserts that some form of lingering respect for Olympias as the mother of Alexander and wife of Philip II led them to turn the allegiance of the army to her. Carney notes that additional factors were likely at play here, including the prospect of a male king in the person of Alexander IV rather than Arrhidaios, who had never been considered suitable to rule, as well as the troubling lack of children from his marriage to Adea. Carney 1985 and 1994.

<sup>81</sup> Diod. 19.4.7; Just. 14.5.10; Aelian, *Varia Historia* 13.36.

<sup>82</sup> Iolas (Iollas) was one of Kassandros's brothers (Olympias also killed the other, Nikanor) and was implicated in reports that Alexander had been poisoned on the orders of Antipater since Iolas was Alexander's cup-bearer. Diod. 17.118.1-2; Plut. *Alex.* 77.1; Curt. 10.10.14-19; Arr. 7.27. The date of Iolas' death is unknown, as is the location of his tomb.

What Olympias did with the remains of Arrhidaios and Adea-Eurydike is not known, and continues to be a heated topic of debate. We are told that Kassandros returned to Macedonia after the murders and quickly defeated Olympias and her troops, capturing Alexander IV and his mother Rhoxane in the process. Kassandros had Olympias killed,<sup>83</sup> imprisoned Rhoxane and Alexander IV at Amphipolis, then returned to collect the bodies of Adea-Eurydike and Arrhidaios. Diodorus 19.52.5 states Kassandros buried them as well as Adea's mother Kynnane at Aigai, according to the custom of burying royalty there, and held funeral games in their honor.<sup>84</sup> This is all the information that exists about the burials of Kynnane, Adea-Eurydike, and Arrhidaios. Like Philip II, we do not know if these three were buried together or separately, whether they had been previously cremated or cremated by Kassandros or not cremated at all, placed in vessels or not, or buried near any other royal individuals. Furthermore, we do not know how much time passed between the murders of Arrhidaios and Adea-Eurydike and their "proper" burial by Kassandros,<sup>85</sup> what condition their remains were kept in before he reclaimed them, or how the remains were treated immediately after their deaths. We can infer from Kassandros's collection of their bodies and his inclusion of the also-murdered Kynnane that each of the remains must have been kept in a known place, and were more or less complete; we can also infer that Olympias had not buried Adea-Eurydike and Arrhidaios properly in a tomb, since Kassandros felt obliged to

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<sup>83</sup> Justin 14.6.6-12; Pausanias 9.7.2; Diod. 19.51.1-5.

<sup>84</sup> Diyllus *FGrH* 73.1. See Landucci Gattinoni 2010 and Wheatley and Hannah 2009.

<sup>85</sup> This question is the subject of intense speculation. Robin Lane Fox has Olympias murder the royal couple in October 317, based on Diod. 19.11.9. Anson argued the chronology for their (re)burial by Kassandros as occurring up to 17 months after their murders, in the spring of 315, but it could have been much earlier, as soon as 4 months. See above, n.29 and Anson 2006; this was noted by Lane Fox 2011, 28. This issue involves both anthropological considerations relating to identity (the so-called 'wet' versus 'dry' cremation argument) and cultural considerations relating to ritual taboo: would bodies still in the putrefaction stage be dug up and handled considering the Greek concept of *miasma* pollution?

bury them himself as part of his “kingly” duties.<sup>86</sup> Furthermore, since Diodorus specifies that Kassandros buried all three of them at Aigai as was the “royal custom”, it seems likely that none of their remains were at Aigai before then. We are not told anything about the nature of their new burials, including the type of tomb, decorations, or whether they were buried with special objects. A lack of information also characterizes the discussion concerning the ages of Adea-Eurydike, Kleopatra, and her child at the time of their deaths and burials, which is a key part of the ongoing debate about the Vergina tombs.

### *The Ages of Kleopatra, Europa, Karanos, and Adea-Eurydike*

Osteological reports detailing the age at death of the skeletal remains from the Vergina tombs have presented a new layer of debate. Since some scholars begin their discussions with preconceived notions about the ages of Kleopatra and Adea-Eurydike as well as Kleopatra’s child (or children), the osteological reports which give specific ages or age ranges for the skeletal remains are thought to definitively exclude some of the candidates. Before examining the physical evidence, it is necessary to understand how the historical arguments have been constructed, and whether there is any basis for disallowing a particular individual from consideration based on the historical evidence concerning their ages. The birth dates of all these individuals are unknown. Dates of birth were not often recorded in the ancient world because of the extensive calendrical confusion stemming from a lack of universal dating system.<sup>87</sup> It is therefore impossible to establish with absolute certainty how old either

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<sup>86</sup> Although Kassandros was not actually king at this time, he had married Thessalonike and was trying to establish a connection with the royal house in this way. This act of piety would have been an important part of his propaganda and self-promotion.

<sup>87</sup> For example, we do not know the birth date of Philip II, although his birth year has been estimated to 382, while Plutarch informs us Alexander III was born on the sixth day of the month Hecatombaion, which has been estimated to July of 356, but the month and day are given only as part of a list of myths which sprung up



Kleopatra or Adea-Eurydike were at their marriages or deaths, although broad estimations using a combination of many ancient sources can be derived. Estimated information about the wives of Philip II remains debatable, but some certainties can be attained. The main source for Philip II and his wives comes from a passage of Satyrus' *Life of Philip*, which states:

In the twenty-two years of his rule Philip married the Illyrian Audata, by whom he had a daughter, Cynnane, and he also married Phila, sister of Derdas and Machatas. Then, since he wished to extend his realm to include the Thessalian nation, he had children by two Thessalian women, Nicesipolis of Pherae, who bore him Thessalonice, and Philinna of Larissa, by whom he produced Arrhidaeus. In addition, he took possession of the Molossian kingdom by marrying Olympias, by whom he had Alexander and Cleopatra, and when he took Thrace the Thracian king Cothelas came to him with his daughter Meda and many gifts. After marrying Meda, he took her home to be a second wife along with Olympias. In addition to all these wives he also married Cleopatra, with whom he was in love; she was the daughter of Hippostratus and niece of Attalus.<sup>88</sup>

These women are presented in likely chronological sequence in Table 1.

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around Alexander. Seasons are noted more often than particular months, and the duration of events or lives is often noted as well. Thus we are told by Diod. 16.91.1-4 that the year in which Philip II was assassinated was “When Pythodorus was archon at Athens, the Romans elected as consuls Quintus Publius and Tiberius Aemilius Mamercus, and the one hundred and eleventh celebration of the Olympic Games took place, in which Cleomantis of Cleitor won the foot-race . . . In this year, King Philip, installed as leader by the Greeks, opened the war with Persia . . . Straightway he set in motion plans for gorgeous sacrifices to the gods joined with the wedding of his daughter Cleopatra, whose mother was Olympias . . .” Helpfully, Pausanias 8.6 specifies that this occurred when Philip II was “but forty-six years old” giving him a birth year of 382. Additionally, the idea of attaching importance to a person’s birth day does not seem to have been well established in ancient Greek or Macedonian culture, although it became common in the Roman world, and birthdays were evidently celebrated in ancient Persia by eating desserts and wine to the point of vomiting; see Herodotus 1.113.

<sup>88</sup> Athenaeus 13.557b-e, in Satyrus, *Life of Philip*. Translated in Heckel and Yardley 2004, 20.

**Table 1. The Wives of Philip II: Chronology and Probable Sequence**

	Name	Origin	Marriage Date	Offspring	Death Date
1	Phila	Elimeia (Upper Macedonia)	360 or before	None known	Unknown
2	Audata	Illyrian	359	Kynnane (358/7-321/0)	Unknown
3	Philina	Larissa (Thessaly)	358	Arrhidaios (357-317/6)	
4	Olympias	Epeiros	357	Alexander (356-323); Kleopatra (c.354-308)	317/16
5	Nikesipolis	Pherai (Thessaly)	353/2 or 346	Thessalonike (b. 352 or 345; d. 295/4)	352 or 345 (died in childbirth?)
6	Meda	Thrace	342?	None known	Unknown
7	Kleopatra- Eurydike	Macedonian	337	Europa (336); Karanos (doubtful)	336/5

In the case of Adeia-Eurydike, establishing the year her parents were married is one way of attempting to determine her likely age at death. We are told by Polyaeus 8.60<sup>89</sup> that her father, Amyntas IV, was killed soon after his marriage to her mother Kynnane, and one line of thought argues that depending when Kynnane married Amyntas, a timeline for the birth of their daughter might be constructed. Since Amyntas was dead by 335 according to

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<sup>89</sup> Κύννα Φιλίππου θυγάτηρ τὰ πολεμικὰ ἥσκει καὶ στρατοπέδων ἡγεῖτο καὶ πολεμίους παρετάσσετο· καὶ Ἰλλυριοῖς παρατασσομένη τὴν βασιλεύουσιν αὐτῶν καιρίαν ἐς τὸν αὐχένα πλήξασας κατέβαλε καὶ πολλοὺς τῶν Ἰλλυριῶν φεύγοντας ἔκρινε. γημαμένη δὲ Ἀμύντα τῷ Περδίκκου ταχέως τοῦτον ἀποβαλοῦσα οὐχ ὑπέμεινεν ἀνδρὸς πειραθῆναι δευτέρου, ἀλλὰ μίαν ἔχουσα θυγατέρα ἐξ Ἀμύντου Εὐρυδίκην καὶ ταύτην τὰ πολεμικὰ ἥσκησεν (Polyaeus, *Strat.* 8.60).

“Philip’s daughter Cynnane used to undergo military training, lead armies and face enemies in battle. When she faced the Illyrians she brought down their queen with a well-timed blow to the neck and killed large numbers of the Illyrians as they fled. She married Amyntas son of Perdiccas, but soon lost him, and could not face the prospect of taking a second husband. Instead she gave similar military training to the one daughter she had by Amyntas, Eurydice” (translated by J.C. Yardley).

Justin 12.6.14,<sup>90</sup> some scholars<sup>91</sup> date the wedding to 337/6. Assuming Kynnane became pregnant immediately after marriage, with Adea-Eurydike born in 336/335, by the time of Adea-Eurydike's death in 317, she would have been 18 or 19. An earlier date for her birth hinges on when exactly Amyntas was killed in comparison to when he and Kynnane were married, which is difficult to determine.

Robin Lane Fox focuses on word use in Polyaeus' Greek, arguing that *τάχα* means "quickly" or "swiftly" but is not used in a "relative" way, and instead used to emphasize "the presentation of Kynna as an independent woman"<sup>92</sup> since she did not remarry after her husband's death. Lane Fox asserts that Polyaeus uses this specific term as well as Kynnane's later rejection of a second marriage to present her as "a true virago who killed a male enemy in battle". Lane Fox's reading of this phrase seems to stem from his interpretation of the participle *ἀποβαλοῦσα* as "rejected / repudiated" rather than "to have lost", making Adea-Eurydike "repudiate" Amyntas rather than losing him to death. In addition to this, Lane Fox rejects a birth date for Adea before 336/5 since anything earlier would mean Kynnane had been married to Amyntas for several years before his death. If Kynnane was born immediately after Philip married her mother Audata, this would give a birth year of 358 for Kynnane, and if she married in 344 when she was 14, the marriage would have lasted eight

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<sup>90</sup> Amyntas was the son of Perdikkas III, the nephew of Philip II. Justin states that he was executed by Alexander III, his cousin, possibly as a potential heir. Arrian states that Kynnane was offered as a bride to Langarus the king of the Agrianes, so she must have been widowed by this time as divorce is unknown in ancient Macedon. Heckel 2009, 23. Although Peter Green 1991, 141 offered the idea that Amyntas was still alive when Kynnane was offered as wife to Langarus, this would again either require her to divorce Amyntas or maintain a polygamous marriage of two husbands; there is no evidence this occurred for any historical Macedonian individuals. See also Arr. 1.5.4 cf. Justin 12.6.14.

<sup>91</sup> Berve 1926, 229 n.2; Lane Fox 2011, 31; Carney 2000, 132 states that Adea-Eurydike was likely born between 338 and 335, allowing an age range of 18-21 for her at her death in 317.

<sup>92</sup> Lane Fox 2011, 31; Carney 2000, n.53, 294 states the opposite, that "swiftly" is "obviously a relative term", a reading which takes the text at face value.

years if Amyntas was killed in 336/5. Since Polyaeus describes Kynnane as losing her husband “quickly,” eight years seems too long and according to Lane Fox, would make Polyaeus’ “presentation of her as a strong-willed virago unsustainable.” Lane Fox dates the marriage of Kynnane and Amyntas to 336, since he asserts that Philip II would have wanted to be present at the wedding of his daughter and nephew, and as he was campaigning outside of Macedon from 342/1-338/7, the marriage could not have taken place until his return, and Kynnane could not have given birth to her daughter Adea before 336, making Adea-Eurydike 19 at her death in 317. This interpretation relies on three points: first, that Polyaeus’ depiction of Kynnane as a “virago” was relevant to her marriage; secondly, that Kynnane married at 14, and finally, that Philip II had to have been present at the wedding of Kynnane and Amyntas.

Because Kynnane was eligible to remarry in 336/5, the death of Amyntas can be inferred, as we know of no instances where Macedonian women divorced their husbands. There is no need to impose the virago concept on Kynnane’s marriage when Polyaeus (based on Douris of Samos) only applies it to Kynnane herself. Kynnane’s age at marriage also cannot be seen as a definitive fact. William Greenwalt has argued convincingly that aristocratic Macedonian women married in their late teens rather than their early teens.<sup>93</sup> If Philip married Audata in 359/8, but Kynnane was not born until 357, and was not eligible for marriage until she was 17 or 18 in 340/339, she could have been 21 or 22 at the time of her husband’s death in 336/5. This would make the duration of their marriage four years, which is a reasonable length to describe as having ended “quickly.” In addition, depending on when Adea-Eurydike was born, between 340/339 and 336/5, she could have been between newborn

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<sup>93</sup> Greenwalt 1988.

and three years old at the time of her father's death, making her 19-22 at the time of her own death in 317. Philip II's presence at Kynnane's wedding is not a certainty. Polyaeus does not mention Philip's presence and does not describe the wedding in any way (cf. Arr. *Succ.* 1.22), and it might be inferred that it was not such a grand occasion as Lane Fox argues for. Although Kynnane was Philip's daughter by Audata, and Amyntas was his nephew, this might have been viewed not so much as a "doubly royal wedding" but a direct political alliance which did not necessitate excessive ceremony or the presence of the king, since too much emphasis on the wedding might have regnal implications for Amyntas, a potential heir, instead of one of Philip's own children.<sup>94</sup> This would allow the wedding to take place before 336, and push back the possible date of Adea-Eurydike's birth.

W.L. Adams proposes a date of 342 for Kynnane's wedding,<sup>95</sup> allowing Adea-Eurydike to be 24-25 at her death in 317. This is dismissed by Lane Fox as inconsistent with Polyaeus' description of Kynnane as showing her independence by "rejecting" Amyntas "quickly". As discussed above, there is no need to read Polyaeus' description as relevant to the nature of her marriage with Amyntas, and a more typical reading of the Greek allows the interpretation that Kynnane married Amyntas but lost him soon afterward, and rejected a second husband when the idea was proposed, rather than Kynnane rejecting Amyntas quickly after marriage, then rejecting a second husband to show her independent, warrior personality. Furthermore, considering only two sources describes this information, and each consists of a single line of text, it may be dangerous to take Polyaeus and Arrian literally and assume precision of dates from their limited accounts. Although both lines of argument have valid

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<sup>94</sup> Additionally, Carney notes that the wedding of Philip's daughter Kleopatra after which he was assassinated involved an unprecedented display of festivities, such as the golden statues, and no other accounts of Macedonian marriages note that the king had to personally witness the occasion.

<sup>95</sup> Adams 1980, especially n.60.

points, without more information the best estimate that can be made about Adea-Eurydike's age is necessarily broad, presenting her as between 18-25 at the time of her death.

The arguments for Kleopatra follow essentially the same line as those for Adea-Eurydike: her birthdate, age at marriage to Philip II, and age at death are not known and must be extrapolated from circumstantial evidence. Kleopatra is assumed to have been particularly young when she was married to Philip II. Sources speak of the match in terms of love and attraction rather than pure political gain, with Plutarch 10.6 relating that Philip had fallen in love with Kleopatra in spite of her age. The Greek term παρθένος refers to an unmarried woman, and while the exact age of such a person is not specified, Kleopatra is also referred to in the passage as a κόρη, maiden. These terms in conjunction with the note that Philip married her despite her age seem to emphasize not only her unmarried status but her youth, suggesting that she was unusually young for marriage. If Greenwalt's study of the marriage age of Macedonian noblewomen, which concludes that they married in their late teens, is correct, Kleopatra must have been in her early-to-mid teens. If the conventional assumption that women married around 14 is correct, then Kleopatra could have been as young as perhaps 12 when she was married. These speculations supply an age range of 12-19 at the time of her marriage. We have no information about her as a person before she appears in the sources as Philip's wife, and the information after this event is limited to stories of how she died.

The date of her death is uncertain. If she was killed by Olympias while Alexander was away from Macedonia dealing with the "co-conspirators" and rebel uprisings in Asia, her death could have occurred at any time after Alexander left. Since the sources give contradictory accounts of when he left Macedon after his father's murder, and the duration of his absence, Kleopatra might have been killed within weeks of Philip's death or about a

year later.<sup>96</sup> The one point of consideration that adds roughly a year to the duration of her life is the birth of a child.

While a daughter named Europa is attested, the existence of a son named Karanos stems from only from one source: Justin. Justin is the only one to specifically mention a name and describe Karanos as the son of Alexander's step-mother, Kleopatra. Justin 9.2 states that Alexander ordered the boy to be killed. The existence of a son was not mentioned by any other source, so although the child's existence may have been a case of scribal error, replacing daughter (θυγάτηρ) with son (υιός), the matter is actually slightly more complicated. While Justin is the only source which names Karanos, Pausanias mentions a male child killed by Olympias, using the word παῖς followed by a masculine adjective and a masculine relative pronoun. It appears that Pausanias may have confused the sex of the child, but nowhere does Pausanias say that this child was Karanos. This means that Justin remains the sole source of information that directly links the name Karanos to a child of Kleopatra murdered by Olympias.<sup>97</sup>

The timing of Kleopatra's marriage, births of children, and death does allow for the existence of a second child, but only just. Using the death of Philip in 336 as a *terminus ante quem* and assuming she could only have become pregnant after her marriage, and the pregnancy occurred very soon after that, Kleopatra could have given birth to the first child, Europa, in 337/8, as we are told. The wedding was almost certainly in summer or autumn 337, and the birth of Europa no earlier than February/March; but since the child was born just before Philip's death in October 336, it can be assumed the marriage occurred in October

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<sup>96</sup> See the comments of Howe in Heckel, Müller and Howe, forthcoming.

<sup>97</sup> For the problem of Karanos see Tarn 1948, 2: 260-62, and Heckel 1979, both arguing against his existence. For Karanos as a second child see Green 1974, 112 and Lane Fox 2011, 385. See also Ogden 199, 17-27; Unz 1985.

of 337, a few months before conception. Excluding the possibility of twins, superfetation (an extremely rare simultaneous occurrence of more than one developing fetus in the same mother)<sup>98</sup>, and premature birth (although possible, the likelihood of a pre-term infant surviving in this time period is very low) Kleopatra may have had back-to-back pregnancies. Of course, all these possibilities are reliant on when the marriage took place; only 6-7 months leeway is required to allow a second birth. If Kleopatra did give birth to two children, they would both still have been infants when she was killed by Olympias. In this case, it is likely both the children would have been killed as well, as the sources state happened to her daughter. Both infants would therefore have been buried with the mother, since they would not have been important enough to be buried separately, or they were not buried properly at all, which begs the question of what the Macedonians did with deceased infants.

This is also problematic archaeologically, since only one set of infant bones were found in the Macedonian tombs at Vergina. Because these bones have been determined to belong to such a young child,<sup>99</sup> scholars have posited that they must belong to the last child of Philip II and Kleopatra. For this to be so, the child would have had to be either a later-stage fetus or what is called a neonate, or newborn. Osteological determination of infant growth is much more precise than that for adults or even teenagers, so a more specific estimation of infant age is possible. If the infant remains from Tomb I belong to Kleopatra's child, only two scenarios are possible: that this was Kleopatra's only child, and was born within a week or two of Philip's assassination since the remains are those of a newborn; or that this was the younger of two children, and the older was already dead or was killed later

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<sup>98</sup> See Walter 1975, Bertrams and Preuss 1980, and Raczek 2003 for instances of superfetation and heteropaternal twins.

<sup>99</sup> See Chapter Three for a discussion of how the age of these remains was established, and Appendix 1 for details on the methodologies involved.



(we can assume this hypothetical child did not survive, as no attestations to this occur in the sources). For the first scenario, the child was likely a daughter named Europa,<sup>100</sup> who Justin informs us was still in the arms of her mother when she was killed by Olympias, and Diodorus 17.2.3 states was born only a few days before Philip's assassination, indicating she was a newborn or infant just as the Tomb I remains reveal. The second scenario of a second child does not present a different sequence of events for the infant remains found at Vergina, but does pose a new question: where are the remains of this second, slightly older child? No other infant remains were found in the main tombs. This suggests that either Karanos never existed, eliminating the need to determine where his remains are, or that the remains from Tomb I are not those of Kleopatra and her child since both children would have been murdered and buried with her.

The question of exactly how old each of these individuals was at the time of their deaths cannot be solved historically unless new evidence comes to light. While theories can be developed and arguments made for or against a specific age, there is no method which will allow a definitive answer, and certainly not anything as precise as saying either of the women was exactly 19 or exactly 23 when they died. Using these arguments to declare that the human remains from Tombs I or II can provide confirmation of any individual identity reveals the convoluted and somewhat circular nature of this problem; as this brief analysis shows, a rather wide range of ages can be given, and the specific age of Kleopatra's child, or even the existence of a second, cannot be currently be proven through historical analysis.

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<sup>100</sup> See Carney 2000, 77-78 for a thorough discussion of Europa.

### *Meda*

The Archaeological Museum of Vergina has taken a definitive stand in the attempt to assign identity to the individuals from Tomb II. Exhibits which display artifacts from the tomb are identified either as belonging to Philip II or, in the case of the first chamber items, Meda, his sixth wife (see above, Table 1). Meda was a Thracian princess, the daughter of Kotylas (or Kothelas), king of the Getae.<sup>101</sup> She is not recorded by the ancient sources as having any children, and does not figure elsewhere in historical accounts aside from a brief mention among Athenaeus' list of Philip II's royal wives.

Meda's candidacy as the woman in Tomb II is based on the weaponry found in the same chamber as the female bones. Andronikos believed the weaponry must have belonged to the adjoining chamber and was not connected to the woman; N.G.L. Hammond proposed that all the weapons belonged to the female, who he identified as either Meda or a Scythian princess.<sup>102</sup> Hammond argued that "the bow was the prestigious weapon not of the Macedonians but of the Getae and the Scythians."<sup>103</sup> Since Meda was from Thrace, and the chamber included a golden *gorytos* (a box made to carry a recurve bow and arrows) from Scythia,<sup>104</sup> the weapons appear less likely to have been hers. Thrace was not part of Scythia: it was located in the region of modern-day Greece, Bulgaria, and Turkey,<sup>105</sup> whereas the

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<sup>101</sup> Heckel 2009, 158; Fol and Mazarov 1977, 53.

<sup>102</sup> Hammond 1978; 1994, 182.

<sup>103</sup> Hammond 1994, 182.

<sup>104</sup> Figure 25.

<sup>105</sup> See Archibald 2010 for a detailed study of how the ancient Macedonians might have conceptualized the region they called Thrace; although it appears to have been bordering or contiguous with Macedon, it also may have extended into the continent, although any connection with Scythia is not apparent from ancient accounts, and Thrace cannot be equated with Scythia or Scythian culture.

Scythians lived in what is now the Ukraine and Russia.<sup>106</sup> The *gorytos* is certainly Scythian; an identical one was discovered in Russia in a Scythian tumulus (kurgan) at Karagodeuashkh on the Taman peninsula.<sup>107</sup> Trade with Scythia was common, and this item may have been purchased as a luxury item or even taken from a battlefield as a prize, since Scythian princes usually carried them. Robin Lane Fox also believes the female remains in Tomb II belong to Meda.<sup>108</sup> In his opinion, the Scythian *gorytos* provided a clear link to Meda, who he describes as a “Getic-Scythian princess.” Discovery of the matching *gorytos* in Russia seems to abrogate his further contention that the *gorytos* was Scythian-style rather than truly Scythian. Hammond, although he considers the possibility that the woman was Meda, links both the *gorytos* and the burial of the wife with the king to “the daughter of the Scythian king, Atheas, if, as seems almost certain, her hand was given to Philip when Atheas, despite having a son, promised to adopt Philip as heir to the throne.”<sup>109</sup> Hammond believes that her burial represented the custom (practiced by both the Getae and the Scythians of suttee: “Such a practice would explain how it came about that a woman of twenty-five died at the same time as Philip and was cremated beside him.”<sup>110</sup> This theory is not without its problems.

First of all, no Scythian bride is mentioned in Satyrus’ list of Philip’s wives. Furthermore, Justin 9.2.3 says that Atheas disavowed the offer to adopt Philip, in which case there would not have occurred the marriage which Hammond regards as “almost certain.” Finally, the description of suttee, which involves rivalry among wives for the ‘honor’ of accompanying the husband into the afterlife, comes not from Herodotus’ description of the

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<sup>106</sup> See D.C. Braund, *OCD* 3 1374-75 s.v. “Scythia.”

<sup>107</sup> Daumas 2009.

<sup>108</sup> Lane Fox, 2011.

<sup>109</sup> Hammond 1978, 336.

<sup>110</sup> Hammond 1994, 182.

Scythians (4.71.4), as Hammond maintains, but from a later passage concerning the Thracians.

There is still open space within the grave, and in it they bury, after throttling to death, one of the king's concubines, his wine-server, cook, groom, steward, and messenger, and some horses and a proportion of all his other possessions, including some golden cups. They do not put anything of silver or bronze in the grave (Herodotus 4.71.4; translated by Robin Waterfield).

The presence of the *gorytos* in the female chamber of Tomb II cannot be used to support the view that the remains belong to Meda. Lane Fox's assertion that Meda fit the proposed age of death that had been estimated from the female remains is on firmer ground, although even this generally accepted detail must now be reevaluated, as discussed below in Chapter Three.

The time and circumstances of Meda's death are not recorded, nor do we know anything else about her life. That she chose of was forced to commit suttee is mere speculation, and it raises unanswerable questions about her standing at court in relation to Philip's other wives. It would be difficult to place the Thracian practice, as described by Herodotus, in a Macedonian context:

The tribes north of Crestonia practise polygyny, and when a man dies, his wives are subjected to searching tests (which their friends take very seriously), to see which of them was loved the most by the husband. When a decision has been reached and one of his wives has been singled out for this distinction, her praises are sung by men and women alike, and then her throat is slit over the grave by her nearest male relatives, and she is buried along with her husband. All the other wives consider it a huge misfortune, because there is nothing more disgraceful for them than not being chosen (Hdt. 5.5; translated by Robin Waterfield).<sup>111</sup>

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<sup>111</sup> Diod. 17.91.3-4 describes a similar example of widow-burning (suttee) among the wives of an Indian leader named Keteus, who died in the service of Eumenes of Cardia. He also describes the origins of this practice among the Kathaians. See Heckel and Yardley 1981, with additional references to the practice.

Even if Meda had decided to follow a tradition of her homeland on Philip's death, we must then believe that it was condoned by the royal court, with members possibly participating in her death. Herodotus does not describe the sacrificed wife as being included in any type of cremation or other ceremony aside from the burial itself, indicating suttee by pyre may not have been practiced among the Thracians, making it even more unlikely Meda would have decided to join Philip on his pyre.

The case for Meda remains weak despite the Greek authorities' insistence on identifying the Tomb II female remains as hers.

### **Chapter Three: Chronology of Analyses and Interpretation of the Remains**

Human remains were recovered from three structures under the Great Tumulus during initial excavations in 1977. Although many articles have subsequently been published by anatomists, physical anthropologists, and other specialists giving professional opinions about these skeletal remains, it is not always clear from the publications who examined the remains, and when. Determining this is important because it is useful to know if the opinions of the physical anthropologists or other experts who discuss the remains in publication result from first-hand examination of the bones or not, and what their level of analysis was in relation to the findings; how long did they spend examining the bones, did they take measurements for metric analysis, did they handle the remains or base all analysis on non-interactive observation only, etc. Additional considerations here include what condition the remains of all the individuals were in, and how the physical analyses have contributed to the interpretation of the site as ancient Aigai. The current dispute over the cremains from Tomb II in particular highlights the importance of establishing empirical knowledge of the skeletal remains.

#### **Tomb I**

The looted Tomb I containing the bones of three individuals scattered on the floor was entered first and excavated completely in 1979.<sup>112</sup> The remains were not housed in a vessel, and had not been cremated. Analysis of the remains from Tomb I was carried out in brief by Jonathan Musgrave in 1984, who established that they represented three individuals: an adult

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<sup>112</sup> Andronikos 1994; Drougou and Saatsoglou-Palladeli 2000; Carney 1992. Clarification of who initially excavated the skeletal remains from Tomb I is attributed by Antonis Bartsiokas and Elizabeth Carney to the unpublished excavation diary of Faklaris 1978. See Figure 4 for a diagram of skeletal nomenclature and anatomical positions.

male of 25-35 years of age, an adult female approximately 25 years of age, and a late-stage fetus or new-born infant of indeterminate sex.<sup>113</sup> Musgrave further revised his tentative statements about these individuals in a 1991 article<sup>114</sup> which mainly focused on the burials from Tomb II, and remains the only expert to have published any details of first-hand examination for these remains. Discussion of the methodologies used on the Tomb I remains is limited to a short note at the end of an article about the skull from Tomb II, which gives estimated ages at time of death and some measurements, noting that these were derived from dental attrition and regression analysis. Another fragment of analysis from a personal communication to Robin Lane Fox reveals that in the male, “Sutural closure [was] far advanced on skull: obliterated internally and almost so externally. This suggests that this man may have been ten years older [than Musgrave’s preliminary assessment of 25-35].”<sup>115</sup> Lane Fox asserts that this revised age estimate still eliminates Philip II as a candidate for the Tomb I male, as Philip II was 46 at the time of his assassination. Since his initial involvement in the project Musgrave has strongly argued that Philip II is buried in Tomb II, and it is interesting to note that his revised age estimate which places the Tomb I male at 35-45 at time of death rather than 25-35 has not been published by him. Lane Fox’s dismissal of this new estimate as being “just possible, but decidedly awkward” for Philip II, seems slightly excessive considering 46 is only one year outside of Musgrave’s revised figures, and methods of age determination are not exact.<sup>116</sup> However, without further analysis by someone other

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<sup>113</sup> Musgrave 1985, 8 writes specifically that “the baby really was a baby” to emphasize how young the infant was. This relates to his wider argument about the ages of the various members of the royal family who were offered as candidates for these individuals; Musgrave 1990, 280, and 1991, n7. 21.

<sup>114</sup> Musgrave 1991.

<sup>115</sup> Personal communication to Lane Fox from Musgrave in 2011. In Lane Fox 2011, n.10, 5.

<sup>116</sup> The determination of age relies on the assessment of the physiological age of the skeleton or skeletal remains, rather than the chronological age of the individual. Physiological age is based on relative growth patterns such as epiphyseal fusion and suture closure, and is hoped to give an accurate estimate of

than Musgrave, it is impossible to confirm his findings. Reliance on Musgrave's analysis has led to two distinct topics relating to the possible identity of the individuals in Tomb I: that the male may not have been part of the original triple inhumation, and that the age of the infant might be able to exclude Kleopatra and her baby. Musgrave's argument here stems from Green's estimation of her being between 19-22, the belief that it is unlikely Philip II would not have been cremated, and the assertion that Kleopatra and her baby were not killed until several months after Philip's assassination, making the infant remains found in Tomb I too young to belong to Kleopatra's child.<sup>117</sup>

### *The Tomb Robber Theory*

This hypothesis attempts to explain the position and condition of the male skeleton when excavated. When Tomb I was opened and discovered to be looted,<sup>118</sup> the first skeletal remains encountered were those of an adult male. This individual was found to be incomplete and

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chronological age, but the impacts of environment, nutrition, and disease can often cause changes in the skeleton which will obscure the true age of the individual. The accuracy with which age can be estimated varies inversely with the age of the individual at death. In younger individuals, age is estimated primarily by observed developmental changes, and more precise estimates are possible, whereas in older individuals, age estimates are more often accomplished through the observation of degenerative changes such as dental attrition (tooth wear), which offer less accuracy. In the case of ancient or damaged skeletal remains, or modifying effects such as cremation, these observations become even more difficult. Assessing the physiological age of an individual at death is generally based on seven different categories of analysis, each of which have specific methodologies to follow. See Appendix I.

<sup>117</sup> Details of the infant remains and analysis can be found below. Musgrave's reading of when Kleopatra and the child were killed is based on the work of Green 1982, who has argued that Kleopatra was no older than her early 20s when she died; Musgrave refutes the identification of the Tomb I female remains with Kleopatra since he believes the remains in no way reflect a person of below 20, so cannot be equated with Kleopatra; see below for the osteological analysis. Musgrave also uses the work of Ellis 1981, who asserts that she was murdered only after the death of Attalos, which Ellis places in 'mid-355 or later'; and Musgrave notes that Hammond, in personal correspondence, suggested Attalos could have been killed earlier than that, in 336/5. Musgrave does not discuss when Kleopatra would have been born, however, therefore eliminating any argument for her age based solely on the date of her death. His assertion that Kleopatra was murdered a few or several months after Philip's murder is not grounded on anything more than speculation. See Howe 2014 for further details on both Attalos' and Kleopatra's murders.

<sup>118</sup> Figure 5.



disorganized approximately 12cm from the stone floor of the tomb, within a matrix of dirt and sediment fill of about 1.42m<sup>2</sup>.<sup>119</sup> Because the male skeleton was found in a different position, at a slightly higher level, and was slightly less scattered than the remains of the female and infant, the so-called tomb robber theory attempts to account for these aspects. The theory posits that one of the grave robbers somehow died during the course of the looting and his body remained in the tomb in a separate location and level from the other occupants, eventually becoming covered by a thick layer of dirt, which had drifted down over the interior of the tomb over time by means of the hole left in the limestone slab roof left by the looters. The distance from the limestone roof of Tomb I and the floor is approximately 3 meters, so one conceivable scenario might be that the robber, having entered the tomb, was unable to get back out for some reason, and died of injury or starvation.

The origin of this pervasive hypothesis remains unclear. Antonis Bartsiokas and Elizabeth Carney attempted to uncover the origins of the tomb robber theory, and published their findings along with a discussion of the remains from Tomb I in 2008. As Bartsiokas and Carney have reconstructed the sequence of events, it began with Lane Fox attributing this theory to Andronikos in a 1980 book,<sup>120</sup> but Andronikos never published this opinion anywhere, as Lane Fox subsequently notes in 2011, still without revealing the provenance of Andronikos' opinion.<sup>121</sup> In 2000, S. Drougou and C. Saatsoglou-Paliadeli stated<sup>122</sup> that the excavator of the Tomb I male remains, A. Kottaridi, had first suggested the male skeleton

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<sup>119</sup> Bartsiokas and Carney 2008, 16.

<sup>120</sup> Lane Fox 2011, 4; 80.

<sup>121</sup> Lane Fox 2011, 4. This was likely a personal communication or private observation, unrecorded and never published by Andronikos. The lack of publication suggests that Andronikos did not feel the theory was sufficiently supported to print it, or perhaps did not want to for other reasons.

<sup>122</sup> Drougou and Saatsoglou-Paliadeli 2000.

was a tomb robber. This paper was then quoted in a 2008 newspaper article,<sup>123</sup> and further reiterated by Robin Lane Fox in 2011. However, Kottaridi was a student at the Tomb I site, not the primary excavator of the male skeleton -- it was P. Faklaris according to his excavation diary -- as stated in the newspaper article, and if Kottaridi is the originator of the tomb robber theory, there is no other evidence for this.

The content of the tomb robber hypothesis rests on two aspects of the excavation: that the tomb was originally intended for a female burial as shown by the lack of weapons and a wall fresco depicting the abduction of Persephone by Hades,<sup>124</sup> and that the male skeleton was found differently positioned than the female and infant. As discussed by Andronikos<sup>125</sup> and later Bartsiokas,<sup>126</sup> the lower limbs of the male skeleton (the tibiae and fibulae as well as the feet, all in correct anatomical position) were misaligned and separated from the femora by about 50cm,<sup>127</sup> which Andronikos reasonably regarded as evidence that Tomb I was looted after the male had already become skeletonized, since repositioning of the leg bones could not have occurred while the body was still fleshed. Bartsiokas agreed with this and presented his opinion that in the course of looting the rest of the tomb, the grave robbers had moved the leg bones into the positions in which they were found, presumably to access grave goods buried with the male.<sup>128</sup> Although Robin Lane Fox dismissed this, writing that, “Bartsiokas has tried to explain it as the act of pious tomb-robbers carefully laying to one side the skeleton of the male burial which they were robbing,”<sup>129</sup> Bartsiokas did not use these phrases and

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<sup>123</sup> Kotti 2008.

<sup>124</sup> Figure 6.

<sup>125</sup> Andronikos 1994, 45.

<sup>126</sup> Bartsiokas and Carney 2008, 16.

<sup>127</sup> Figure 7.

<sup>128</sup> Bartsiokas and Carney 2008, 16.

<sup>129</sup> Lane Fox 2011, 4 quoting Bartsiokas and Carney 2008, 16.

concluded only that the repositioning of the bones was a result of human intervention, where grave robbers had moved the bones. While Lane Fox attributes the idea of pious tomb robbers according special treatment of these bones to Bartsiokas, it appears that this is his own invention.

The location of the skeleton when found has been another point of contention. Because the remains were supposedly found at a level significantly higher than that of the female and infant remains, this has been viewed as evidence the male was added to the tomb later. However, as can be seen in a photograph of the male skeleton at the time of excavation<sup>130</sup> the level in which the male was found is not problematic or significant. The image shows parts of the skeleton *in situ* on the stone floor of Tomb I with some of the earthen fill matrix still embedded around the bones. The lower legs, complete with tibiae, fibulae, and the tarsals and metatarsals of the feet are visible, the right foot slightly overlapping the left, all in correct anatomical position. No other parts of the skeleton are visible except for the distal ends of the femora where they would articulate with the knee, which are lying parallel to each other some distance away and not in line with the lower legs. The rest of the skeleton is still embedded in the fill in this image. The removal of the legs from the rest of the axial skeleton indicates that these limbs were moved after skeletonization occurred, although the lower legs and feet do not seem to have been disturbed much. The image shows this individual at the same approximate level as the floor, with a moderate covering of dirt from the open hole in the roof having drifted down to cover the remains at some point. As stated above, the remains were approximately 12cm from the floor of the tomb, a negligible distance of less than five inches, and a result of the earth which later filled

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<sup>130</sup> Figure 10 in Andronikos 1994. See Figure 7.

the tomb through the roof opening. They were not, as reported in the 2008 Greek newspaper article, found “in the upper layers” of the fill.<sup>131</sup>

### *The Female and Infant Remains from Tomb I*

Musgrave’s brief analysis of the female and infant remains from Tomb I found that the woman was approximately 25 years old at the time of her death, and was accompanied by the fragmented remains of an infant he described as being a recent newborn or perhaps a late stage or full-term fetus. These findings become important when attempting to assign a known identity to these individuals, since Philip II’s last wife, Kleopatra, is known to have had at least one young child, while Adea-Eurydike is not described as having any children. Although the age of either Kleopatra and her child (or children) cannot be determined with certainty since their dates of birth are not known,<sup>132</sup> several scholars have attempted to estimate both Kleopatra’s and her child’s approximate ages, (see Chapter Two). As discussed above, there is no consensus of what Kleopatra’s age was at the time of her death, with estimates ranging from 18 or 19<sup>133</sup> to perhaps 22<sup>134</sup> when she died. That Kleopatra was quite young seems to be the only agreed-upon view, but beyond that her age is open to a degree of interpretation. Given Musgrave’s estimation of approximately 25 for the age of the woman in Tomb I, this seems to eliminate at least Kleopatra as a possibility, and therefore any infant of hers, which would likely have been interred with her since she and her child or children would have been killed at the same time; however, this argument is not definite. The infant

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<sup>131</sup> Kotti 2008.

<sup>132</sup> We do not know the birth dates or exact ages of any of Philip II’s wives, or indeed for any wife of a Macedonian king. See Greenwalt 1988.

<sup>133</sup> Carney 2000, 72; Lane Fox, in Musgrave et al. 2010, 13.

<sup>134</sup> Worthington 2008, Appendix 6, 238.

remains from Tomb I have been described by Musgrave as those of a baby of 38-39 weeks, either unborn or very recently newborn, what is termed a neonate. This was established by measuring the ossified shaft<sup>135</sup> of the right humerus of the infant remains, which was 65.9mm.<sup>136</sup> Estimates of the exact age of a neonate based on the size of the humerus range from Musgrave's assessment of 38-39 weeks to perhaps greater than 42 weeks,<sup>137</sup> but still presents an infant of no more than a few days old following the time line presented by Diod. 17.2.3, who states Kleopatra bore Philip a child a few days before his assassination.

The matter then turns to whether Kleopatra's child or children could have been the right age to be identified with this burial, as discussed above. The age of both Kleopatra and her murdered child remain relevant for the same reasons when examining the findings from Tomb II. Musgrave's assessment that, "to accept that Tomb I contained Philip II, Cleopatra and her baby also involves accepting that none of them was cremated; and that Cleopatra was only a few months pregnant when Philip was assassinated."<sup>138</sup> He dismisses as "inconceivable" the possibility that Philip, Kleopatra, and the baby might not have been cremated, and cites Diodorus 17.2.3 as evidence that Kleopatra bore Philip II a child a few days before his assassination, which eliminates the possibility that it could be her, since he asserts that Kleopatra and her child were both killed several months after Philip's murder.<sup>139</sup>

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<sup>135</sup> Long bones are usually categorized as having three distinct zones: the diaphyses, or ends of the bone, and the shaft, or middle. To say a bone is ossified means that it has finished transforming into bone from a developing stage, sometimes cartilage; this rate of ossification is often used to determine the age of an individual.

<sup>136</sup> See Scheuer, Musgrave, and Evans 1980 for a complete survey of the methodologies Musgrave used to determine age from the infant's humerus.

<sup>137</sup> Bartsiokas and Carney 2008, n.20, 16. Bartsiokas quotes Scheuer and Black 2000, and a personal communication from A.T. Chamberlain, a professor of bioarchaeology at the University of Manchester, who himself quotes a table of prior probabilities of age given humerus length from a then-unpublished master's dissertation by Becky Gowland from 1998.

<sup>138</sup> Musgrave 1990, 280. Musgrave believed the infant to be Europa.

<sup>139</sup> Musgrave 1991. See above, n.117.

These assessments are purely historical in nature, and cannot be confirmed based on the osteological evidence.<sup>140</sup> Since no other experts have yet published any analyses of the remains from Tomb I, Jonathan Musgrave's reports remain the only source for osteological information. Much of his interpretation of these remains is linked to his assessment of those from Tomb II, which have garnered the most attention and extensive, detailed analysis.

## **Tomb II**

Tomb II was entered next in the same excavation season of 1977,<sup>141</sup> and the cremated, skeletal remains of two individuals were found, each in their own chamber.<sup>142</sup> The antechamber (Chamber I) of Tomb II contained the cremated bones of a single individual, wrapped in a gold and purple cloth, then entombed in a golden *larnax* with a gold wreath of myrtle leaves and floral motifs.<sup>143</sup> The main chamber (Chamber II) also contained the cremated remains of a single individual, also wrapped in a gold and purple cloth and interred in a very similar but more elaborate golden *larnax* with a golden wreath, this time of oak leaves and acorns.<sup>144</sup> Because of the mass of information about the individuals from Tomb II, I have divided this section according to the primary experts who analyzed them, along with their published findings and interpretations. The most recent analysis of the Tomb II remains has not yet been published; preliminary details announced through a press release in March of 2014 will be discussed at the end of the Tomb II section.

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<sup>140</sup> See Chapter Two for a wider discussion of the possible age of Kleopatra at the time of her death, as well as the age, sex, and number of her children, and their possible ages at death, including how long after Philip II's murder Kleopatra might have lived.

<sup>141</sup> Figure 8.

<sup>142</sup> Figure 9.

<sup>143</sup> Andronikos 1988, 191. Figure 10.

<sup>144</sup> Andronikos 1988, 191. Figures 11 and 12.

### *Xirotiris and Langenscheidt*

The original 1981 study carried out by Xirotiris and Langenscheidt discussed the remains from both Tomb II and Tomb III. For Tomb II, two individuals were found, each in their own chamber. Extensive attention was paid to the individual from Chamber II, with detailed measurements and discussion of morphology included, while the discussion for the individual from Chamber I was more limited, and presented information on sex, age, and height. Aside from these points, the most valuable aspect of Xirotiris and Langenscheidt's work is their discussion of methodology and the effects of cremation on bone which preceded the main report.<sup>145</sup> This helped to contextualize the technical information of their study, and allowed other researchers to understand how conclusions were reached.

The individual in Chamber I was in poor condition compared to the remains from Chamber II. The bones still retained traces of ashes from the cremation, and no bone could be fully reconstructed. The bones were a yellow-brown and slightly shrunken from normal appearance, qualities which helped determine the amount and duration of heat applied to the bones during cremation.<sup>146</sup> This individual was determined to be female largely due to the gracility or delicate appearance of the overall skeleton. Xirotiris and Langenscheidt termed this individual, especially the post-cranial skeleton, as “extraordinarily gracile,”<sup>147</sup> a term which refers to a delicate, lighter, smaller overall form, compared to a heavy or more “robust” shape.<sup>148</sup> Morphological and metric analysis were the only ways to determine the sex of this individual, since no other portions of the skeleton that are typically used in such cases (such

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<sup>145</sup> Xirotiris and Langenscheidt 1981.

<sup>146</sup> See below, *The Effects of Cremation on Human Bones*, for a detailed overview of color, shrinkage, warping, and other modifications which occur to human bone during burning.

<sup>147</sup> Xirotiris and Langenscheidt 1981, 155.

<sup>148</sup> See White, Black, and Folkens 2012, 379-426 for specific indications of gracility versus robustness in female and male skeletal remains.

as the pelvis) remained intact. In the paragraph detailing the morphology of this individual, Xirotiris and Langenscheidt refer to the smallness, delicacy, and fragility of the remains, with metric analysis results reflecting this in a table comparing them to the remains from Chamber II.<sup>149</sup> Age at time of death was determined by sutural closure of the cranium and epiphyseal fusion. Some of the cranial sutures were not ossified, while the extant epiphyses of the long bones showed complete closure except for a fragment of clavicle, which was determined to be incompletely fused, indicating the individual was not fully mature.<sup>150</sup> Xirotiris and Langenscheidt estimated the woman to be approximately 25, but not younger than 20 or older than 30 at time of death.<sup>151</sup> Estimation of height in cremations is particularly challenging owing to fragmentation and incomplete collection of bones. The female from Chamber I had no intact long bones, which are usually used to estimate height, so an approximation was made by measuring the diameter of the radial head. As Xirotiris and Langenscheidt note, this method is prone to a higher degree of inaccuracy than standard measurement techniques, but

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<sup>149</sup> Xirotiris and Langenscheidt 1981, 147, Table 1. For gracility and robustness means, they used data collected by Nils-Gustaf Gejvall, a Swedish zoologist and osteologist who had a special interest in burned human remains and assembled a corpus of data from more than 6000 human cremations, both prehistoric and modern. Gejvall 1955 and Brothwell and Higgs 1963.

<sup>150</sup> The clavicles are the last bones in the body to complete ossification. Samples analyzed in the literature show one hundred percent clavicular fusion by age thirty, with a median age of twenty-five. Sternal ossification of this bone does not begin until about age eighteen, so sternal ossification with incomplete epiphyseal fusion will indicate an age between eighteen and twenty-five. See Manson and Jeanty 2003; Krogman 1962; Flecker 1942; McKern and Stewart 1957; Szilvassy 1978; Todd and D'Errico, 1928.

<sup>151</sup> Xirotiris and Langenscheidt 1981, 156. This type of large age range is necessary in osteological analysis when working with an unknown individual; bony remains can only reveal so much, and many other factors such as condition and age of the material must be taken into account. Cremated bones are particularly difficult to use for specific trait determination, as fire warps, shrinks, cracks, and changes the color of skeletal remains. Precision of an adult individual's age at time of death through osteological analysis alone is unlikely, particularly for ancient Greek or Macedonian remains, as no data sets exist for this population for comparison, although one for Roman remains does exist. The age for infants and subadults is slightly easier to estimate because distinctive changes happen to young skeletons in a short period of time, allowing for a smaller range of possible ages. For infants, this is even more particular, since they follow a fairly rigid timeline of development.



is acceptable in the absence of other procedures.<sup>152</sup> These measurements resulted in a height estimation of 153-155cm (adjusted for shrinkage), presenting a slender-boned young woman of just over five feet in height.

For the individual from the next chamber, Chamber II, the historical importance attached to the possible identity of these remains caused them to be subjected to a much higher degree of analysis than those of the female. This might also be due to the exceptional state of preservation the remains were in when excavated compared to Tombs I and III.<sup>153</sup> The individual from Chamber II was found to be arranged in layers within the burial casket, wrapped in the remains of a fabric. The cremated bones had been diligently collected and cleaned, resulting in a nearly complete, although fragmented, skeleton, an unusual find in ancient cremation burials. The bones of this individual had experienced substantial deformation, making their reconstruction to anatomical accuracy impossible, but still allowing for the shape and approximate size of most bones to be discerned. Measurements were taken to determine height, but again had to be adjusted for a shrinkage of 10%, a rate which Xirotiris and Langenscheidt admit could not be based on any evidence, but rather seems to have been extracted from estimations in the literature.<sup>154</sup> They found the burn pattern inconsistent over the remains, with some pieces more burned than others, all assessed

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<sup>152</sup> Xirotiris and Langenscheidt 1981, 156, using radial head estimation formulas by Müller 1958; Bach 1965, and Olivier, Aaron, Fully, and Tissier, 1978.

<sup>153</sup> Figure 13. Much has been made of the excellent condition of these bones. Musgrave in particular emphasizes how much more complete they are compared to bones from other cremation sites, and suggested as early as 1985 that the individual may have been cremated in an enclosed structure which protected the remains particularly well. This concept was then reflected by the findings of Kottaridi, who excavated the charred remnants of a peculiar wooden house-like structure on the roof of Tomb II, complete with roof, doors and knockers. Kottaridi has argued that both the individuals from Tomb II were cremated in these structures, thereby accounting for the exceptional preservation of the male bones. This does not account for the condition of the remains from the antechamber, however, which were not exceptionally preserved.

<sup>154</sup> Xirotiris and Langenscheidt discuss the limitations of analyzing burned human remains with regards to shrinkage estimates in the introduction. See Chapter Four for a discussion of bone shrinkage in current literature.

like the female from Chamber I according to Chochol's Grade scale, varying from 1-4.<sup>155</sup> Morphological assessment of the Chamber II individual indicated a rather small person with many characteristically feminine traits such as a gracile skull lacking in robustness in the cranium, but displaying typically masculine traits such as a robust and thick mandible (lower jaw) and a well-developed *linea aspera* on the femur, a longitudinal ridge where the large muscles of the thigh attach. This combination of traits places the cremains between male and female according to the metric comparison data Xirotiris and Langenscheidt used. These observations in conjunction with metric analysis led Xirotiris and Langenscheidt to determine this individual as male "with high probability," although they qualify this assessment by noting that a one hundred percent definite sex determination of the Chamber II individual is impossible.<sup>156</sup>

Age at death was assessed according to sutural closure, analysis of the pubic symphysis facies, and epiphyseal fusion. Cautioning that exposure to heat from the cremation may have reopened formerly obliterated cranial sutures, examination of the remains using these three aspects suggested an age at death of 35-55. This estimate follows an extensive discussion about the various limitations of the age estimation techniques used, as shown in Table 2, which lists estimated ages ranging from 29-52, depending on which technique is used.<sup>157</sup> Body height in this case was slightly easier to carry out than for the female in

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<sup>155</sup> Xirotiris and Langenscheidt 1981, 145; Chochol 1961. Chochol's scale was used widely at the time Xirotiris and Langenscheidt made their analysis, although this is no longer the case. Chochol's scale incorporates a number of combustion grades, from I-V, which are determined through the color of various bones and features. For example, a Combustion Grade of I or I-II is indicated by a yellowish white, ivory-colored, or glassy light grey, while a Combustion Grade of V is indicated by a bone color of old white, cream-colored, or brownish, greyish, or ochre. These colors are analyzed in conjunction with other observations, such as a chalky surface, or brittle cracks, which complete an assessment of estimated temperature applied to the bone.

<sup>156</sup> Xirotiris and Langenscheidt 1981, 148. See also 147, Table 1, for metric analysis figures.

<sup>157</sup> Xirotiris and Langenscheidt 1981, 148-152, including Table 2.

Chamber I, as the long bones of this individual were preserved, although deformed and damaged from cremation.<sup>158</sup> Xirotiris and Langenscheidt give an estimate of 1600-1700mm, approximately 5'2"-5'5". An additional remark about phenotypic appearance notes that the muscle attachment sites on the bones indicated the individual had well-developed muscles and seemed to reflect a Mediterranean type. This analysis presents a muscular, small, gracile man of early middle age approximately five and a half feet tall. The most notable part of the analysis is where they state that, "Fresh or healed damage to the bones or change due to illness could not be established," and emphasize that no injury to the right supraorbital margin could be established.<sup>159</sup> This means that Xirotiris and Langenscheidt observed no evidence of injury for this individual, whether from accident or disease, healed or not, although they did note that age related degenerations of the joints could be observed, supporting their estimate of an older individual. They conclude the paper by supporting Andronikos' suggestion that Tomb II contains the remains of Philip II and Kleopatra.

### *Musgrave*

As noted above, Jonathan Musgrave is an anatomist, and provided an extremely detailed analysis of the remains from Tomb II. Much of the evidence he cites is used to support the hypothesis that the remains belong to Philip II and one of his wives, which Musgrave strongly defends. Musgrave's analysis of the remains from Tomb II differ from the analysis done by Xirotiris and Langenscheidt in several crucial ways, most notably with respect to the existence of injuries and what Musgrave terms 'asymmetries',<sup>160</sup> which Xirotiris and

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<sup>158</sup> Figure 14.

<sup>159</sup> Xirotiris and Langenscheidt 1981, 153; 159.

<sup>160</sup> Musgrave 1990, 276.

Langenscheidt did not detect at all. Musgrave also discusses the sex and age determination of the Tomb II remains. He concludes that no features exist on the female bones from Chamber I that could place her age at 19-20 at the time of her death, and opts for the more conservative estimate of 25 instead, writing that Xirotiris stated the bones in Chamber I were those of a “skeletally mature young woman.”<sup>161</sup> However, Xirotiris’ analysis claimed the opposite, noting in particular that the right clavicle appeared not have finished ossifying, indicating a skeletally immature young woman. While the combined weight of other observations led Xirotiris and Langenscheidt to conclude an estimate of approximately 25 years old at time of death, skeletal features do exist on the bones that signify an incomplete growth process, and both younger and older estimates could not be ruled out due to the lack of complete material.<sup>162</sup> There are no other disagreements about the cremains from Chamber I.

For Chamber II, the first of Musgrave’s primary arguments concern the appearance of ‘asymmetries’ and injuries. Although Xirotiris and Langenscheidt did not observe any of these, Musgrave has emphatically declared that the remains show evidence of several healed injuries: damage to the right eye socket resulting in a ‘notch’ on the superior margin of the right orbit as well as a “pimple of bone” that could be palpated, indicating bone remodeling;<sup>163</sup> damage to the right zygomatic bone and right maxilla resulting in a healed fracture;<sup>164</sup> a ‘gross facial asymmetry’ resulting in misalignment of the right maxillary

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<sup>161</sup> Ibid.

<sup>162</sup> Musgrave, 1990, n88 .287 discusses this very problem, seeming to contradict himself by admitting that Xirotiris and Langenscheidt’s evidence is valid and supports their range of age estimation, and the remains are not able to support more precise age estimations due to their fragmentation and condition. Musgrave comments on all the epiphyseal closures except that of the clavicle, observing that they have all completed fusion, supporting his insistence on a minimum age of 25 for the Chamber I female from Tomb II.

<sup>163</sup> Figure 15.

<sup>164</sup> Figure 16.

sinus;<sup>165</sup> a piece of bone missing from the zygomaxillare; and damage to the right mandible resulting in realignment and reformation of the chin.<sup>166</sup> Musgrave states that these features are either the result of healed bone after an evidently severe injury which he links to Philip II's arrow wound at Methone in 354, or a possible congenital deformation of the face. Several of these points were later amended or reiterated by Musgrave in response to Bartsiokas' 2000 article; these are discussed below.

Musgrave's second primary argument is whether the Tomb II remains show evidence of a 'dry' or a 'wet' cremation. Musgrave asserts that both the cremains from Tomb II were burnt as fleshed bodies - a 'wet' cremation, due to the severe warping, twisting, and deformation for the bones of the male, and the fragmentary and distorted nature for those of the female.<sup>167</sup> All of these points underpin Musgrave's assertion, like Xirotiris and Langenscheidt, that Tomb II contained Philip II and a wife.

### *Prag and Neave*

Before examining the opposing osteological views of Antonis Bartsiokas, the famous facial reconstruction of the male skull from Tomb II must be addressed. This was done by John Prag and Richard Neave in conjunction with Musgrave, and published in 1984 after a presentation in Athens.<sup>168</sup> The reconstruction resulted in a three-dimensional portrait depicting a middle aged Caucasian man with dark hair and a full beard, with somewhat small

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<sup>165</sup> Figure 16.

<sup>166</sup> Figure 17. Musgrave 1985; 1990, 275-277 and Appendix 3; Musgrave et al. 2010 *passim*, and Musgrave, Neave, and Prag, 1984, 60-78.

<sup>167</sup> Musgrave et al. 1984b, 7. For a full discussion of the effects of cremation on fleshed or defleshed remains, see below, *The Effects of Cremation on Human Bones*.

<sup>168</sup> Musgrave et al. 2010.

features in a square face with a high forehead.<sup>169</sup> The portrait's dark left eye was contrasted strongly by a closed right eye topped by a long diagonal scar which ran from the middle of the forehead down to the right zygomatic arch. When the reconstruction was released, the team faced considerable backlash over the large scar over the right eye that had been included, and Prag released an amended version in 1990.<sup>170</sup> Plaster casts of the skull from Chamber II were made, and the face reconstructed from these. Because the bones were fragmented, damaged, and not complete (as discussed above), it was not possible to obtain fully accurate casts, and some of the bones or parts of the bones had to be reconstructed based on guesswork or approximation from other skulls of similar type.<sup>171</sup> Neave was only able to obtain a total of five bone fragments of the skull: the frontal bone, the mandible, the incomplete maxillae, and a portion of the right temporal bone. Neave begins by describing the reconstruction method. Wax copies of the plaster casts were made and set into a block of clay and positioned to anatomical correctness, and the missing or blank areas were built up with more clay to produce a full skull.<sup>172</sup> This was then cast, and the soft tissue built on top using wooden marker pegs for thickness guides; the facial muscles were then sculpted on top

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<sup>169</sup> Figure 18.

<sup>170</sup> Prag 1990. Interestingly, Prag placed the blame for the scar on Ruth Quinn, the makeup artist who completed the 1984 reconstruction. Prag's quote explaining Quinn's decision is worth quoting in full here: "As we have described elsewhere, we knew of no evidence that on or near the field of battle Philip received treatment that would have prevented obvious scarring of the wound, and by one of those coincidences that seem hard to believe, on the day she did the make-up on the reconstruction, Ruth Quinn met a Canadian lumberjack who 16 years previously had suffered an almost identical injury, caused by a falling axe rather than a flying arrow. He had been some weeks away from proper medical care, and thus his wound had remained a gaping hypertrophic scar, with a red, shiny, and livid appearance. It seemed perfectly correct to use him as a model for reconstructing the external appearance of Philip's injury, and it was with this horrendous scar that the King of Macedon was first shown to the XII International Congress of Classical Archaeology in Athens in 1983, and in this form that he subsequently appeared in public, both in the press and in medical and archaeological journals," 239. This story is first recounted in the original publication of the reconstruction, in substantially less detail. See Musgrave et al. 1984b, 68.

<sup>171</sup> Musgrave et al. 1984b, 66.

<sup>172</sup> Figure 19. This image also shows the angle of descent a penetrating missile would have been required to strike the face at in order to achieve the injuries claimed by Musgrave, Prag, and Neave.

of this, following anatomical references of spacing and position. For the surface layer, Neave used the assumption that this individual was Philip II, and gave the reconstruction a “weathered complexion” with dark hair, beard, and eyes, and notes that because the nasal bones had been damaged during cremation, the nose of the reconstruction reflected this. To complete the figure, Ruth Quinn added skin color and hair to a wax copy, as well as the livid scar over the closed or missing right eye. Although Neave ended his portion of the article by asserting his belief that the reconstruction was “as true a likeness as it is possible to obtain at the moment,” several factors involved in the reconstruction create a certain level of doubt. Fragmentation of the skull, a limited inventory of bones, and the condition of the bones when cast<sup>173</sup> all prevented a realistic assessment of the appearance of the Chamber II individual. In addition to this, as Neave makes clear, the team proceeded from the start from the assumption that they were reconstructing Philip II, which led to the final, highly subjective appearance. Anagnostis Agelarakis, a forensic anthropologist, noted that, “It is extremely difficult to undertake such a construction given the non-homogenous warping and shrinkage of the bone mass in the cremation process. Add to this taphonomy, especially if one is looking for antemortem manifestations of trauma, and the job becomes nearly impossible.”<sup>174</sup> The scientific value of this reconstruction is doubtful as far as establishing identity for the

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<sup>173</sup> It is evident that the remains from Tombs I, II, and III may not have been held in satisfactory archival conditions. From the gluing that Xiotiris had to do for his analysis (which was never removed), to the way they were stored (first in boxes, then plastic bins, with the male from Tomb II on display in a Perspex container with lights shining directly on the remains), and Musgrave’s comments that the bones may have deteriorated between his and Bartsiokas’ examinations, that care and maintenance of the Great Tumulus remains has been somewhat deficient. In conversation with Laura Wynn-Antikas, who is currently analyzing the remains, she informed me that before the current team began their examination, all the bones from the Great Tumulus tombs had been kept in “wet cardboard boxes” with no packing material or other precautions. It is not known how they were stored when not on display in Thessaloniki and later at Vergina, but vital osteological evidence may already have been lost, making conservation by qualified experts imperative.

<sup>174</sup> Quoted in Schuster 2000.

remains, but useful as a reminder of the type of limitations ancient osteological material can provide.

### *Bartsiokas*

Antonis Bartsiokas examined the bones from Tomb II in 2000, publishing his findings in *Science*. His paper caused something of a commotion upon publication, although it would be ten years before Mugrave and his team published a reply to Bartsiokas' comments. Bartsiokas photographed the remains from Tomb II at a 1:1 magnification, enabling study of the microstructure of the bones, especially the right eye orbit.<sup>175</sup> Echoing Xirotiris and Langenscheidt, Bartsiokas did not find any evidence of injury (healed or not) anywhere on the remains of the male from Tomb II. In light of Musgrave's assertion that the male from Chamber II showed evidence of a healed injury to the right orbital margin, Bartsiokas examined this area closely. He determined that the notch and "pimple of bone" Musgrave asserted was evidence of healed trauma to the right eye socket was in fact a part of normal anatomy, and not pathological.<sup>176</sup> The supraorbital notch is a small section of bone where nerves pass through, palpable on most people by depressing the ridge of the socket above the eyes. The "pimple" Musgrave described as evidence of callus formation (a lump of bone where cells accrete after an injury) was instead described by Bartsiokas as part of the bony protuberance of the supraorbital notch, and not a particularly pronounced one. He found no evidence of a missing piece of bone at the zygomaticoxillary suture, which Musgrave described as having been "knocked away" in some trauma, perhaps the same event which

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<sup>175</sup> Figure 20.

<sup>176</sup> Bartsiokas 2000, 512.



blinded Philip II.<sup>177</sup> Instead, Bartsiokas observed trabecular bone at this location which was exposed through a crack. Trabecular bone, also called cancellous bone, is the spongy, lattice-like interior bone which forms under parts of bones where tendons attach.<sup>178</sup> If this bone should be exposed due to injury and the individual survives, a healing process takes place where cells fill the area in and repair it, resulting in a bony callus. Exposed trabecular bone indicates either an injury that was not able to begin healing because of death, or postmortem exposure from cracking (heat from cremation could expose the trabecular interior).

Bartsiokas also addressed the extreme facial asymmetries described by Musgrave. Bartsiokas determined these distortions to be artifacts as a result of both the cremation and poor reconstruction. The mandible, for example, was described by Musgrave as deformed on the right side, with the chin essentially rebuilt; images of the mandible do show a marked asymmetry, with the right mandibular condyle angling away from the rest of the jaw.<sup>179</sup> If this was the result of a healed injury, there would likely have been significant difficulty with eating and a marked change in appearance, since the muscles of the face would also have been injured and the jaw would have been protruding some distance away from the normal plane; an unusual appearance would also be the result if this was a congenital malformation. In either case, this would have been a noticeable disability in life, just as much as any blindness.

Bartsiokas also disagrees with Musgrave's 'wet' cremation hypothesis, instead asserting that the warping and cracking of the long bones indicates a defleshed cremation. Bartsiokas completes his assessment by submitting Arrhidaios as a more viable candidate.

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<sup>177</sup> Figure 21.

<sup>178</sup> See White et al. 2012, 32.

<sup>179</sup> Figure 17; also see Figure 5 in Musgrave 1985.

### *Rebuttal*

In response to this article, which disagreed with all the most compelling aspects of Musgrave's analysis and reinforced Xirotiris and Langenscheidt's study which found no injuries, asymmetries, or malformations, Musgrave, Prag, Neave, Robin Lane Fox, and Hugh White penned a response in 2010. The osteological section answers Bartsiokas' main criticisms and reasserts Musgrave's own findings. For the zygomatic injury Bartsiokas said was an artifact of improper reconstruction, Musgrave wrote that glue and consolidant in the area made study difficult, and that, "restoring delicate areas of the face, especially when they have been cremated, is more difficult than gluing together limb bone fragments that join perfectly."<sup>180</sup> It is not clear if Musgrave was modifying his earlier opinion of the existence of an injury or not. Musgrave accepts that perhaps no eye injury can be detected, and any asymmetries might be the result of something other than trauma, as he noted in the 1984 paper with Prag and Neave. Musgrave stands by the other asymmetries and evidence of injury to the right side of the face, as well as his hypothesis about the Tomb II individuals having been cremated fleshed, *contra* Bartsiokas. Musgrave asserts the male bones display significant warping, while Bartsiokas terms the warping as minimal. During Musgrave's rebuttal to the cremation argument, he discusses what could have happened to the cranium to cause the severe deformation of the left parietal bone, which was attached by a small piece of bone and twisted away from the cranium at the coronal suture.<sup>181</sup> Musgrave explains this as a result of a fleshed cremation caused when the brain, blood, and cerebrospinal fluid

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<sup>180</sup> Musgrave et al. 2010, 3.

<sup>181</sup> Figure 22. Musgrave et al. 2010, 8, Figures 16-18.

boiled and the skull exploded. While this is a valid possibility, it is not clear how often this occurs,<sup>182</sup> and Musgrave's opinion that, "There is abundant anecdotal evidence on the Internet"<sup>183</sup> does not provide further scientific verification. Bartsiokas did not address the parietal warping, leaving his assessment of the male remains less complete than Musgrave's.

Musgrave accused Bartsiokas of using selective data and focusing too much on the question of the eye injury while ignoring the other data, while Bartsiokas asserts that Musgrave's findings are not supported by the osteological evidence and are mainly the result of mistaking poor bone reconstruction for trauma. Finally, Musgrave has asserted that since fifteen years passed between his examination and Bartsiokas', the remains may have deteriorated to the point where Musgrave's findings were no longer apparent, but this has been dismissed by Bartsiokas.<sup>184</sup>

### **A New Analysis**

In the middle of March 2014, a press release announcing several new findings was provided by Theodore Antikas, head of an anthropological research team who had been re-examining the human remains from Tomb II. The findings were presented in Greek at the Aristotle University in Thessaloniki. Although no report has been published, some commentary is necessary because of the noteworthy claims made by the team. A number of pathologies were observed by the team that had not previously been identified; this may be due to the use of technologies which allow for a high level of detail such as X-Ray Fluorescence scanning,

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<sup>182</sup> There is some debate about whether or not the skull explodes in fires; Pope and Smith 2004 deny this occurs, while Fairgrieve 2008 gives several examples.

<sup>183</sup> Musgrave et al. 2010, 8.

<sup>184</sup> Koenig 2000, 411.

which provides chemical analysis, and axial tomography: CAT-scanning. The team revealed that they found:

- Evidence of a fleshed, or “wet” cremation that excludes the “dry” cremation theory;
- A new set of age ranges; the male is now set between 41-49 years of age at death, and the female at 30-34 years of age at death, owing to a fragment of her pelvis that had not been examined before;
- Several antemortem pathologies. For the male, these were listed as chronic frontal and maxillary sinusitis, due to evidence of an old trauma to the right side of his face; an old incised trauma on his left hand caused by a sharp edged object; degenerative markers supporting the age estimation and intensive horse-riding. The female also was listed as having intensive horse-riding experience, along with a new find of a compression fracture to her left tibia which had caused shortening, atrophy, and lameness.

No other details of the analysis were included in the press release. Without knowing exactly how these new finds were made, only a limited commentary is possible. The wet vs. dry cremation argument has been based on the possibility that Arrhidaios was exhumed and then cremated by Kassandros; Musgrave held that the long bones of both sets of cremains displayed severe warping, evidence of a fleshed cremation. Bartsiokas believed the warping was not substantial, and the bones may have been defleshed or dry at the time of cremation. The new analysis does not present any details regarding the cremation process, just that they found evidence pointing to wet cremation.

The new age ranges do not affect either Philip II or Arrhidaios as candidates. Both kings were middle aged when they were killed, and this range is consistent with the historical sources for when they might have died. The female, however, has been given an age of

between 30-34 at the time of death, which would eliminate both Kleopatra and Adea-Eurydike from consideration, even with the absolute latest estimates for either of their ages at death. The assessment of a woman in her early 30s contradicts all the previous estimates. Xirotiris and Langenscheidt would not go beyond the age of 30, since they believed the woman's right clavicle had not completed full ossification. Combined with their other observations, an age at death of 25 was estimated, which Musgrave subsequently agreed with. If the new analysis is correct, then the clavicle was either incorrectly identified as retaining incomplete ossification, or this woman's clavicle was still not fully grown and fused in her early-thirties. This seems to contradict the literature on clavicular fusion, as noted above, which shows one hundred percent fusion by the age of 30. However, the team's findings were evidently based not on the clavicle, but a piece of her pelvis that had not been examined before; no details of what technique was used or what specific part of the pelvis was analyzed were released.

The pathologies noted by the team focus on two significant features: they support Musgrave's assertion that the male suffered a facial injury to his right jaw and cheekbone, and in a surprising addition, the team announced the female had a shortened left leg as a result of a healed shin fracture. The male facial trauma has now been recognized by two teams, and unrecognized by two others; Bartsiokas' assertion that the trauma is actually an artifact of improper reconstruction was not addressed in the release. The most interesting finding here is the compression fracture of the woman's left tibia. Compression fractures generally occur in the spine, and result in a shortening of the affected body part through the compression of one bone against another, such as the vertebrae; these are generally linked to pathological degenerative conditions such as osteoporosis and are not common in the young,

although this has been recorded.<sup>185</sup> High-impact traumas can create compression injuries, but occurrence in the limbs is also rare and typically involves associated bones. The press release used this as an opportunity to explain a pair of “mismatched” greaves<sup>186</sup> that had been placed in the same chamber as the female. The left greave is considerably shorter than the right, and with an unnaturally shortened leg, the female now fits into them very well.<sup>187</sup>

Although no statement about the identities of the remains was included in the press release, it is clear that certain conclusions are inevitable. First, the team upheld Musgrave’s findings for the male, which support the hypothesis of Philip II. The team evidently did not uphold Musgrave’s findings for the female, however; it should be noted that Musgrave supported an identification of Kleopatra. Secondly, the discovery of degenerative changes indicating an active horse-riding lifestyle along with the shortened left tibia and the note that the greaves must therefore belong to her clearly point to Meda. As discussed in Chapter Two, Hammond’s assertion that the Scythian golden bow-and-arrow case demonstrated their owner was a mounted archer favored Meda the Thracian for this position, despite Scythia not being located near Thrace. Furthermore, if the greaves now fit the female, indicating they definitely belonged to her, the unwarlike Kleopatra can now be more firmly excluded. Therefore, if the male is Philip II, and the female cannot be Kleopatra, the latest findings also terminate any argument for Arrhidaios and Adeia-Eurydike, since it is unlikely the mentally-challenged king would have accrued sufficient riding experience to produce marked morphological changes to his bones, and was not known to have suffered any injury.

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<sup>185</sup> Ferrari et al. 2012.

<sup>186</sup> Figure 26.

<sup>187</sup> Previous to this, several scholars had linked this short greave to Philip II, since he was known to have suffered a leg injury and been lame the rest of his life. Many discussions focused on this, until it was finally pointed out that Philip is known to have injured his right leg, and the shortened greave is for the right.

Interestingly, no accounts exist of any royal Macedonian woman having a shortened leg or limp, and of the warlike women who did rate a mention in the sources, Meda is not among them.

This new analysis, while presenting a number of significant developments and areas of scrutiny, does not explain how such major features as a compression fracture were missed by all previous examinations, and follows the problematic tradition of linking the remains to artifacts from the tomb, although this is, strictly speaking, beyond the purview of physical anthropology. The press release will undoubtedly create a new wave of articles either for or against the results, producing further confusion for this topic. Without an independent, third-party analysis, it is doubtful whether these contradictory opinions about the remains from Tomb II will ever be resolved.

### **Tomb III**

Tomb III was not opened until August 5, 1979, and was also revealed to be unlooted. The cremated bones of a single individual were found in a silver *hydria* with a hinged lid, with a golden wreath of oak leaves and acorns placed on the shoulders of the vessel.<sup>188</sup> The remains had been wrapped in purple cloth. Examination of the remains interred in this vessel was done by Xirotiris and Langenscheidt and published as part of their 1981 study which focused mainly on those from Tomb II.<sup>189</sup> Jonathan Musgrave also examined the remains from Tomb III, and provided detailed osteological notes and measurements.<sup>190</sup> Only fragments of this individual remained, and no complete reconstruction of any bone was possible.

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<sup>188</sup> Figure 23.

<sup>189</sup> Xirotiris and Langenscheidt 1981.

<sup>190</sup> Musgrave 1990, 291.

“There is a unanimous agreement that Tomb III belongs to Alexander’s son.”<sup>191</sup> This quote, while reflecting scholarly consensus, displays the central problem of dealing with this topic. Although most scholars<sup>192</sup> agree that the cremains found in this Tomb are those of Alexander IV, a son of Alexander the Great who was murdered in his teens, this is speculative if based on the osteological evidence alone. As Xirotiris and Langenschiedt note, the Tomb III remains are so fragmentary that no bones could be completely reconstructed, making a determination of age difficult but achievable and a determination of sex impossible. Age at death was estimated using the five teeth preserved with the remains, a portion of the pelvis, and part of the forearm, all of which showed incomplete growth.<sup>193</sup> The five surviving teeth were estimated as being at an adolescent stage of eruption, with some permanent teeth or roots evident, but some parts of the teeth not yet mature. Epiphyseal fusion was determined to be incomplete for the acetabulum and the proximal end of the radius, limiting this individual to the ages of approximately 13-17 years of age at time of death. In addition to these features, Musgrave adds incomplete epiphyseal fusion for the upper border of the scapula, distal end of the humerus, and the proximal end of the ulna, supporting the age estimation.<sup>194</sup> Determining sex for this individual was deemed impossible by Xirotiris and Langenschiedt, who cited the incomplete nature of the remains as being inadequate to establish sex based on accepted measurements such as the pubic symphyses and tooth dimensions (the teeth were too poorly preserved to rely on the metric analysis).<sup>195</sup> However,

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<sup>191</sup> Bartsiokas and Carney 2008, 17.

<sup>192</sup> With the exception, as Bartsiokas and Carney note, of Panagiotis Faklaris, who does not believe Vergina is the site of ancient Aigai.

<sup>193</sup> Xirotiris and Langenschiedt 1981, 156-157.

<sup>194</sup> Musgrave 1991, n.28, 7.

<sup>195</sup> Xirotiris and Langenschiedt 1981, 156-157.



Musgrave's later analysis disputes this conclusion, instead asserting that the sciatic notch from the right hip bone was narrow and male, and the diameter of one of the femoral head epiphyses (it was not possible to side it) indicate that this was likely a male.<sup>196</sup> No other analyses have been conducted on this individual, and no article focusing on the osteological evidence has been published. Without more data, it is difficult to determine any information beyond the youth of this individual based on the limited evidence available.

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<sup>196</sup> Musgrave 1991, 27np.7.

## Chapter Four: Injury and Cremation

### Combat Trauma of Philip II

The first factor driving the details of this osteological discussion is the evidence or lack thereof for antemortem injuries on the male skeletal remains from Chamber II of Tomb II. Philip II was known to have sustained several injuries during his life, and many scholars contend that definitive evidence of these on the male bones would add plausibility to the argument for identifying both sets of remains from Tomb II as belonging to Philip II and one of his wives. His son Arrhidaios, however, was not known to have any injuries, and was distinctly unwarlike owing to his apparent mental difficulties as discussed in Chapter Two. Absence of any injuries on the male skeleton would, according to this line of thought, strengthen the case for the male bones belonging to Arrhidaios, and the antechamber bones to Adeia-Eurydike. According to various sources, Philip II had several injuries from his years at war:

- i. An injury from an arrow to his right eye, sustained 18 years before his death at the siege of Methone from a missile, likely an arrow, in 354 resulting in permanent blindness.<sup>197</sup>
- ii. A broken right collar bone sustained in personal combat during a battle with the Illyrians 8 years before his death in 344.<sup>198</sup>

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<sup>197</sup> Diod. 16.34.5; Plut. *Alex.* 3.2; Demosthenes 18.67; Didymus *in Dem.* 11.22 col. 13.43-64; Demetr. *de Eloc.* 293; Strabo vii *fr.* 22 and *fr.* 22a; Pliny, *Natural History* 7.37.124; Justin 7.6.14; Lucian, *Hist. Conscr.* 38; Athenaeus 7.248f. The difficulties in dating of the siege of Methone are discussed by Buckler 1989, 181-85, Appendix I. Buckler argues that Methone was invested in the winter of 355 and fell during the summer of 354.

<sup>198</sup> Demosthenes 18.67; Plut. *Mor.* 177f no. 9; Didymus *in Dem.* 11.22 cols. 12.64-13.2; Seneca *Con.* 10.5.6.

- iii. A maimed right arm and (possibly right) leg (upper leg) that left him lame in 339, three years before his death. A *sarissa* pierced his leg through and killed his horse beneath him as he rode it.<sup>199</sup>

Alice Riginos provides a detailed overview of the veracity of the sources which describe Philip II's injuries and the different variations of each account.<sup>200</sup> Each of these injuries, while grievous, was evidently tended to quickly enough that Philip survived them all in good health. For the eye injury, we are told that Kritoboulos, a noted physician, was able to prevent any scarring although he was unable to save Philip's eye, indicating his blindness was due to complete loss of the organ rather than moderate damage, but does not indicate whether the eye was significantly destroyed on impact or Kritoboulos was forced to remove it himself due to extensive damage or infection.<sup>201</sup> Kritoboulos' actions are noted by Prag in his 1990 paper which amended the facial reconstruction of the Tomb II male skull to remove the livid

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<sup>199</sup> Demosthenes 18.67; Plut. *Mor.* 331b and 739b no.4; Didymus *in Dem.* 11.22, col. 13.3-7; Seneca *Con.* 10.5.6; Athenaeus 6.248f. Justin 9.3.2 states *Hinc iurgium et mox proelium, in quo ita in femore vulneratus est Philippus, ut per corpus eius equus interficeretur.* As Riginos 1994, n.64, 117 notes, the injury as described by Justin makes it difficult to imagine there would have been no evidence of the wound left on Philip's skeleton. While it is not stated explicitly that his leg was broken, the size of a *sarissa* makes a strike to the bone very likely. No record of such an injury has been noted in any of the osteological reports made on the Tomb II skeletal remains.

<sup>200</sup> Riginos 1994.

<sup>201</sup> Pliny, *Natural History* 7.37.124: *magna et Critoboulo fama est, extracta Philippi regis oculo sagitta, et citra deformitatem oris curata orbitate luminis.* Abundant accounts of penetrating trauma from arrow strikes and other missiles is found in Greek literature. In the *Illiad* 11.804-848, Patroclus removes an arrow from the thigh of Eurypylus, who is described as sweating profusely and in great pain; after the arrow was cut out, Patroclus then rinsed the wound in warm water, applied an herbal analgesic and a styptic to encourage blood clotting. Injuries of this type are now referred to as intraocular foreign bodies (IOFBs), and can now be repaired in most cases. However, with a penetrating eye injury of the type Philip suffered would have been almost impossible to preserve the eye, since reconstruction techniques were not available and missile strikes would likely have possessed significant momentum, creating impact damage to the tissues as well. The kinetic energy of a high impact arrow strike would have been significant:  $KE = 1/2 MV^2$ , where M = mass, and V = velocity. Furthermore, penetration of the eyewall would cause immediate intraocular hemorrhage and mixing of the vitreous and aqueous fluids and inflammation; furthermore, metallic IOFBs provide a higher risk of infection from introducing nonsterile objects to the exposed blood and lens mixture. Boffard 2011, 7; Kuhn and Pieramici 2002, 236-7.

scar present in the original version.<sup>202</sup> It should also be noted that no record of a traumatic injury to Philip's cheek or jaw in combination with loss of his eye or otherwise is known. Accounts of his blinding omit any mention of a shattered cheek or broken jaw:

*Testimonia for Philip's Eye Injuries*

- (1) Marsyas of Pella *ap.* Didymus, *On Demosthenes* col. 12.43-50 (*FGrH* 135/6 F16): "In connection with the siege of Methone he had his right eye knocked out, when he was struck by an arrow while he was supervising the siege engines and the so-called (tortoise) sheds. This is the way it is recounted by Theopompus in the fourth (book) of his histories about him (i.e. the Philippika), and Marsyas the Macedonian concurs. But Douris (of Samos), for even on this occasion he has to *talk marvels*, says (that) the name of the man who cast the *missile*<sup>203</sup> at him [in this opportune way] was [A]ster (Shooting Star), even though almost all those who *were on the campaign* with him say (that) *he* was wounded by an arrow. Now, as for the story concerning the flute players, that is agreed upon even by Marsyas. (It says) that, as he (sc. Philip) was celebrating a music festival a little before this misfortune (i.e. the loss of his eye), it happened that fatefully all (the flute players) played the (dithyramb) Kyklops (i.e. the one-eyed man)..." (translated by Harding 2006, 87-8).
- (2) Pliny, *HN* 7.37: [124]: "Critobulus also has a great reputation for having extracted an arrow from King Philip's eye, and having treat his loss of sight *without causing disfigurement to his face*" [emphasis added] (translated by H. Rackman, Loeb Classical Library).

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<sup>202</sup> Prag 1990a, 239.

<sup>203</sup> The Greek word *ακοντιον* means a javelin or a spear intended for hurling. Harding 2006, 235 cites Griffith 1979, n.2, 257, who believes that "a spear or a catapult [dart] in the eye would have been fatal."

- (3) Diod. 16.34.5: “In this siege it so happened that Philip was struck in the eye by an arrow and lost the sight of that eye” (translated by Charles L. Sherman, Loeb Classical Library).
- (4) Justin 7.6.14-15: “He was engaged in an attack on the city of Mothone (*sic*) and was passing before its walls when an arrow fired from the defences struck out the king’s right eye, but the injury did not make him any the less effective in combat or more savage in his treatment of his enemies” (J.C. Yardley tr.).
- (5) Demosthenes, *De Corona* 67: “Philip himself, contending for empire and supremacy, had endured the loss of his eye, the fracture of his collar-bone, the mutilation of his hand and his leg, and was ready to sacrifice to the fortune of war any and every part of his body” (translated by C.A. and J.H. Vince, Loeb Classical Library).
- (6) Plutarch, *Alexander* 3.1-2: “Philip sent Chaeron of Megalopolis to Delphi, by whom an oracle was brought him from Apollo, who bade him sacrifice to Ammon and hold that god in greatest reverence, but told him he was to lose that one of his eyes which he had applied to the chink in the door when he espied the god, in the form of a snake, sharing the couch with his wife” (translated by B. Perrin, Loeb Classical Library).

Additionally, it has never been ascertained what type of missile it was that struck Philip. Strabo claims he was hit by a catapult projectile, while Douris opts for a missile (by which he means a javelin or catapult dart).<sup>204</sup> The other sources assert that it was an arrow fired from a bow.<sup>205</sup> Although there is no study of what type of arrow might have been used in the attack, arrowheads from this time were usually made of bronze, sometimes barbed or leaf-shaped, about 2-3” long. Such a missile would have done considerable damage to the soft

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<sup>204</sup> See Harding 2006, 235. For the catapult dart see Snodgrass 1999, 117.

<sup>205</sup> This is the version given by Marsyas of Pella (*FGrH* 135/6), who is our most reliable source, since he was at the court of Philip of Macedon at the time of, or very soon after, the injury. See Heckel 1980.

tissues of the eye, although without knowing the angle of descent and the force of its strike, it is impossible to say for certainty what other structures may have been damaged, or how far the arrow would have gone. Although Musgrave's analysis and Prag and Neave's reconstruction of the Tomb II male skull shows a missile striking the eye at a sharp angle and penetrating the orbit rim then continuing down to shatter a portion of the cheekbone and jaw (Fig. 19), this was done based on the injuries observed by Musgrave, and facial injuries of the kind he asserts were involved with Philip are not corroborated by ancient sources.

A direct strike to the eye would have damaged it beyond repair and caused immediate swelling and bleeding, along with possible nerve damage to the upper face, but it is not certain that the bone would have been struck as well. An arrow could have injured Philip without leaving any mark on the surrounding orbit wall, especially if Philip was wearing a helmet at the time, which would have protected most of his face.<sup>206</sup> Prag and Neave present a hypothetical missile strike to the (unprotected) skull as part of their reconstruction work, and have a missile impacting the face at an almost parallel angle, slicing into not only the upper orbit of the right eye, but into the right cheek as well, at the mala-maxillary suture.<sup>207</sup> A blow from this angle is the only conceivable way to explain not only the eye injury but the apparent damage to the cheekbone as well, described by Musgrave and Prag as missing a small piece, which was "knocked away" in the same incident. However, without specific details of the blinding, any conjecture about the angle of descent as well as the nature of the weapon which

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<sup>206</sup> Helmets from this time were usually made of cast bronze, with the cranial vault comprising a single piece with additional cheek-pieces attached with leather straps, called Thracian helmets. See Heckel and Jones 2006, 60; see also Snodgrass 1999, 105, fig. 53. Cavalrymen wore the so-called Boiotian helmet, which has a visor of sorts and would have offered further protection to the face and eyes.

<sup>207</sup> Prag and Neave 1997, 66, Figures 7-8.

struck Philip is pure speculation; Musgrave, Prag and Neave have constructed a narrative for Philip II based on the bones rather than our sources for Philip.

The same rationale holds for the leg (and/or arm) injury. Though a *sarissa* is a substantial weapon (Fig. 20),<sup>208</sup> the sources do not agree exactly where in the leg Philip II was hit, although the upper thigh is noted,<sup>209</sup> or if any bones were broken. Blood loss, scarring, and nerve damage all might have been the result of such an injury.<sup>210</sup> Since he was left with a limp for the rest of his life, it can be assumed either the injury was substantial and a physician was not able to repair the wound completely, or medical aid was not obtained quickly enough to prevent major damage. Although a broken bone could be posited from this description, without any direct testimony, there is no evidence any skeletal structure was involved here either. Leaving the possibility of a break aside, since Philip's limp was considerable, it may have caused compensation by the opposing muscle groups if he was unable to fully support his weight on the injured leg through nerve damage or other tissue injury. Damage to any part of the musculoskeletal system will tend to cause compensation for the deficiency by other muscles and ligaments. Over time, consistent use of the compensating muscles or ligaments can cause increased bone growth at attachment sites in response to over developed or differently used tissues. Changes might also occur in the spinal vertebrae, hips, and feet in the case of an opposing side leg injury. These changes might conceivably be detected, although the distortion caused by cremation would make this difficult.

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<sup>208</sup> See Heckel and Jones 2006 for a discussion of the *sarissa* as a field weapon.

<sup>209</sup> Demosthenes, Plutarch, and Athenaeus refer to τὸ σκέλος; Didymus and Plutarch, ὁ μηρός; Justin says *in femore*.

<sup>210</sup> Boffard 2011, 156-62.

The most promising account of injury that is most likely to have left a visible trace on the bone is the broken right collarbone he suffered in 344, eight years before his death. The collarbone is the most frequently broken bone in the body,<sup>211</sup> and a strike from a *sibyna* or lance (λόγχη, according to Didymus) would have created a fairly traumatic injury, depending on where the break occurred. We can assume no subclavian nerves were damaged since Philip retained use of the arm, but there may have been muscle or ligament impairment since Plutarch relates that Philip was tended daily by a physician and was forced to recuperate for weeks.<sup>212</sup> This indicates the wound was severe, but also that sufficient medical treatment was available. Such a break would provide the best chance of lingering evidence on his skeletal remains, as physical changes to the bone structure occur after every break, even small ones.

When a bone breaks, a process called bone remodeling occurs. Cells called osteoclasts and osteoblasts replicate and grow around the injury site, then repair the damaged bone. In about 6 weeks, this creates a lump around the break called a callus as the cells work, and usually diminishes with time (Fig. 21).<sup>213</sup> In Philip's case, although a clavicular break would certainly have caused modification of the bone, after eight years there is no guarantee any evidence would still remain since the remodeling might have completed and the extra cells been reabsorbed, although the opposite might be true as many people retain callus formations many years after the break, with the likelihood of a callus remaining the older the patient is. Additionally, other indications such as fracture lines or unions would likely still

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<sup>211</sup> Robinson, Court-Brown, McQueen, and Wakefield 2004; Postacchini, Gumina, De Santis, and Albo 2002.

<sup>212</sup> Plut. *Mor.* 177f no.9. This information is in the form of an amusing anecdote where Philip is being tended to by an unnamed physician who demands his fees each time he sees Philip, which is daily. Philip replies, λάμβανε ὅσα βούλει τὴν γὰρ κλεῖν ἔχεις, 'So long as you have the clavicle (key), pay yourself!'

<sup>213</sup> White et al. 2012, 40-41.



be evident to some degree under radiography, although this does not seem to have been done on the Vergina bones prior to the most recent Antikas study.

Despite the debate over whether the male bones from Chamber II in Tomb II reveal proof for or against Philip II based on injury analysis, even with a firm identification, it is not certain any of his injuries except the broken clavicle would even have involved the skeletal structures in any way, or at least sufficiently enough to remain evident on his cremated remains. The existence or non-existence of osteological injury on the Chamber II skeleton cannot be used to determine the identity of the interred.

### **The Effects of Cremation on Human Bone**

The second anthropological factor affecting identification is the cremation of the remains from Tombs II and III. It has been suggested<sup>214</sup> that evidence of immediate cremation for the remains from Tomb II would substantially strengthen the case for Philip II, while evidence of delayed cremation would strengthen the case for Arrhidaios.<sup>215</sup> Understanding the effect these two types of cremation would have had on human bones, and how cremation might affect evidence of injury is essential to determining whether the Vergina skeletal remains reveal any indication of these activities which might support individual identification.

### *Temperature*

Determining the temperature of ancient cremations is a difficult task. Problems with ascertaining this figure include types of fuels used in the cremation process, different customs

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<sup>214</sup> Most notably by Musgrave in his work on the Tomb II remains (see below), but see also Anson 2006 and Lane Fox 2011, 28.

<sup>215</sup> If Philip II was cremated, this occurred soon after his death. While Kleopatra may have been killed soon after Philip, or within a few weeks or months, it is not clear if she was cremated. It is also not known how much time passed between Arrhidaios' and Adea-Eurydike's deaths and cremation, if they received one.

which dictated the length of burn time as well as the size of a pyre, whether the body was encased in a structure or not, and what materials if any were included with the deceased, such as metals, flammable fabrics, or foods and oils. All of these factors would affect the temperature of the fire, and therefore the results of cremation on the remains. Temperatures of ancient pyre cremations ranged between 180°C up to approximately 1000°C,<sup>216</sup> with many appearing to average around 650°C.<sup>217</sup> In contrast, modern kiln cremations are typically set at a working temperature of around 700-1000°C, taking about 1-1.5 hours to complete.<sup>218</sup> Considering these difficulties, assessing the temperature at which ancient remains were cremated has typically relied upon the color of the excavated remains, which corresponds with firing temperature.

### *Color*

The color of bone after cremation depends on three variables: oxygen availability, duration and temperature. Bone can range in color from black and brown charring, through blue and grey moderate burning, to an oxidized buff or white color. Shipman et al.<sup>219</sup> used animal bones and argued that pale yellow and brown meant a temperature less than 285°C, black meant 645°C, and white or light blue-gray meant 940°C, with temperatures above in neutral white or gray. By taking sheep bones and cremating them at different temperatures, they were able to correlate temperature to color. While there are variables which change this, colors similar to these roughly correlate to temperature of the cremation. Walker et al.<sup>220</sup> note the

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<sup>216</sup> McKinley 2000, 407.

<sup>217</sup> Mays 1998, 134.

<sup>218</sup> McKinley 2000, 407.

<sup>219</sup> Shipman, Foster, and Schoeninger 1984.

<sup>220</sup> Walker, Miller, and Richman 2008.

importance of oxygen, material, and environment in determining the color of cremains. They built a number of funeral pyres and used modern human femurs to test differences. They found that bones burnt on open air pyres lost their color and warped more than the bones burnt on pyres that were placed in holes in the soil. These observations are important to archaeologists since temperature can aid interpretations of the size of the pyre, the duration, the type of wood, and the energy put into the funeral rite. For example, Bartsiokas' observation of a light brown color for the male bones from Tomb II compared to Xirotiris and Langenscheidt's similar estimation does indicate they were likely burnt at a lower temperature (compared to modern fires with chemical accelerants), consistent with ancient methods of cremation, but beyond this, not much information can be extracted from the color of the bones without a chemical analysis of the cloth covering the remains, and perhaps the effects of being interred in a gold casket or silver urn for over 2000 years.

### *Deformation*

“The clearest form of dimensional change caused by burning is warping.”<sup>221</sup> Anthropological techniques rely on unmodified bone dimensions that are altered by warping and shrinkage, and since warping of bone during cremation will distort the appearance of a skeleton, this effect may have implications for identifying pathology or physical injuries, so any indications of this occurrence are important to note.

Studies on heat-induced fractures have focused on two conditions of bone during cremation: bone that is burned fleshed (green, or ‘wet’ bone), or dry bone which has been

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<sup>221</sup> Thompson 2005.

burned a long period of time after the flesh has been removed (degreased bone).<sup>222</sup> The appearance and effects of heat-induced fracturing and warping are disputed in the literature, with no clear standardization available. However, Ubelaker notes<sup>223</sup> that cremated green bone will display transverse fractures, often in a “curvilinear pattern,” with considerable warping, and irregular longitudinal splitting. In contrast, dry bones will display longitudinal splitting and less evidence of warping. These effects were confirmed in the above experiments by Shipman et al. on non-human animal remains.

### *Shrinkage*

Bone shrinkage due to the effects of burning has been recorded by several studies.<sup>224</sup> In 1970, experiments were carried out<sup>225</sup> to determine the correlation between temperatures and bone shrinkage. Using cortical fragments of the femur and spongy tissue from the mandible and the patella, the dimensions of the bones were measured after every 100°C of heating, with the temperature ranging from 200°C to 1500°C. It was determined that bone shrinkage occurs between the 700°C-900°C, and shrinkage may vary up to 25% of the original length on each bone.<sup>226</sup> Ubelaker agrees with the 1970 study that bones fired at higher temperatures should be linked with a shrinkage rate of 25%, which affects age and sex estimates.<sup>227</sup> Byers also researched the correlation between fire temperature and bone shrinkage.<sup>228</sup> He found that there was minimal to 2% bone shrinkage at temperatures less than 700°C. Bone shrinkage

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<sup>222</sup> Mayne Correia 1997, 278.

<sup>223</sup> Ubelaker 2009, 1-3.

<sup>224</sup> Thompson 2005, 187.

<sup>225</sup> Van Vark 1970.

<sup>226</sup> Stewart 1979, 128.

<sup>227</sup> Ubelaker 1978.

<sup>228</sup> Byers 2002, 287.

between 1 and 2% was almost always present between the temperatures of 700°C and 800°C. Finally, temperatures ranging over 800°C caused bones to shrink between 10 and 15%; however, 25% has been recorded,<sup>229</sup> which is consistent with the 1970 study. Therefore, a degree of bone shrinkage is expected to be present in cases of cremation, although it is not clear if there is any correlation between bone shrinkage and the fleshed or dry state of the body at cremation. Furthermore, the rate of 10% used to adjust figures for the bones from Tombs II and III is arbitrary, but within the range of lower temperatures expected from an ancient cremation.

### **The Limitations of Osteological Analysis for Determining Identity**

As Jonathan Hall notes, discussing the occupants of Tomb II, “One is entitled to wonder whether physical anthropological analysis of a cremated body more than two thousand years old can really distinguish between a nineteen- and twenty-year-old female.”<sup>230</sup> Hall was questioning Robin Lane Fox’s (and Musgrave’s) assertion that the individual in Chamber I from Tomb II cannot be Adeia-Eurydike, since she would have been too young for the age of “mid-to-late twenties” which Lane Fox attributed to the remains; as Hall notes, and as discussed above, Xirouris in fact gave an estimated range of 20-30, while Green observes<sup>231</sup> that Eurydike could have been twenty-one, and Kleopatra seventeen. Hall is correct in wondering whether it is possible to determine the difference between a 19 year old woman and a 20 year old using only osteological analysis; as of now, it is not. Part of this problem is the methods used for determining age in skeletal remains. No method corresponds to the

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<sup>229</sup> Maples and Browning 1994.

<sup>230</sup> Hall 2014, 109.

<sup>231</sup> Green 1989b, 139 and 145.

ages listed for any other method. For example, Buikstra and Ubelaker <sup>232</sup>suggest these categories and ages: Adolescent (12–20 years), Young Adult (20–35 years), Middle Adult (35–50 years) and Old Adults (50+ years), whereas Roksandic and Armstrong <sup>233</sup> argue for basing these categories on specific fusion and degenerative traits: Adolescence (eruption of permanent canines), Young Adult (fusion of long bones), Middle Adult (fusion of medial clavicle) and Old Adults (beginning of degeneration) without listing any ages at all. Furthermore, some of the techniques used are subjective: is an examined pubic symphysis more crenellated, or scalloped? The effects of cremation further distort skeletal remains, as noted above.

An additional factor that must be taken into account when analyzing the published evidence is the bias each of them carries. Each of the articles presenting an osteological analysis of the skeletal remains from Tombs I, II, or III proposes a firm identity at the outset or conclude with one, and examine the evidence in light of individual theories. Musgrave in particular makes opening statements such as “My aim is to persuade you that the bones from Tomb II belonged to Philip II and, probably, Cleopatra, and not, as others have suggested, to Philip III Arrhidaios and Adea Eurydice,”<sup>234</sup> and peppering all his publications with in-depth historical arguments in support of this hypothesis. Bartsiokas is guilty of this as well, albeit in less strident terms. Choosing an outcome and then attempting to fit the evidence to the desired conclusion creates confusion and prevents objective analysis from being done. The initial study done by Xirotiridis and Langenschiedt remains the most cautious, stating that

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<sup>232</sup> Buikstra and Ubelaker 1994.

<sup>233</sup> Roksandic and Armstrong 2011.

<sup>234</sup> Musgrave 1991, 3.

nothing was preventing identification with Philip II, although nothing was completely supporting it either.

Related to the problem of predetermined outcomes is the assessment of what is “scientific fact” and what is not. Richard Neave, addressing the facial reconstruction, emphasized the veracity of the portrait by listing the amount of expertise that went into it and calling it a “purely objective method”.<sup>235</sup> While the underlying techniques may be objective, as he discusses prior to explaining the process for the Tomb II remains, preconceived notions of who the individual is and how they are supposed to look do influence the process and final design; working with Musgrave, Neave assumed the identity of the remains as those of Philip II was confirmed, and proceeded with the reconstruction accordingly, citing specifically that it was helpful to have a certain miniature ivory portrait head that Andronikos identified as Philip II to work from when modeling the beard. How significantly Neave’s reconstruction may differ from reality is, of course, impossible to gauge.<sup>236</sup> As mentioned above in note 141, the appearance of a certain Canadian lumberjack in the building where the makeup artist was completing the reconstruction is what led to the finished version sporting a healed scar; despite Prag and Neave’s later dismissal of this feature, they did initially allow it, showing that even for the most “scientific” of scholars, sometimes it is difficult to retain complete objectivity.

The hazards of preconceived conclusions were demonstrated in another story about a unique unplundered tomb containing human skeletal remains. In September of 2013, an unlooted, intact rock-cut Etruscan tomb dating to c.610-600 BC was found at Tarquinia in

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<sup>235</sup> Musgrave et al. 2010, 13.

<sup>236</sup> Neave 2000, 325-334 presents a discussion of these and other considerations, using the Tomb II skull as a case study.

Italy; when opened, the skeletal remains of two individuals were found lying on stone biers.<sup>237</sup> One of the skeletons was complete and in good condition, and found with brooches and an iron spear on the larger of the two platforms, while the other skeleton was in considerably poorer condition and was mostly ash and bone remnants, and was found with gold jewelry and an unopened jewelry box on the smaller of the two platforms. Like the Vergina tombs, this was a rare find, and news outlets around the world immediately carried the story, with the lead excavator Alessandro Mandolesi quoted as describing the stone biers or platforms as “probably for a couple, especially if you consider the objects. The point of an iron spear is male . . . While other objects such as a jewellery box are female.”<sup>238</sup> While Etruscan culture is not directly comparable with that of the ancient Macedonians, and the date of this tomb is earlier than the date given for the Vergina tombs, there are, nevertheless, several striking parallels. This was termed the “Tomb of an Etruscan Prince” by several media outlets and described as the bones of a royal man wrapped in cloth lying next to the cremated remains of his wife. However, the accounts describing the tomb and the skeletal remains as “royal”<sup>239</sup> are inaccurate: the actual quote given by Alessandro Mandolesi described the human remains as a couple of high rank, “una coppia di altissimo rango.” The appellation of “royal” attached to this discovery seems to hinge on its location: close to the

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<sup>237</sup> Although no scholarly papers have yet been published on the find, lead excavator Alessandro Mandolesi gave several interviews to the Italian media detailing the finds and the developments as the story unfolded. The first reports are from late September 2013. Pinna 2013a.

<sup>238</sup> Gasperetti, 2013.

<sup>239</sup> Online reports from media around the world are summarized within the following story by Alessandra Pinna for *Viterbo News* 24, September 29, 2013c, “La tomba etrusca fa il giro del mondo.” Earlier quotes from *Viterbo News* of September 21, 2013a also state that the discovery was that of a prince: “Al suo interno gli archeologi hanno trovato lo scheletro di un principe vissuto 2700 anni fa, ancora adagiato sulla tomba di pietra, vasellame e un ariballo (un vaso che si utilizzava per contenere olii profumati) appeso a una parete. E ancora, nascosti in dei vasi, i sigilli appartenenti al principe, monili, una lancia, un giavellotto e probabilmente frammenti di un’armatura.”



erroneously-named tumuli called the “Queen’s Tomb,” and “King’s Tomb,” neither of which are royal burials and the former of which is actually a shrine rather than a tomb.<sup>240</sup>

Secondly, osteological analysis has played a key role for this find: examination discovered that the supposed “prince” was in reality a female, despite being interred with a spear, and the fragmentary remains on the smaller bier found with gold items and a jewelry box were those of a male.<sup>241</sup> After discovering sewing needles and thread in an even older *pyx*, The Tomb of the Etruscan Prince was quickly renamed “The Tomb of the Embroiderer”, and the spear is now thought to refer to a union between the two even though it was not touching the male, nor was it found in any position suggestive of union; lying instead between the wall and the female skeleton, parallel to her remains. Preconceptions about what a single spear lying next to the skeletal remains of an individual meant defined all interpretations of the tomb before any analyses were made. In this case, the bones were fortunately in pristine condition and were analyzed immediately, with the attendant results subsequently redefining the tomb as that of an aristocratic woman who embroidered, rather than that of a warrior prince. The state of the bones and the speed with which they were analyzed, especially in comparison to those at Vergina, presents yet another difficulty when attempting to use ancient human remains as definitive proof of identity.

The poor storage conditions of all the Great Tumulus remains is a limiting factor. The remains are not pristine, and have been repeatedly handled by multiple people of unknown qualifications, sometimes stored in cardboard boxes or under lights, and pieced together with

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<sup>240</sup> These tumuli are referred to as belonging to a “Queen” and “King” because of their size and resemblance to the tumulus tombs of Salamis on Cyprus, which are themselves thought to be royal based on nearly the same criteria as the Vergina tombs: evidence of Homeric burial such as cremation and the sacrifice of horses, quantities of bronze and gold items, armor and weaponry, and large size.

<sup>241</sup> Pinna 2013b.

glue of unknown composition. For several years, the bones of the male from Tomb II were laid out in a glass case on display in the museum, with no temperature or light control, and may have been adversely affected by humidity or heat. As shown in the analyses conducted by Musgrave and Bartsiokas, the initial reassembly of the bone fragments from Tomb II was not noted by one expert, and blamed for creating mistaken asymmetry by another. The existence of a previously-unknown or unexamined piece of pelvic bone from the Tomb II female demonstrates that past analyses have not been able to perform fully comprehensive studies, and that the bones were not maintained in an organized fashion.

While osteological analysis can produce many facts and present a picture of many aspects of the individual while alive, such as diet, broad estimations of height, age, and sex, how they were cared for after death and even cause of death in some cases, it cannot produce evidence for identity of an unknown individual of ancient age based on the skeletal evidence alone. As Musgrave remarks, “It would be unreasonable to expect an urnful of cremated bones to yield as much information as a whole, undamaged, inhumed skeleton from an undisturbed grave”;<sup>242</sup> yet it seems that with the skeletal remains from the Great Tumulus, many people expect exactly that.

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<sup>242</sup> Musgrave 1991, 286.

## **Chapter Five: An Anatomical Assessment of the Male Remains from Tomb II**

Given the limited amounts of data that are available for most of the human remains, and the contentious nature of the analyses done by Musgrave and Bartsiokas and the latest discoveries by the Antikas team, it is worth questioning what conclusions can be obtained from the published findings. Apart from the factual points noted above, much of the problem with this material is how the evidence has been interpreted. While each expert has weighed in on one side of the debate or another in favor of a preferred candidate, it is useful to evaluate the details without specifying any particular identity. However, since many experts have strong arguments for either Arrhidaios or Philip II, evaluating the male remains from Tomb II in the context of these two possibilities presents an intriguing line of consideration. Since the most contentious part of the analyses has been the skull, I will focus on this area.

Considering Musgrave's assertion that the male skull from Tomb II shows extensive deformation due to bone remodeling through injury or possible congenital abnormalities, these features have been analyzed to determine if any of the proposed scenarios matches the osteological evidence as published. The facial asymmetries described by Musgrave do exist, although the way they were caused has been disputed. While Musgrave asserts that these are a result of injury or were there from birth, Bartsiokas contends that these are all results of the restoration process combined with the effects of cremation, producing deformed bones that did not have this appearance in life. In light of these statements, four possibilities exist:

- 1) The man was born with deformities to the right side of the face. The superior margin of the orbit, the zygomatic bone, maxilla, and mandible all developed abnormally, but only on the right side of the face. These abnormalities were further deformed by cremation.

2) The man was born with normal bone morphology, but was struck in the face by an arrow or other missile in battle, or sustained injury in some other way (or through separate events) which also damaged his zygomatic bone, maxilla, and mandible, causing extensive bone remodeling to the mandible and resulting in a misalignment of the healed bones. These bones were further deformed by cremation.

3) The man had no developmental defects or injuries; all deformations are a result of the effects of cremation.

4) The man had no developmental defects or injuries; the bones were deformed during cremation, but the major asymmetries on the right side of the face are a result of gluing the fragmented bones back together improperly.

Using only the published photographs and data about these facial bones, three inferences are possible:

1) The mandible deformity matches the maxilla deformity quite closely, indicating a craniofacial skeletal abnormality present during development: *birth defect*.

2) The mandible deformity does not match the maxilla deformity, and tooth wear or muscle scar evidence indicates differential chewing forces: *healed adult injury*.

3) The mandible deformity does not match the maxilla deformity, with the maxilla also deformed but differently: reconstruction artifact alone, cremation warping alone, or a combination of both.

The diagnoses of these various scenarios are dependent on a number of different factors, some of which are not discernible on the cremains.

### *1. Birth Defect*

Early in embryonic development, the different parts of the face form separately but depend on each other to come together in the right spots.<sup>243</sup> If this does not occur because of a genetic mutation, chromosomal abnormality, or exposure to teratogenic substances, several problems can arise, including improper formation of the affected structures.<sup>244</sup> Since the facial bones form at about the same rate and the mouth and jaw are linked, an abnormality present in one structure such as the mandible would likely be present in the associated structure as well, in this case the maxilla. An examination of the available images for the mandible and maxilla for the male from Tomb II indicates that the asymmetry noted by Musgrave<sup>245</sup> in the mandible does not appear to have a commensurate equivalent in the maxilla. The right zygomatic bone and maxilla are presented as gravely asymmetrical with the maxilla vertically inadequate to the point where occlusion with the mandible would have been seriously affected or impossible. This type of birth defect might have impacted the individual's ability to chew and eat, which could have resulted in abnormal or asymmetrical musculature in the jaw. According to Musgrave, the mandible of the male skeleton from Tomb II does present some indications that it was used abnormally in chewing. "The posterior portion of the left mandibular body is thicker and some of the muscles attached here have apparently left more marked impressions than those on the right. In particular there is a pronounced downward continuation of the anterior border of the left coronoid process, or oblique line, perhaps

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<sup>243</sup> Problems that can arise during the developmental process of morphogenesis (dysmorphogenesis) are discussed in Schoenwolf, Bleyl, Brauer, and Francis-West 2009, 133-165.

<sup>244</sup> Jacobsson 1997; Diner, Tomat, Hamou, Vazquez, and Picard 2008.

<sup>245</sup> Musgrave 1985, 5, and see Figures 2 and 3 on p. 12, and Musgrave et al. 2010, Figures 3, 4 and 5, the same images as previous, but with better resolution, and Figure 7, for an occlusal view of the maxilla and hard palate with remnant dentition.

associated with a well-developed masseter muscle.”<sup>246</sup> This partly agrees with Xirotiris’ assessment that, “The oblique line is well developed on both sides, the masseteric tuberosity is developed strongly on the right weaker on the left,”<sup>247</sup> though it should be noted that Xirotiris did not emphasize the left oblique line of the mandible as Musgrave did. The fracturing and damage of the male bones from cremation means their original condition and shape are not completely apparent now, but it seems that the deformation or asymmetry of the right maxilla for this individual does not match the deformation of the right side of the mandible, indicating the deformity was unlikely to have been a result of a birth defect. As noted above, a birth defect resulting in a skeletal deformity would potentially produce muscles with a different shape than normal. However, longterm differential use of musculature following an unrepaired injury would also cause misshapen muscles, and might also further affect the bone morphology depending on the application of different forces to different places.

## *2. Healed Adult Injury*

As discussed above, Philip II was blinded by a missile strike at the siege of Methone in 344. This injury is well attested, although the weapon which caused it may be somewhat uncertain. His son Arrhidaios is not recorded as having any known injuries, although this does not preclude their existence.<sup>248</sup> Musgrave has claimed the male facial bones from Tomb II show extensive evidence of healed injury in conjunction with cremation damage, leading him to

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<sup>246</sup> Musgrave 1985, 6.

<sup>247</sup> Xirotiris and Langenscheidt 1981, 146.

<sup>248</sup> Arrhidaios’ mental condition probably precluded his participation in battle. Hence no war injury is to be expected.

support the view that the skeleton belonged to Philip II. This king was not known to have any other facial injuries except that of the blinded right eye, and no further indications of facial disfigurement or impairment are recorded. If, as Musgrave suggests, Philip II received damage to his face in addition to the loss of his right eye, with even a piece of cheekbone “knocked away” in the incident, it seems reasonable to expect some mention of this in the sources considering his other major injuries are recorded. An injury to his cheekbone which caused a piece of it to be not only missing but absent would result in a surface wound as well, although absence of such an injury in the record may speak to the minor nature of the wound. Prag and Neave explain the lack of testimonia for a facial injury to the existence of Philip’s beard.<sup>249</sup> They dismiss the idea that deformation of the cheekbone or jaw would have been particularly noticeable, especially when covered by a beard, and assert that the face would only have been “slightly twisted.”<sup>250</sup> Furthermore, they then suggest that the deformity was not severe and not noteworthy anyway, but also that Alexander then shaved his own off so no one would think he was hiding a deformity himself:

A person’s face must be very badly deformed before it becomes noticeable; so that it is not at all surprising that no ancient description refers to Philip’s misshapen face – in a world where deformity of all kinds was much more common than it is now such a minor irregularity would not have been worthy of comment. All the same one sometimes wonders whether Alexander might not have laid such emphasis on shaving off his own beard counter to the Macedonian tradition, compelling his soldiers to do the same, in order to make the point that, unlike his father, his face was perfectly balanced.

This last statement implies that not only would Philip’s facial deformity have been obvious, but that it was severe enough for Alexander to want to prove he himself was not disfigured.

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<sup>249</sup> Prag and Neave 1997, 68.

<sup>250</sup> Ibid.

While the missing cheekbone fragment suggests damage to the face, how it occurred is not evident. Of greater interest is the apparent damage to the maxilla and mandible, indicating the right side of the face including the lower jaw was fractured or shattered. While Musgrave, Prag, Neave, and Lane Fox posit this event occurred in conjunction with the loss of his eye and the damage to the cheekbone, no record of such an injury exists in the sources, although they posit it was not severe enough to warrant mention in the ancient sources. However, an injury of the severity described by Musgrave would have been significant and created difficulties in eating and speaking. Musgrave consistently describes the facial bones as asymmetrical, and focuses on this in the 2010 article which responded to Bartsiakas. Musgrave states that the lateral walls of the right maxillary sinus are “decidedly abnormal...shorter, straighter, and more angled come to mind to describe it.”<sup>251</sup> Bartsiakas also records this severe asymmetry, although he does not attribute it to injury. In contrast to Prag and Neave’s assertion that the deformation to the face caused by this asymmetry would be negligible, the extreme disparity in height between the left and right sides of the jaw contradict this.<sup>252</sup> For a distortion of this severity, the jaw and cheekbone would both have likely been broken and healed incorrectly, resulting in substantial deformation. Any evidence of tooth wear which might indicate differential or compensated chewing as a result of such an injury must be discarded through loss of the teeth during cremation, since teeth tend to explode when exposed to high heat. With the absence of teeth, muscle or ligament attachment sites on the jaw itself which are abnormally developed could point to compensatory use due

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<sup>251</sup> Musgrave et al. 2010, 3.

<sup>252</sup> Figure 16. Musgrave et al. 2010, 3. The difference in elevation between left and right sides is about 1 centimeter. While this seems minor, the entire right side of the face is lifted up and misaligned, which means all the muscles and soft tissues of the side would have been distorted as well, resulting in a visibly abnormal face rather than the small twisting of the mouth Prag and Neave suggest would have existed.



to injury to the opposing side of the face; these traces would be subtle if the use was not extensive. Furthermore, the condition of the maxilla and mandible would likely prevent complete assessment of these factors, since the bones have been exposed to gluing and reconstruction.

### *3. Reconstruction, Warping, or Both*

Of all the possible explanations for Musgrave's detection of cranial injuries, the effects of cremation and reconstruction are the most difficult to assess. Since the remains are no longer in pristine condition and it is not known exactly how they were treated and handled in the years since their discovery, it may be impossible to tell which artifacts are the result of cremation warping, the reconstruction process, or a combination of both. Even if all the chemical glue components were completely removed, a task which would likely further damage the bones, it would still be difficult to discern exactly which features were completely heat-induced, especially at the microscopic level. Differential chewing, increased muscle and ligament attachment sites, and wear patterns on surviving teeth are all factors that would need to be examined closely, and could not be completely assessed without enlarging the suspect sites. Although Bartsiokas did this with macrophotography for some features such as the disputed arrow wound in the right eye orbit, a complete survey of the cranium would need to be done in order to produce comprehensive results.

Clinical analysis of the bones from Tombs I, II or III is limited to an evaluation of published photographs, which do not lend themselves to accurate scientific study. Without direct access to the bones themselves, or at least a database of high resolution images such as that announced by the Antikas team in the 2014 press release, independent corroboration of Musgrave's findings cannot be made. Although observations about these bones are

preserved in the published reports, a detailed study of the type of weaponry used to injure Philip and the medical effects it would have on his musculoskeletal system is needed to complete any medical assessment of his injuries, and determine whether any evidence might remain on his bones.

## Chapter Six: Conclusion

The Macedonian tombs at Vergina continue to be a subject of intense interest. Work at the site is ongoing, and produces fruitful results. In March 2014, it was announced<sup>253</sup> that five new tombs had been found at Vergina: three cist or chamber tombs similar to Tomb I, and two ‘Macedonian’ or monumental masonry tombs. Angeliki Kottaridi, director of the 17th Ephorate of Prehistoric and Classical Antiquities of which Vergina is a part and the principal excavator of the new tombs, has linked them to the Temenid kings including Perdikkas II (454-413) and possibly Kassandros.<sup>254</sup> All the new tombs were looted and partially destroyed, and until publications emerge detailing the finds, the methods used to determine the identities for whom the tombs were intended remain a mystery.

The human skeletal remains from Tombs I, II, and III present a similar problem. Without identifying markers or inscriptions, the identities of the occupants become a matter of educated guesswork. Osteological analysis alone cannot settle the question. And the political tensions between Greece and the Former Yugoslav Republic of Macedonia (FYROM) have resulted in a dispute over the ownership of culture and the nature of national identity. For the nationalistic claims and image of Greece and FYROM, possession of Philip II’s remains would enable either to claim a remarkable heritage reaching back more than two thousand years. Hence many scholars working in the fields of history and archaeology focusing on the Vergina tombs, feel an obligation to choose sides in this dispute, which sometimes takes the form of invective and questionable methodology. The Vergina tombs

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<sup>253</sup> This announcement was part of the 27th Meeting covering Archaeological Works in Macedonia and Thrace, held at the Aristotle University in Thessaloniki.

<sup>254</sup> Kassandros qualifies as a Temenid ruler only by virtue of his marriage to Theassalonike, daughter of Philip II.

seem to act as a kind of Rorschach test, where each scholar identifies particular features as more important than others, and interprets the art, artifacts, and human remains in a way that supports his or her preferred hypothesis. The resulting conclusions, which are not based on solid evidence, lead to misunderstandings about the material itself and create scholarly divides detrimental to further research.

Even the most recent findings from the Antikas team have not put an end to the disagreement. While the proposed database of over 3000 images mentioned in the March 2014 press release may be able to provide definitive proof, it is not clear when or if this database will ever be made accessible to researchers not directly involved in the project. Limiting access to a strictly Greek team prevents the international scholarly community from verifying the accuracy of the conclusions published to date.

It is worth noting that no evidence of injury was observed by two of the teams that have examined the remains from Tomb II. Although Musgrave observed a large number of injuries that are supported by the most recent analysis, he did not record the most significant of these: the compression fracture on the female's left tibia. This seems to indicate that Xirotiris, Langenscheidt, Musgrave and Bartsiokas all missed this crucial piece of evidence. Of course, the bones which display this injury were not available to any of these experts for analysis, as demonstrated by the new pelvis fragment which has changed the age at death for the Tomb II woman so significantly. If even at this late date new material is being discovered and assessed, the true value of all previous analyses, whether claiming evidence of injury or not, must be called into question. How do these new results alter the many theories of ancient historians based on the osteological material? If the Antikas team is correct, then our understanding of the Macedonian royal court during the time of Philip II must also be altered, along with other aspects of this topic.

Suggesting Meda as the most likely candidate for the female bones in Tomb II raises a number of questions concerning her status and lifestyle, as well as our understanding of burial practices and funerary rituals during the fourth century. Why would an almost unknown wife be accorded the special honor of being buried adjacent to the king? If the weaponry in the chamber belongs to Meda, how did her martial nature escape the notice of contemporary and later historians, who recorded the activities of Kynnane and Adea-Eurydike as exceptional? If the woman is not Meda, similar questions remain: which royal wife might be buried in Tomb II, and where is the child if the remains are those of Kleopatra? Tomb I appears to present a viable alternative, although the presence of a male skeleton and the absence of grave goods continues to preclude any firm identification; as the case of the “Etruscan Prince” shows, relying on artifacts from a burial before establishing the facts can be risky. Although features such as the Abduction of Persephone fresco in Tomb I seem to indicate female burial, the existence of both the infant remains and the male skeleton have forced some academics to construct creative hypotheses that make the evidence fit with a preconceived narrative, such as the infamous ‘tomb robber.’

The adolescent in Tomb III, often thought to be the son of Alexander the Great, presents a similar complication. Rather than deriving a conclusion from the available facts (the grave goods and the cremated bones) then determining a possible identity, opinions seem to have developed the other way around. As a result, some scholars have constructed circular arguments. Vergina is now identified with Aegae; Aegae is the traditional burial place of Macedonian royalty; King Philip II is entombed next door. Thus it was inevitable that a limited number of candidates present themselves. Again, rather than confirming particular burial customs, Tomb III raises more questions. If this is Alexander IV, where is his mother? What was the custom when it came to burying royal children? The Great Tumulus burials

seem to offer at least three possibilities based on the skeletal evidence alone: infants were buried with their mothers (Tomb I); childless women (or those who had predeceased them) were buried alone (Tomb II); motherless children or young male adolescents were also buried alone (Tomb III). Each of these scenarios modifies our understanding of what happened to the Argeads after Philip II's assassination, and requires further research.

The search for confirmation of historical events through osteological analysis has proven elusive. Much of what can be determined from bones relies on exactly what happened to the living individual, both before death and afterward. The existence or absence of antemortem injuries on ancient skeletal remains should not be used as definitive proof for identity. Without knowing exactly what happened to a particular person while he or she was alive, it is impossible to corroborate proposed injury sites with the historical record, which is likely incomplete. Additionally, the physical effect on development and morphology that any supposed injuries might have had on the person must be understood. In the case of Philip II, although his most serious war injuries are well attested in the ancient sources, the consequences of these to him and his body are not known. If infection had caused Kritoboulos to surgically remove Philip's injured eye, this might impact the marks left on his skeleton. The *sarissa* wound Philip suffered may have broken his leg, leaving more obvious traces on his bones than a tissue wound alone. If, hypothetically, Andronikos and his team had discovered male remains in Tomb II, but with a clearly amputated arm, how might such an injury affected all subsequent interpretation of the tomb, the site, and the history of Macedon?

The evidence provided by the human remains from Tombs I, II, and III is far from certain and cannot be used as the basis for establishing the identity of the occupants of the tombs except in the most speculative way. Much more hazardous is the use of these speculative identifications for further interpretation of the individual tombs or chambers or,

even more, for establishing the identities of the individuals in adjacent tombs, and by this extension, the entire Vergina site. Methodologically, much of what has been done is either a case of putting the cart before the horse or creating circular arguments. Furthermore, forced linkages between speculative identifications and the evidence of other tombs leads to a house of cards. The scholars most concerned with Carney's 'vexed question' of who is buried in Tomb II have created a mass of conjecture rather than substantiated arguments, and have generally done so on incomplete understanding of the available osteological material. Osteologists who wish to pursue work in this field should be encouraged to provide reports in language more accessible to historical scholars, to avoid further misunderstandings of their results. Many of the complications surrounding the Vergina bones stem from a lack of understanding of osteological methodologies. Although Hatzopoulos asserts that historians and anatomists should not make statements about one another's fields, the Vergina human remains demonstrate that an interdisciplinary approach is not just recommended, but essential.

My purpose is not to impugn the integrity of the anatomists and physical anthropologists who have examined the Vergina human remains, or the expertise of the historians working on this topic, but rather to illuminate the most troubling aspect of attempting research in this field. I believe the tendency to distort or misrepresent some of the anatomical findings is not malicious or deliberate, but rather originates from an inability to be fully impartial. Knowledge of Philip II's combat injuries naturally leads to speculation about whether these would have left traces on his bones. Consequently, some anatomists and physical anthropologists begin by looking for such evidence. As shown above, determining precise information from cremated ancient remains is not the exact science that most scholars

in this field believe. The difficulty is increased when pieces of the puzzle, including fragments of bone, have not been available to everyone.

The only way to ensure a truly unbiased and objective assessment of the Vergina bones is to have them freshly analyzed by a completely new team. Ideally, the team would comprise international experts on forensic anthropology experienced with cremains, who have no ties to Greece, Vergina, or any other aspect of the site. The team would not be told the potential identities of the bones they were examining, and therefore under no pressure to interpret the evidence in any particular way. Although the Antikas team has effectively blocked additional analysis of the Tomb II skeletons for the time being, I am optimistic that future scholars will have new opportunities to study both the bones themselves, as well as the methodologies that have led to the current state of affairs.

Rather than acting as a minor feature of the Macedonian tombs at Vergina, the study of the ancient human bones found there have instead imbued the entire field with a special air of importance. It is one thing to find an empty tomb, devoid of artifacts and many traces of personality, and another to find the remains of the person interred within, still wrapped in the burial cerements and surrounded by belongings likely used in life. Osteological analyses of ancient remains provides a direct link to historically known individuals, and allows us to connect with their lives and stories in a way a ceramic potsherd cannot. For the three Vergina tombs, although the ancient bones found within must be left unidentified, the impetus to determine the true identity of the six individuals from the Great Tumulus will continue.



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## **Appendix I: Age Determination Methods in Physical Anthropology**

### **Dental Eruption and Occlusion**

The emergence of deciduous and permanent teeth generally follow a certain timeline, and is most useful in age estimates up to 15 years old, since after all teeth have erupted (and some, such as the wisdom teeth, never do in many individuals) no reliable indication of age can be obtained. Occlusal wear, how worn down an individual's teeth are at time of death, can sometimes indicate age but has been shown to be highly inaccurate in archaeological contexts because high-grit content diets can replicate the effects of wear in a younger individual.<sup>255</sup> This method examines how erupted or worn available teeth are, and compares them to a set of standards

### **Cortical Bone Histology**

Kerley<sup>256</sup> developed a system of aging based on osteon counts taken from midshaft long bone sections. This process involves counting the number of whole osteons and osteon fragments (which increase in number with age), and nonhaversian canals and the percentage of circumferential lamellar bone in the cortex (which decreases with age, completely disappearing around age fifty). These estimates are taken from the outer one third on the cortex, with a normal light microscope in four fields at 100X. A percentage estimate is calculated, and what is sought after is the rate of osteon turnover or replacement. These percentages are added into either a regression formula or a pre-calculated age\profile chart. Kerley has obtained a reliability of almost 90% with a standard deviation of +/- 5 years, with

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<sup>255</sup> Brothwell 1981.

<sup>256</sup> Kerley 1984.

the best correlation coming from the fibula, then the femur and the tibia. Images from microscopic examination are analyzed for traits and compared against a set of standards.

### **Cranial Suture Closures**

This method bases age upon the degree of closure, union or ossification of the cranial sutures. These methods have until recently been considered inaccurate, but Meindel and Lovejoy<sup>257</sup> have introduced new evidence to indicate parietal ectocranial sutures are reliable indicators of age over 40 years. The various sutures which make up the cranium are examined according to if they can be seen, their location, and how closed they are, graded on a number scale. These measurements are then compared against a set of standards; the more open and visible cranial sutures are, the younger the individual generally is. Age tends to obliterate cranial sutures as bones fuse together. A particularly aged individual may have an almost smooth cranium with hardly any visible cranial sutures.

### **Postcranial Epiphysial Unions**

Endochondral bones of the postcranium form via the union and ossification of cartilaginous bridges between growing bones. This process can be seen to occur along a growth algorithm, and can be used to estimate age at death. Bass<sup>258</sup> lists some of these locations of epiphyseal union, as well as the approximate age ranges for which these unions occur. This data can be used on a union/non-union basis, and McKern and Stewart have define five grades of epiphyseal union: unobservable (0), beginning (1), active (2), recent (3), and complete (4),

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<sup>257</sup> Meindel and Lovejoy 1985.

<sup>258</sup> Bass 1987.

and these offer a possibly more accurate estimate of age.<sup>259</sup> The existence of clearly visible epiphyses in the post cranial skeleton often indicates a younger individual, which can sometimes fall within specific age ranges depending on which bone the epiphysis is connected to. Epiphyses which are completely unattached (unfused) generally indicate an immature individual, while fully fused epiphyses with no epiphyseal lines evident indicate a mature and older individual. These sites are most prominent on the long bones.

### **Pubic Symphyseal Face Morphology**

The pubic symphyseal face in the young is characterized by an undulating surface, such as the crenulated surface of a typical non-fused epiphyseal plate. This surface undergoes a regular progressive metamorphosis from age 18 onwards. This system was developed by Suchey and Brooks for the male pubic symphysis.<sup>260</sup> The pubic symphyseal face is the joint between the two halves of the pelvic bones; these surfaces have distinct morphology which can be compared well with a set of standards in the form of plaster casts of individuals of known age. A great deal of familiarity with bones and pubic symphyseal facies is required for accurate estimation of age from this method.

### **Age-Related Degenerative Changes in Skeletal Features**

Many non-pathogenic conditions such as certain expressions of arthritis and osteoporosis become more prevalent and pronounced in old age, and can be used to give corroborative evidence in the determination of age. These occurrences are not entirely reliable in themselves, however, as injury and pathological expressions of these conditions can mimic

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<sup>259</sup> McKern and Stewart 1957.

<sup>260</sup> Suchey, Brooks, and Katz 1988. This method involves comparison of a wide variety of sample casts of the pubic symphyseal facies.

the degenerative condition. One example of these changes is the existence of osteophytic growths on the vertebral body via osteoarthritis. These growths form on the outer margins of the centra, and Stewart<sup>261</sup> has computed an age progression histogram for humans over 21 years based on the percentage of extra-central lipping as a function of age for the lumbar and thoracic vertebra. Other age-related changes include collapsed bones from bone density loss, excessive wear on joints, or unusually built up areas of muscle attachment on load-bearing bones.

### **Phase Changes in the Sternal Ribs**

Iscan and Loth<sup>262</sup> have developed a system of age estimation based on sequential changes at the sternal end of the fourth rib. These changes are similar to those that occur on the pubic symphyseal face. They are of a specific morphological nature and occur on the costochondral joint between the rib and sternum. They consider that these phases are not as subject to variation due to sex, pregnancy and activity patterns as is the pubic symphyseal face. This technique is very similar to the examination of the pubic symphyseal facies, and where the sternal rib ends are compared to a set of plaster casts from individuals of known ages. Again, a high degree of familiarity and skill is required for accurate estimation using this technique.

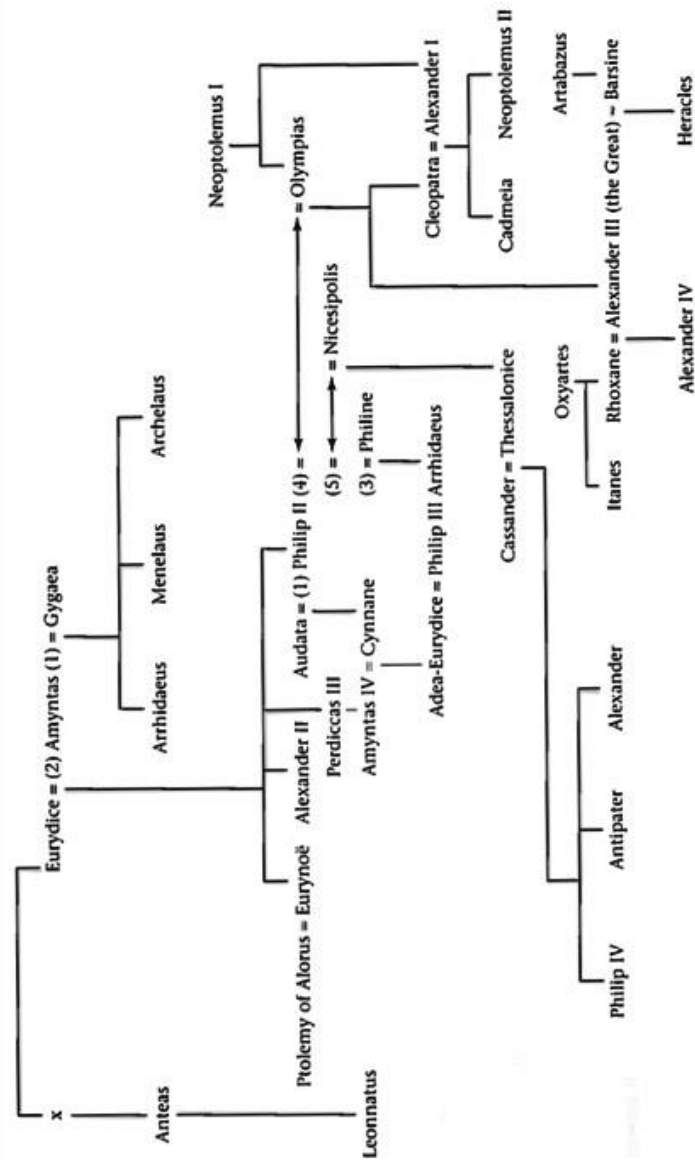
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<sup>261</sup> Stewart 1958.

<sup>262</sup> Iscan, Loth, and Wright 1984a; 1984b; 1985; 1987.

## Appendix II: Figures and Illustrations

### Stemma



Stemma 1. The Macedonian royal house.

## Figures



Figure 1. Entrance to the subterranean Archaeological Museum of Vergina, former site of the Great Tumulus.

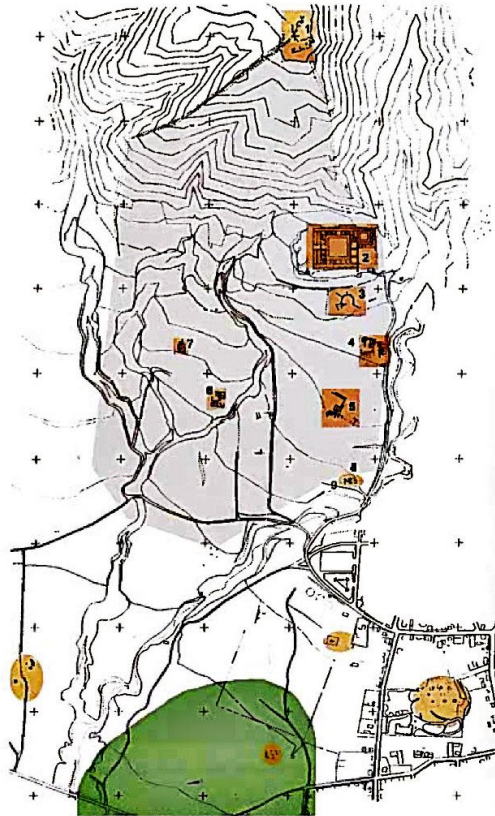


Figure 2. Plan of the Vergina archaeological site. The Palace is at the top, the tumuli cemetery in green, and the Great Tumulus/Museum to the right in orange.

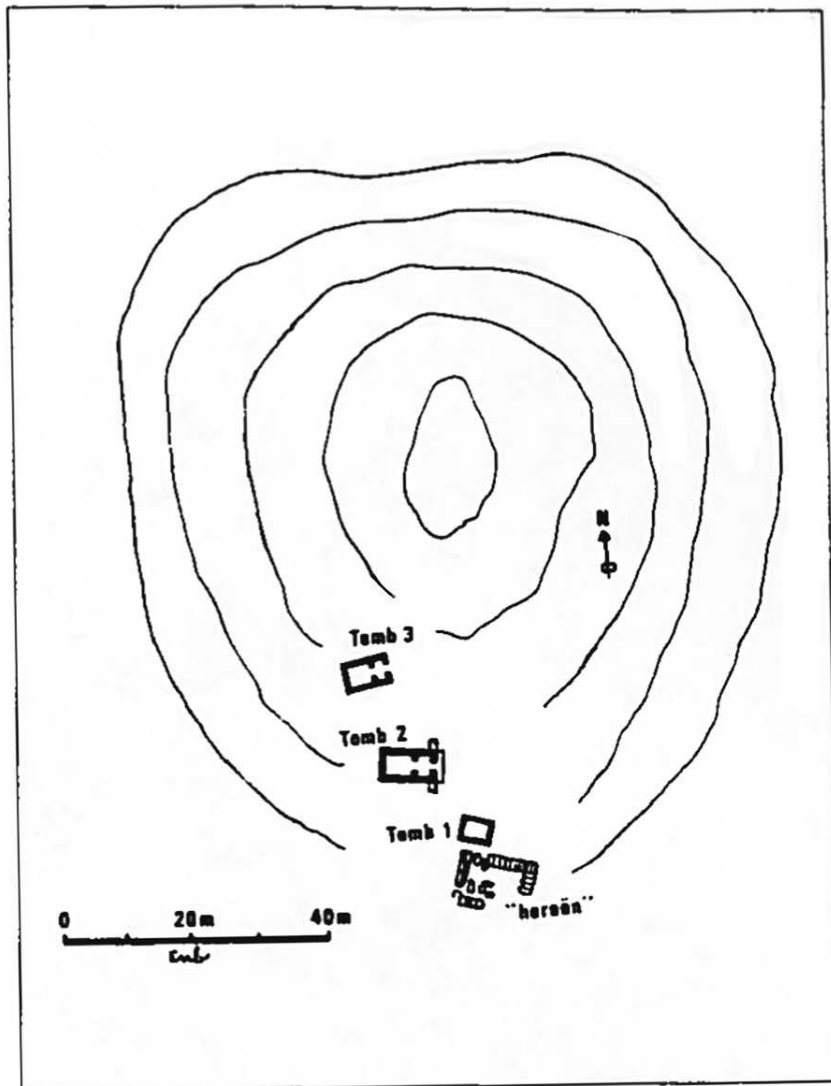


Figure 3. Position of Tombs I, II, and III within the Great Tumulus.

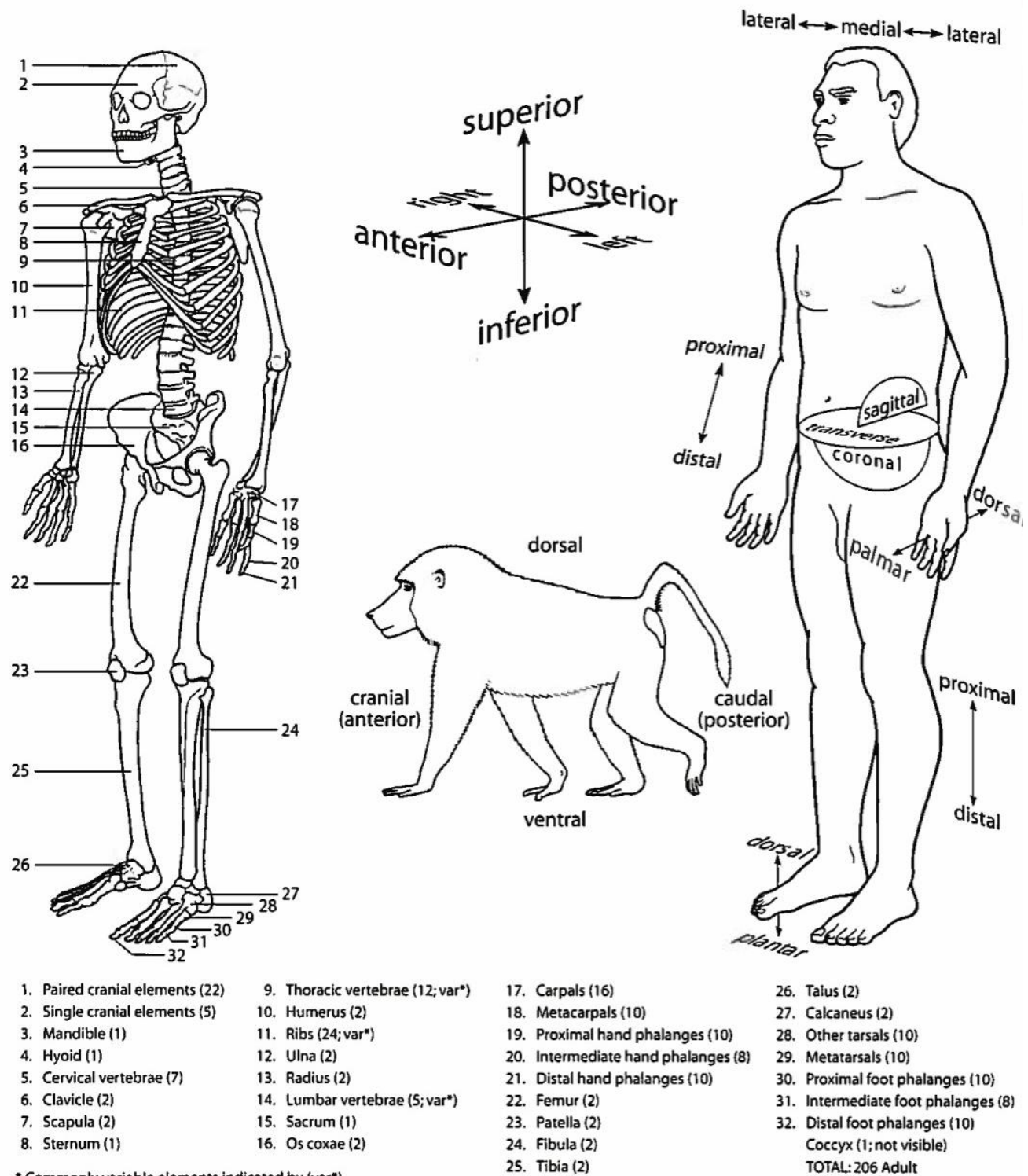


Figure 4. Directional planes and anatomical nomenclature.



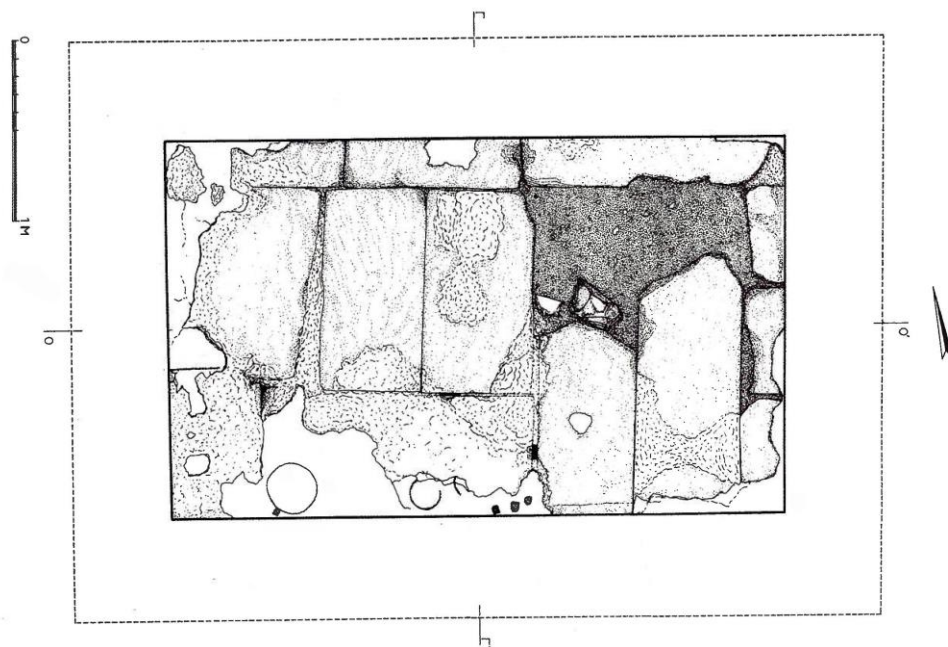


Figure 5. Drawing of Tomb I, overhead view showing broken roof slabs.

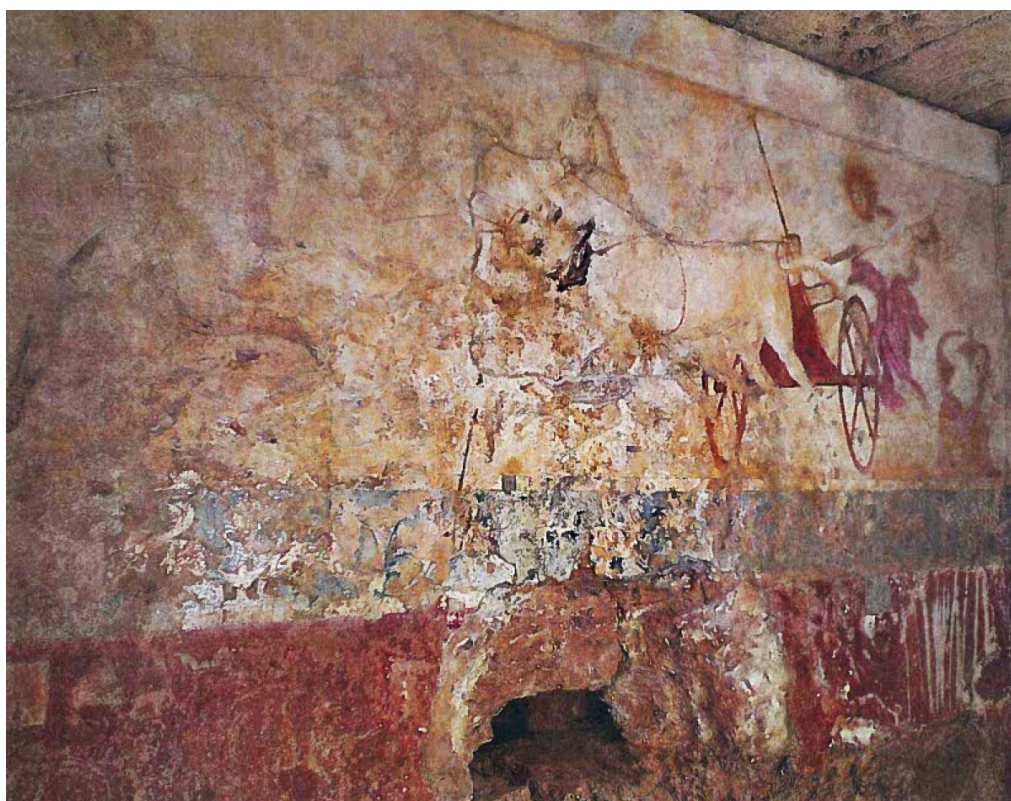


Figure 6. Interior of Tomb I showing 'Abduction of Persephone' fresco and attempted robber's hole.



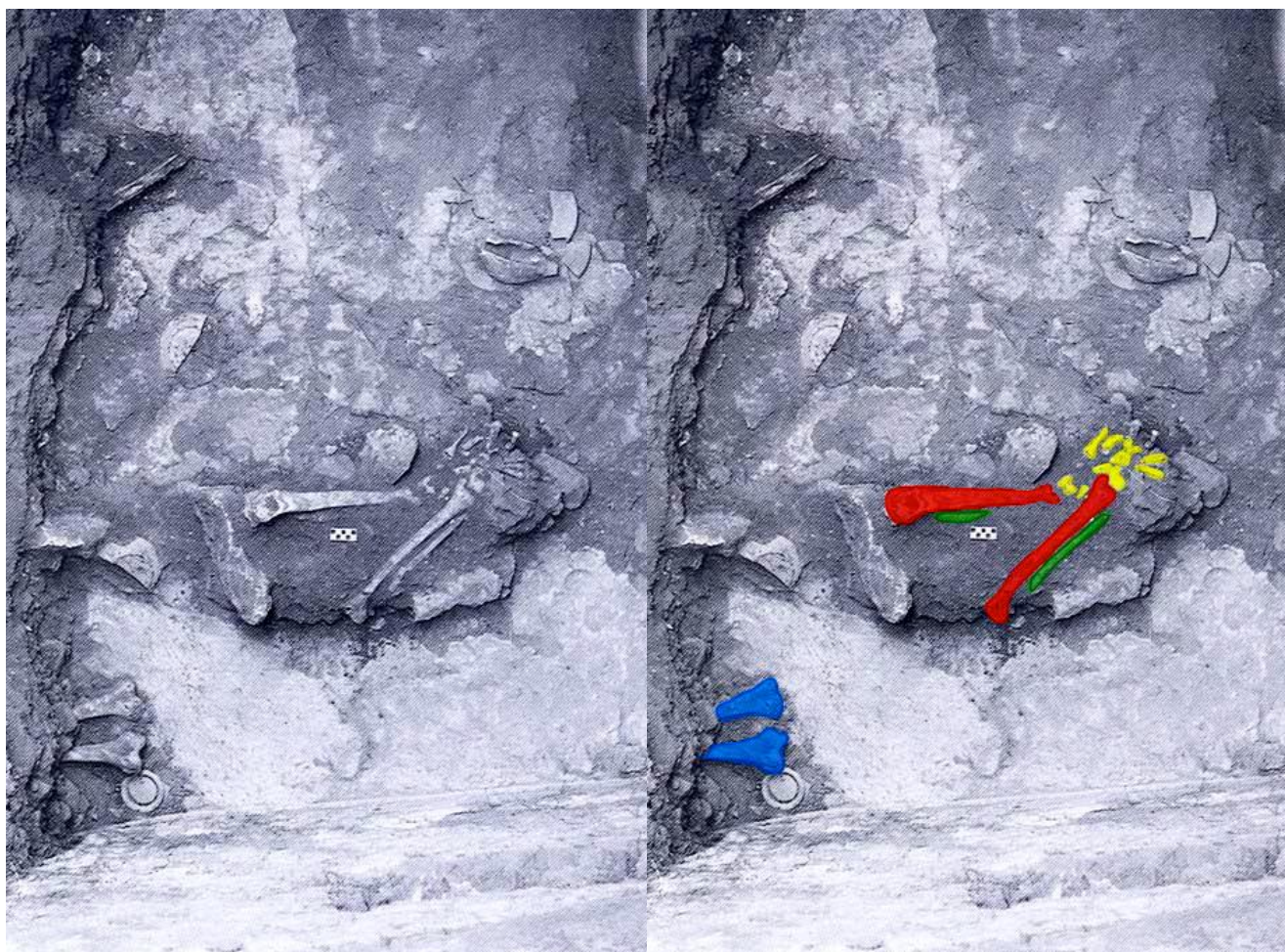


Figure 7. Left: Adult male skeleton from Tomb I, still partially embedded in the matrix fill. On the right, the leg bones have been marked in color: blue are the femora; red are the tibiae; green are the fibulae; yellow are the tarsals and metatarsals.





Figure 8. Facade of Tomb II.

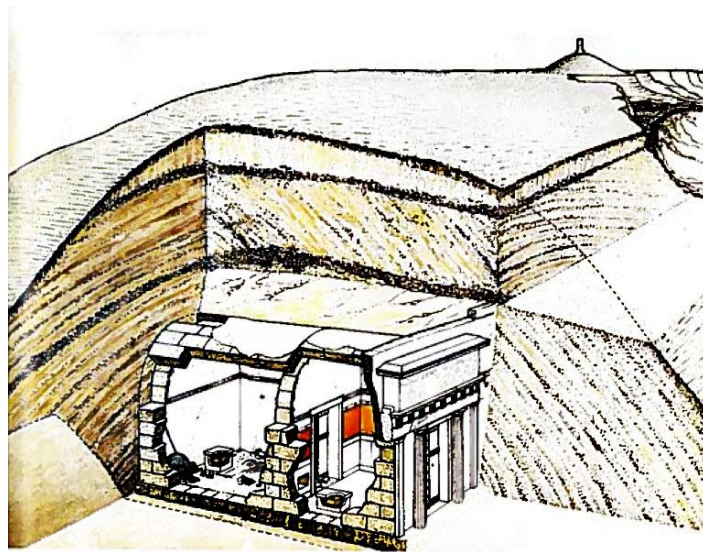


Figure 9. Cutaway view of Tomb II showing both chambers with sarcophagi.



Figure 10.  
Golden *larnax*  
containing the  
cremated bones  
of a female from  
chamber I of  
Tomb II. Note the  
lack of 'feet' and  
scrollwork  
compared to the  
*larnax* from  
Chamber II, but  
the same rosette  
and starburst  
motifs.



Figure 11. Golden  
*larnax* containing  
the cremated  
bones of a male  
from Chamber II  
of Tomb II. Note  
the addition of  
'feet' as well as  
more elaborate  
decorative motifs  
compared to the  
*larnax* from  
Chamber I.





Figure 12. Interior of the *larnax* from Chamber II of Tomb II, showing the cremated remains as found wrapped in the remnants of a purple and gold cloth along with a golden wreath.



Figure 13. Full skeleton of the male from Chamber II in Tomb II on display in the Archaeological Museum in Thessaloniki, 1990.

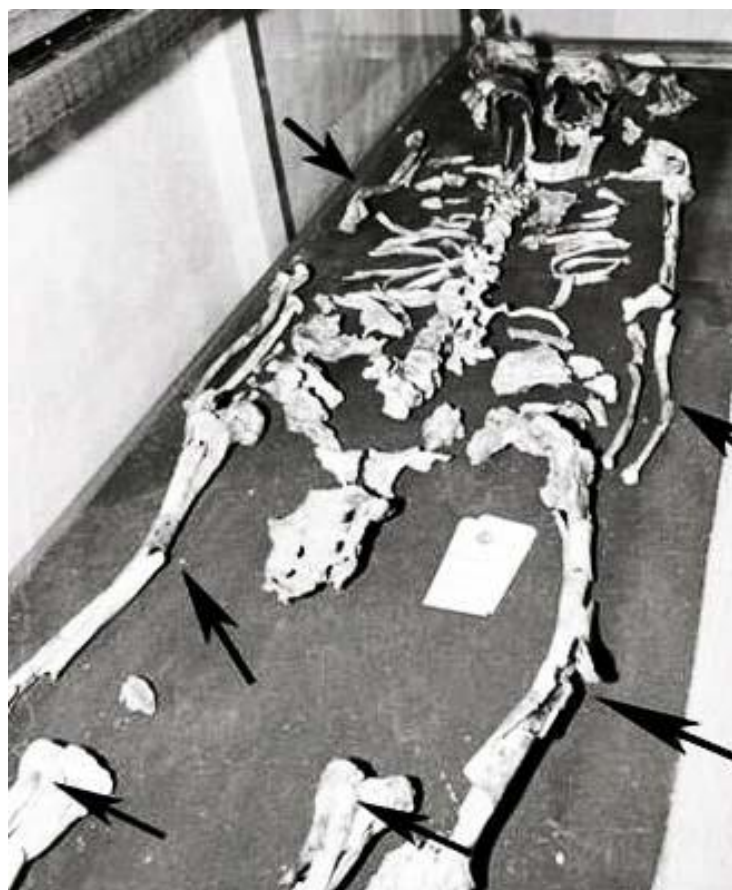


Figure 14. Incomplete skeleton of the male from Chamber II in Tomb II in storage at the Archaeological Museum in Thessaloniki, 1983. Arrows indicate warping in the long bones.

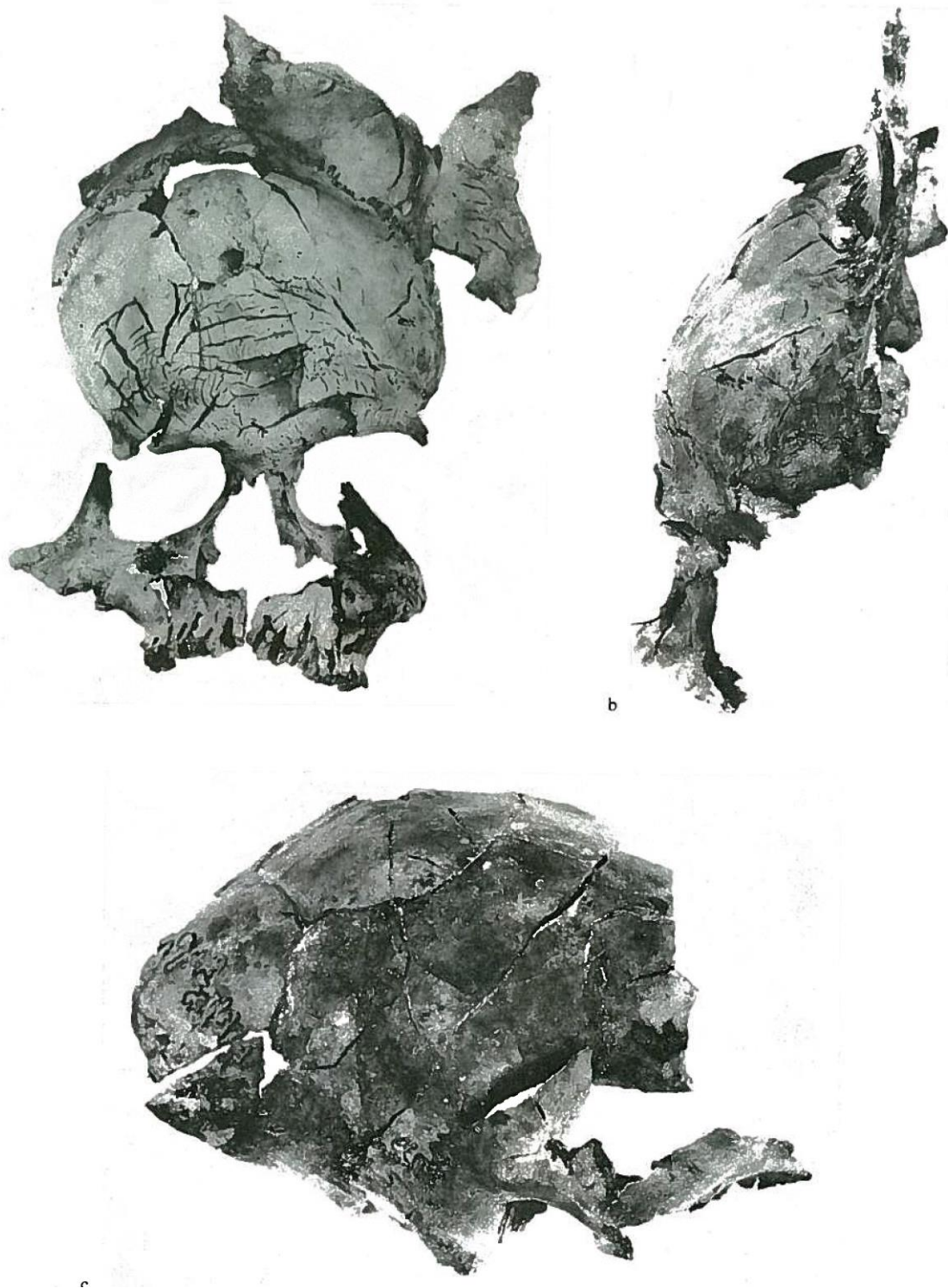


Figure 15. Three views of the cranium of the male from Tomb II. A) Front view of the face; b) Left profile view of the face and nasal bones; c) Right side of the neurocranium.



Figure 16. Zygomatic bones and anterior aspect of the maxillae of the male skeleton from Chamber II in Tomb II. The arrow on the right indicates the missing piece of bone



“knocked away” in an injury event. Note the block of perspex used to elevate the bones, demonstrating the severe asymmetry of the face.



Figure 17. Upper and lower jaw and fragments of the pelvis of the male from Tomb II. A) Upper jaw, inferior view; b) lower jaw, superior view; c) right half of the pelvis, in fragments.



Figure 18. Wax reconstruction from the male skull from Tomb II. The unhealed or unattended eye injury is on the left, and the healed wound on the right.

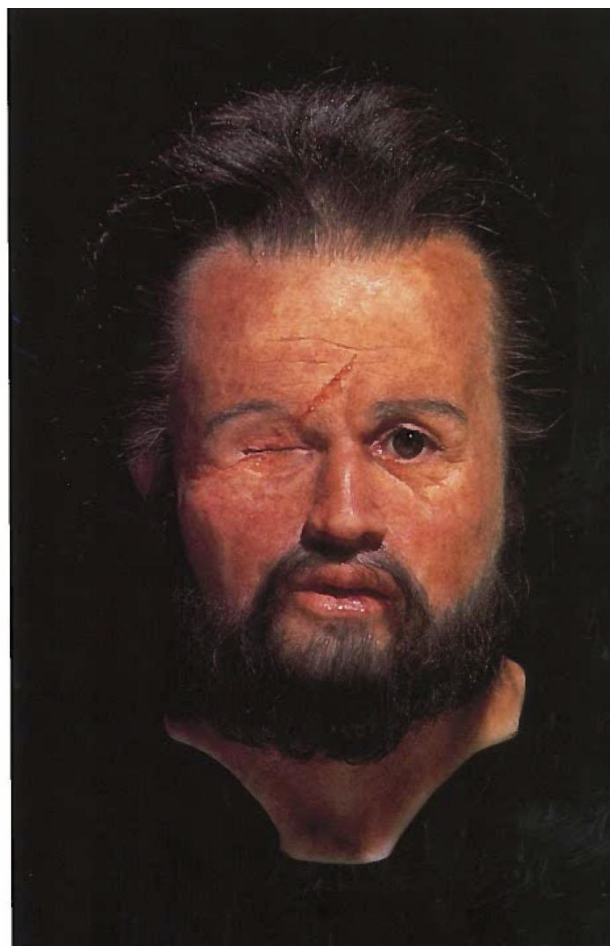
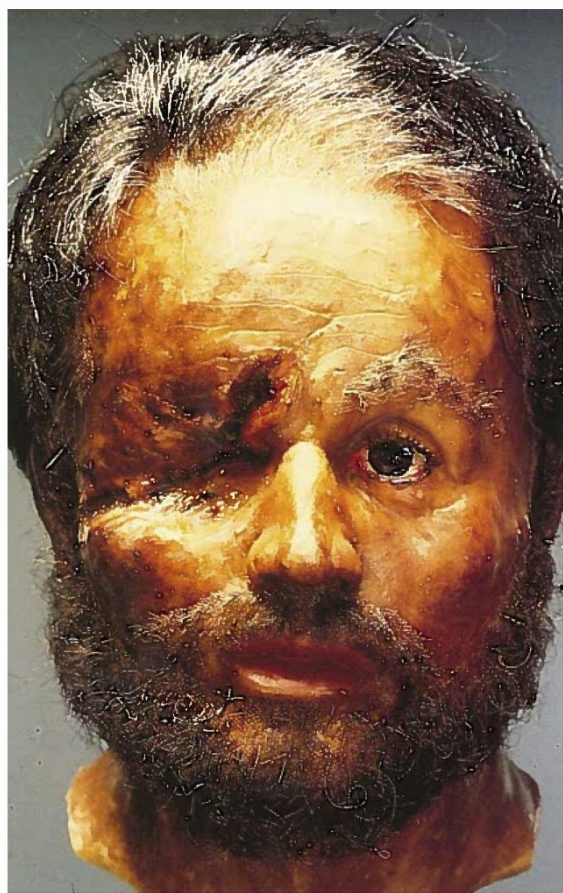
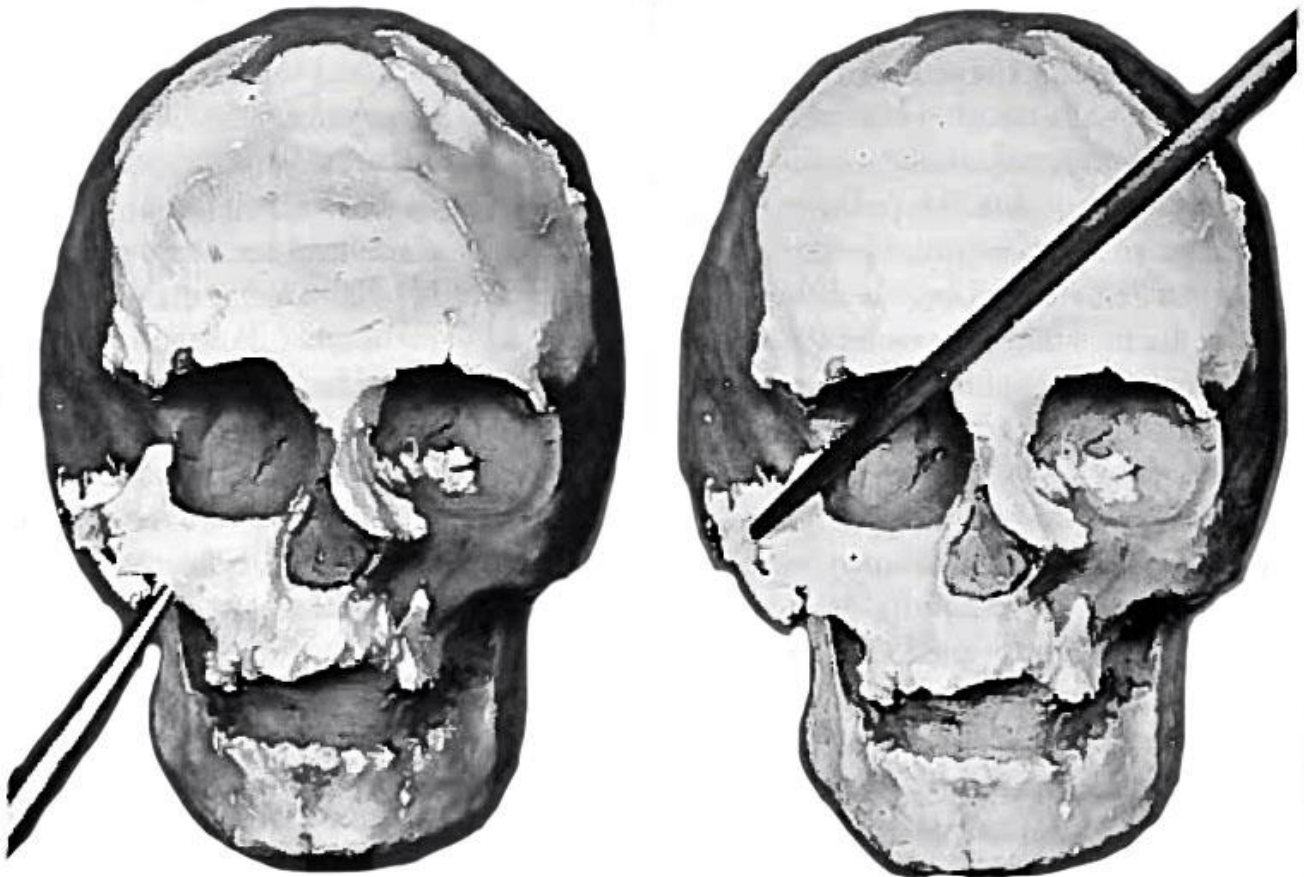


Figure 19. Wax casts of the male skull from Tomb II showing angle of missile entry. The



left image shows the location of the check and associated jaw injury, while the right shows the suggested orbital damage and associated facial injuries.





Figure 20. Right orbital margin of the male skull from Chamber II in Tomb II. Left arrow points to what Bartsiokas asserts is the supraorbital notch; the right arrow points to the frontal notch. Both are features of normal anatomy, not injury sites.



Figure 21. Close up view of the zygomaticomaxillary suture showing the apparent missing piece of bone Musgrave asserts was “knocked away” in an injury event; circled. Bartsiokas claims this is instead an artifact of poor reconstruction techniques.



Figure 22. Front view of male skull from Chamber II in Tomb II, from the Antikas team analysis in 2010. This high resolution photo is significantly more detailed than previous published images, and shows the twisted position of the left parietal bone jutting up from the cranial vault.





Figure 23.  
Facade of  
Tomb III.



Figure 24. Silver  
*hydria* with  
golden wreath  
containing  
cremated bones  
in marble  
sarcophagus  
from Tomb III.



Figure 25. Gold *gorytos* and mismatched greaves.



Figure 26. Greaves found in Chamber I of Tomb II, leaning against the door to Chamber II. The left greave is shorter and narrower than the right.

## **Glossary of Terms**

**Acetabulum** The hollow socket on the pelvis which articulates with the femur to make the hip joint.

**Anatomical position** A human standing, facing forward, feet together and pointed forward, hands at the sides of the body with palms turned outward. This position ensures none of the long bones are crossed when viewed from the front or back.

**Antemortem** Prior to death.

**Articulate** A place in the body where two bones make contact; the bones are adjacent.

Ex. The vertebrae of the spine articulate.

**Attachment sites** Roughened surfaces of bones where muscles, ligaments, or tendons connect.

**Axial skeleton** The parts of the skeleton that comprise the torso or truck: sternum, ribs, vertebrae, sacrum.

**Bone remodeling** A process in which bone is resorbed and deposited at a specific site, often an injury. After a break, bone cells accrete at the location to repair the damage.

**Callus** A bony protuberance caused by bone remodeling, where a collection of cells has been deposited around an injury site and the resorption process is not yet complete.



**Clavicle** The collarbone.

**Compression fracture** A bone break, especially in a short bone, that disrupts osseous tissue and collapses the affected bone. Axial loading is the usual mechanism of injury. The bodies of vertebrae are often sites of compression fractures.

**Congenital** A condition existing from birth and often prior to birth, likely developing as part of the embryonic stage.

**Cortex** In bone, the outer surface of a bone. Cortex is denser and therefore shows up better in radiograph images.

**Cranium** All the bones of the skull, including the mandible.

**Cremains** Cremated human remains. They may be fully intact or only partially complete.

**Dental attrition** Wear and tear of the teeth. Individuals with adult teeth but who are still young have more pointed teeth than older people; these gradually become worn down, flatter, and smoother through normal chewing. Ancient skeletons tend to have a great degree of dental attrition owing to the higher grit content of food items like bread.

**Dental eruption** The normal emergence of teeth through the gums, either juvenile or adult. In some people, the wisdom teeth never erupt and sometimes must be extracted through surgery.

**Dental occlusion** The way teeth bite together and make contact in the jaw. People with jaw injuries or facial deformities will have an unusual occlusion pattern.

**Diaphysis** The shaft of a long bone; the middle.

**Dysmorphogenesis** The process of abnormal tissue formation anywhere in the body, either through a congenital problem or injury.

**Endochondral bones** Bones which develop through normal processes and replace cartilage. Part of ossification.

**Epiphysis** In long bones, the cap at the end that develops separately then later fuses with the shaft.

**Epiphyseal fusion** A process in which the epiphysis of a long bone merges with the diaphysis. These two parts start off as separate bones, connected only through other tissue, but join together as a person ages, resulting in a single bone, often with a line of demarcation indicating where the fusion occurred called an epiphyseal line. Epiphyseal fusion is often used as a way to determine the age of an individual.

**Femur, femora** The largest bone of the leg; the thigh bone.

**Fibula, fibulae** The outer, thinner of the two bones which comprise the lower leg; sometimes called the calf bone.

**Fracture** Any break in the continuity of a bone. This can either be moderate, where the two sides of the bone do not separate, or severe, where the two sides

separate and break through the skin as well. Fractures can occur anywhere along a bone, and more than one fracture and one type of fracture can occur on a single bone.

**Gracile, gracility** The quality of being graceful, delicate, lighter, smaller. Women tend to have more gracile skeletons, especially skulls, than men, though this is not always the case.

**Histogram** A statistical term referring to the graphical representation of data.

**Humerus** The upper bone of the arm that articulates with the scapula or shoulder blade.

**Inhumation** To place in an earth grave or bury. Although burials in tombs are technically entombments, inhumation may also be used in these cases.

**Larnax, larnakes** The Greek term for a burial box or ossuary which is used for the inhumation of bones rather than a fleshed body.

**Lamellar bone** Woven bone. Lamellar bone is characterized by collagen fibers organized in layers.

**Macrophotography** Extreme close up photography which produces images much larger than the true life size of the subject.

**Mala-maxillary suture** The point where the two cheekbones meet; more commonly called the zygomaticomaxillary suture.

**Mandible** The lower jaw including the teeth and chin.

**Mandibular condyle** The large, rounded prominence at either end of the mandible which articulates with the upper part of the face and jaw.

**Masseter muscle** One of the main muscles of chewing. A large muscle, it connects the mandible to the cheekbone.

**Masseteric tuberosity** A roughened bump on the mandible where the masseter muscle attaches.

**Maxilla, maxillae** The upper jaw including the teeth. Unlike the lower jaw which is one solid bone, the upper jaw is comprised of two pieces, the left and right maxilla.

**Metatarsals** The five bone of the mid foot which come just before the toes.

**Metric analysis** The process of measuring many different aspects of a particular bone and comparing these measurements to a set of standard data used by osteologists and defined in the 19th and 20th centuries. For example, the length, breadth, and height of a femur, or thigh bone, is all taken, then compared to an index of the same measurements from known individuals to see where the femur falls along the scale of age, height, and sex. Measurements for more complex bones, such as those of the skull, may have dozens of points to assess.

**Morphology** The form and structure of organisms and specific structural features.

Morphology can be affected during development or afterward through lifestyle or injury. Also refers to the shape of bones in any context.

**Morphogenesis** The process by which a person or organism develops a specific shape.

**Neonate** A newborn in the first 28 days after birth.

**Nonhaversian canals** Primary vascular channels within the bone cortex.

**Oblique line (mandible)** A ridge on the mandible which begins at the chin and becomes more defined as it approaches the jaw socket; provides attachment for two jaw muscles used in chewing.

**Ossification, ossified** The process of bone formation through deposition of osteoblasts.

**Osteoblast** Bone forming cells which create and deposit new bone.

**Osteoclast** Cells responsible for the resorption of bone tissue in the remodeling process.

**Osteon** Also called the Haversian system. An osteon is the fundamental unit of compact bone composed of a vascular system.

**Osteophytic growths** A small bony growth often found on bones with abnormal pathology. Osteophytes are often features of osteoarthritis.

**Orbit** The eye socket.

**Pathological** Relating to or caused by disease.

**Pubic symphysis facies** The medial, oval surface of the pubic bones which face and articulate with the interpubic disk.

**Phenotypic appearance** The appearance of an organism deriving from the interaction of the genotype (the genetic makeup of a cell) and the environment.

**Radial head** The part of the radius bone near the elbow.

**Regression analysis** A statistical procedure for estimating the relationship among variables, such as measurements of surviving skeletal fragments)

**Robust** The quality of being heavy, sturdy, thicker. Males generally have a more robust skeleton than females, especially certain aspects of the skull such as the mandible, although this is not always the case.

**Subclavian nerve** A nerve situated below the collarbones, part of the brachial plexus nerve assembly.

**Supraorbital margin** The arched, thin margin of bone which forms the top of the bony eye socket.

**Supraorbital notch** A small divot located above the eye socket and below the eyebrow, which allows passage of the supraorbital nerve and vessels. Often, this can be easily palpated on most people. In about 25% of individuals, this notch closes and forms the supraorbital foramen.

**Subadult** Adolescent near maturity.

**Superfetation** The simultaneous occurrence of more than one developing child in the same person.

**Suture; sutural closure** The skull and face are composed of several different bones, all of which are separated slightly by an open division called a suture. As an individual ages and the bones grow, these lines close up and begin to fuse, forming a solid mass of bone. The rate at which these fusions occur is often used to determine the approximate age of an individual, as these rates are fairly consistent across a range of ages.

**Tarsals** The bones of the toes.

**Taphonomy** The processes which affect skeletal remains between death and examination.

**Tibia, tibiae** The thicker, more robust bone of the lower leg; the shin.

**Trabecular bone** Also called cancellous or spongy bone. A cross-hatching matrix which forms the interior of a bone and provides structural strength. Trabecular bone is not visible unless the interior of a bone has been exposed, and will not retain the original spongy appearance if remodeling has occurred.

**Zygomatic bone** One of two bones which create the cheeks. Also called the cheekbone or sometimes the malar bone.