ALEXANDER I:

COINAGE & KINGDOM

Talia K. Knowles

B Media, MA, Master of Research (Mediterranean Archaeology),

Macquarie University.

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For Γιαγια

DECLARATION

I, Talia Katherine Knowles, certify that this thesis has not been submitted for a higher degree to any other university or institution. Signed:

October 10, 2014.

ABSTRACT

Alexander I ruled Macedonia between 498/7 and 451 B.C. His kingdom and his coinage are essential to our understanding of the political economy of northern Greece during the fifth century B.C. This thesis examines the evidence for a change in Alexander's weight system and tetradrachm output, as a result of Athens' economic aspirations in the Strymon gulf between c.476/5 and 463 B.C. By assembling a larger corpus of tetradrachms for study and conducting a comprehensive analysis of weight, die distribution and coin output, it strives to achieve this aim. The goal is to prove that Alexander I did not mint tetradrachms of Athenian weight, but staters using a reduced version of the Lydo-Milesian standard.

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ACKNOWLEDGEMENTS

Inspired by my matrilineal heritage, I have always been deeply interested in ancient Greek history. At the completion of my MA, I participated in the 2013 excavations at Argilos in northern Greece. The lush green of the north was a stark contrast to the dry, mountainous Greece with which I was familiar. The Strymon region had clearly supported a host of different tribes and cities – and the wealth of the land had inspired lively trade between them. Yet, so little of the region had been explored, archaeologically. As the dig drew to a close, I knew that northern Greece was where I wanted to be.

I am indebted to many people for their guidance and assistance in producing this thesis. Foremost, my supervisor Dr. Ken Sheedy has helped me combine my love of data and northern Greece into a single endeavour. I have benefitted immeasurably from his guidance in undertaking my very first numismatic project, from access to the wonderful resources at the Australian Centre for Ancient Numismatic Studies and from his knowledge, criticism, and support. To Dr. Gil Davis I extend my thanks for reading countless drafts of articles and chapters. I would like to thank the many people in Sydney and abroad who permitted me to conduct my fieldwork using their facilities: Colin Pitchforth and Jim Noble at Noble Numismatics, Sydney; Dr Dimitra Tsangari at the Alpha Bank, Athens; Mr B. Demetriadou and Patricia A. Felch, The BCD Library, Athens; Mrs E. Ralli at the Numismatic Museum of Athens for accommodating me during a very busy season; Dr. Selene Psoma at the University of Athens for her guidance; Christopher James, Doctoral Candidate at the Max Planck Institute for Meteorology for double-checking my calculations. Finally, I would like to thank my partner Sara for her support and her patience.

INTRODUCTION

The phenomenon of coining in ancient Greece was a significant technological and cultural milestone. Coins transformed the mode of commodity exchange between the silver-rich peoples of northern Greece, and the grain-rich peoples of Egypt and the Near East.[1] They offered a new medium for facilitating large state expenditures, permitting nimble transactions between states, particularly in times of war or hardship.[2] They also proved to be an effective medium for marketing the resource-wealth of their region of origin.[3] The obverse and reverse design of a coin communicated that the minting authority possessed the networks required to import or export commodities in that particular region. These networks ultimately facilitated the assembly of fleets and armies. Thus, to study ancient coinage is to study resource control in the Mediterranean.

Coins played a leading role in developing new paradigms of wealth and power in the late sixth and early fifth centuries B.C. This dynamic is largely understood in terms of Athenian coins.[4] The rise of Athens in the fifth century typifies the relational development of power and coinage in the ancient world. Athens' maritime and economic hegemony in the North Aegean was mirrored by the supremacy of her currency.[5]

To examine this dynamic, one need only turn to the contemporary coinages of northern Greece. In a political sense, the tribes and kingdoms of Thrace, Macedonia and Chalcidice, were candidates for "a world without coinage."[6] Conversely, these disparate territories were prolific minters.[7] The rich diversity of silver coinages attests a long tradition

[1] Picard (2008): 465; Kroll (2011): 31; Psoma & Zannis (2011): 32-33; Psoma (2006): 85-87; Archibald (2004): 883; Archibald (1998): 89; Borza (1990): 126; Kraay (1979): 139-43; Hammond & Griffith (1979): 69-91; Price & Waggoner (1975): 2-19.

[2] Borza (1990): 129; Rowan (2013): 105.

[3] Howgego (2002): 15, 17; Kraay (1976): 317.

[4] Kroll (2011): 32; Sheedy, (2006): 1; Howgego (2002): 2-16, 18-20; Kroll (1981); Kraay (1956); Seltman (1924); Svoronos (1923-6).

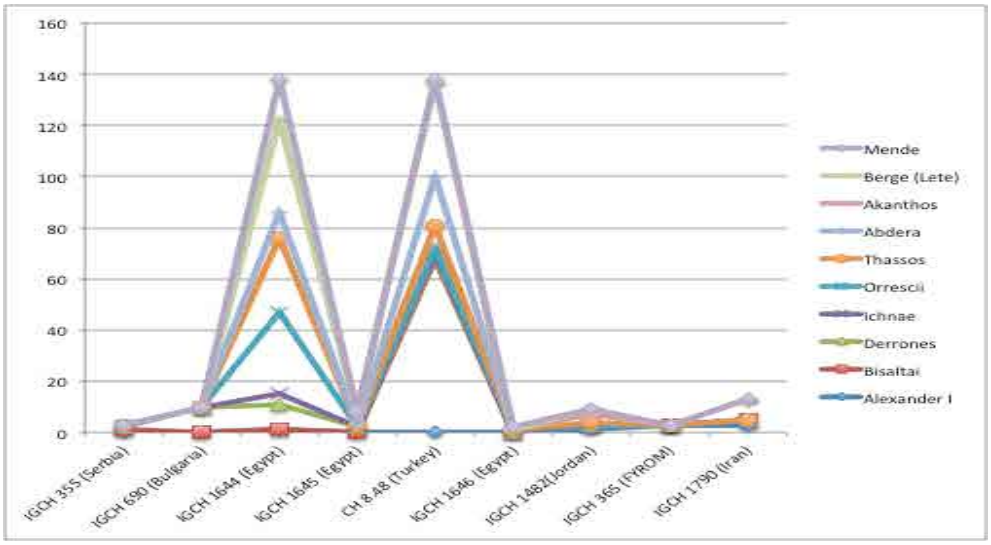
[5] Kroll (2011): 32.

[6] Trevett (2001): 33.

[7] Archibald (1998): 89-90.

of mining and metallurgy in this region.[8] It is believed that the earliest coinages, produced by Thracian tribes and Greek cities of the Pangaion region, commenced during the late sixth century B.C.[9] Of northern Greek coins, large specimens, typically between 10g and 40g in weight, have been discovered in coin hoards around the Mediterranean.

Graph 1.1: Hoard Finds



The geographic deposition of northern Greek coins indicates that these specimens followed traditional bullion exchange routes across the Mediterranean in the late sixth to early fifth centuries B.C.[10] The Persian and Egyptian thirst for silver has been credited with the development of this cross-continental commodity network.[11] The practice of coining, however, may have come from Lydia or the Greek states of Asia Minor.[12]

The Persian withdrawal from Thrace c.480 B.C. may have enabled King Alexander I of Macedonia to conquer a strategic silver source in Bisaltia.[13] This conquest extended

[8] Picard (2008): 465; Psoma & Zannis (2011): 32-33; Psoma (2006): 85-87; Archibald (2004): 883; Archibald (1998): 89; Borza (1990): 126; Kraay (1979): 139-43; Hammond & Griffith (1979): 69-91; Price & Waggoner (1975): 2-19.

[9] Picard (2008): 465; Archibald (2004): 883; Archibald (1998): 89; Borza (1990): 126; Kraay (1979): 139-43; Hammond & Griffith (1979): 69-91; Price & Waggoner (1975): 2-19.

[10] Rowan (2013): 105; Picard (2008): 465; Psoma & Zannis (2011): 32-33; Psoma (2006): 85-87; Archibald (2004): 883; Archibald (1998): 89; Borza (1990): 126; Kraay (1979): 139-43; Hammond & Griffith (1979): 69-91; Price & Waggoner (1975): 2-19.

[11] Kroll (2011): 31; Kroll (2008): 35, 36; Wartenberg (1995): 11; Kraay (1964): 83.

[12] Kroll (2008): 35, 36; Archibald (1998): 89-91; Kraay (1964): 83.

[13] Borza (1990): 129; Kagan (1987): 22-29.

Alexander's dominion, north into Paeonia and east into Mygdonia and Bisaltia.[14] Some time after this expansion, it is believed that Alexander minted the first regal Macedonian coinage (c.480-451 B.C). As an absolute monarchy, regal Macedonia offers a unique insight into the relational development of resource ownership, coinage and power during the early fifth century B.C. Ancient Macedonia was a vast region, rich in timber and home to a variety of 'Macedonian' tribes.[15] The establishment of a monarchy in Macedon, and maintaining power, required the support of powerful Macedonian families, a significant full-time force and control over crucial resources.[16] Conquest was an essential aspect of Macedonian kingship. The theme is central to the foundation legend of the Argeads of Macedonia (the Macedonians from Argos): the Temenid dynasty, to which Alexander I belonged.[17]

According to Herodotus, Alexander I traced his lineage to Perdiccas, the youngest of three brothers descended from Temenus, King of Argos (VIII.138-9, V.22.1-2). In Herodotus (VIII.137.2), the three Temenid brothers fled to Illyria after being cast out of Argos. In the town of Lebaea, they took up work on the property of a tribal king (VIII.137.2). Everyday, the king's wife would prepare their meals and everyday she noted that the loaf of bread intended for Perdiccas always rose larger than the others (VIII.137.3). She told her husband, who interpreted this oddity as an omen. Fearing a potential challenge from Perdiccas, the king ejected the three brothers from his household (VIII.137.3-4). When the men asked to be paid dues for their service, the king swept his arm about and claimed that shelter and sustenance had been his gift to them and they should not seek further payment. (VIII.137.5). Perdiccas took the kings obscure gesture to mean that the king gifted his land to the men as payment. He drew a line around a stream of sun illuminating the floor, and folded up the light in a cloth. He then thanked the king for his gift and the three brothers departed (VIII.137.5). The men settled further west in a location near the garden of Midas (VIII.138.1-2). At this place, they established the capital Aegae (VIII.138.2). From this base, the Temenids set about conquering tribes and villages of the surrounding region and subjecting them to their rule (VIII.138.3).

The helmet and the horse are common coin types employed by Alexander I. They attest to the legacy of combat and conquest established in the Temenid foundation legend.[18] The head or forepart of the goat is also a common coin type employed in Alexander's

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[14] Thuc. 2.99.3-6; Hatzopoulos & Paschidis (2004) in Hansen & Nielsen (2004): 794-5; Jansen (2004) in Hansen & Nielsen (2004): 810; Borza (1990): 123-129; Hammon & Griffith (1979): 8-10, 81-88.

[15] Archibald (1998): 90-901; Hammond & Griffith (1979): 8-10, 81-88.

[16] Borza (1990): 124-128.

[17] Hatzopoulos & Paschidis (2004) in Hansen & Nielsen (2004): 798; Borza (1990): 124.

[18] Borza (1990): 128; Hammond & Griffith (1979): 81, 86, 104-5.

coinage. As Perdiccas had attended a herd of goats for the Lebaean king, it is thought that the goat may have symbolised the Temenid kings.[19]

The Temenid foundation myth may have referred to an actual migration event. Around the seventh century B.C., colonists from Argos may have undertaken a campaign in central Macedonia in order to settle in the region.[20] A powerful family who founded the Temenid dynasty may have led the invaders.[21] As a reminder of their path to the conquest of the land, the city which became the seat of Macedonian power was renamed Aegae.

Much has been written on the development of the Macedonian state. D Raymond's seminal work on the coinage of Alexander I and Perdiccas II has provided the basis for impressively detailed histories written by N.G.L Hammond, E Borza and M Hatzopoulos.[22] Hammond and Griffith used geographical references from Herodotus and Thucydides to map the Macedonian territory during the reign of King Amyntas I and King Alexander I.[23] Hammond also provided the first truly detailed analysis of the distribution of Thracian and Macedonian tribes between 500 and 451 B.C.[24] Borza's work primarily addressed the Demosthenes-inspired figure of the Macedonian barbarian. His work focused on the resource wealth and military prowess of the early Macedonian kings. He sought to dispel the myth that the Macedonian state was unsophisticated and without a complex royal administrative system.[25] The current state of knowledge of Macedonian political institutions we owe to the works of Hatzopoulous. Epigraphic records dating to the reign of Perdiccas II through to Philip II, have permitted Hatzopoulos to offer insight into the economic and administrative structures that facilitated Macedonian rule.[26]

Very little is known from the literary record, or from inscriptions, about the rule of Alexander I. There is no epigraphic record. But he did leave behind a rich silver coinage. Raymond's ground-breaking work completed in 1953, *Regal Macedonian Coinage to 413 B.C,* remains the only systematic study of this key evidence for the Macedonian state ruled by Alexander I. Raymond remains the authority on Regal Macedonian currency in the fifth

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[19] Hammond & Griffith (1979): 8.

[20] Hatzopoulos & Paschidis (2004) in Hansen & Neilsen (2004): 798-799; Hammond & Griffith (1979) 3–14).

[21] Hatzopoulos & Paschidis (2004) in Hansen & Neilsen (2004): 798-799; Hammond & Griffith (1979) 3–14).

[22] Raymond (1953) *Regal Macedonian Coinage to 413 B.C.*, ANS, NNM pp.170; pl.I-XV.

[23] Hammond & Griffith (1979) *A History of Macedonia, Vol.2: 550-336 B.C.*

[24] Hammond & Griffith (1979): 88-100.

[25] Borza (1990) In *The Shadow Of Olympus: The Emergence of Macedon*.

[26] Hatzopoulos & Paschidis (2004) in Hansen & Nielsen (2004); Hatzopoulos (1996) *Macedonian Institutions Under The Kings*, Vol I, & II.

century. Her typology and order of production have been consistently proven, her chronology and her weight theory prevail and this attests to the contribution that her work has made to Macedonian history, to the history of northern Greece and to ancient numismatics. It is to her that this thesis is ultimately indebted.

Historical interpretations of Alexander's coinage are heavily Athenocentric.[27] The coinage is framed by Athens' economic ambitions in the North, which begin to take shape between 479 and 465 B.C., after the formation of the Delian League.[28] The two competing chronologies for Alexander's coinage derive from an interpretation of Athenian activities in the Strymon basin between 476/5 and 451 B.C. Raymond's Athenian weight system theory positions Athens as the cause for a shift in Alexander's minting strategy.[29]

Raymond applied a three-group chronology to her order of issues. She placed a single series of octobols between 476/5 – 460 B.C. This date was selected based on the close proximity of the average octobol weight (4.39g) to the Athenian drachm weight standard (4.30g).[30] She proposed that Alexander introduced these coins around the time that Athens had conquered Eion and established a foothold in the Strymon region.[31] Furthermore, she argued that the octobol was used as the base unit of weight for Alexander's tetradrachms between 476/5 and 460 B.C., to facilitate easy exchange with Athenian currency.[32] Thus, 476/5 was proposed as the commencement of Alexander's Group II coinage.

A revised chronology, suggested by the contents of the Decadrachm hoard, does not accommodate this three-group structure.[33] It does, however, retain Raymond's order of issues.[34] The existing chronologies (Raymond in particular) assume that Alexander I minted continuously, rather than minting to meet specific expenditures. As a consequence, each chronology produces a trend of coin decline. The final issues of octadrachms and tetradrachms (Group III) appear to have been produced in far smaller numbers. Concurrently, an increase in smaller denominations is demonstrated (light tetrobols). Raymond interpreted these trends as consequences of a deliberate change in minting strategy. She proposed that

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[27] Kremydi (2011): 163; Borza (1990): 129; Cole (1978); Price & Waggoner (1975): 28, 29, 38-39; 117-19; Raymond (1953): 109, 100, 133, 134-8.

[28] Kallet (2013): 44.

[29] Kremydi (2011): 163; Borza (1990): 129; Price & Waggoner (1975): 28, 29, 38-39; 117-19; Raymond (1953): 109, 100, 133, 134-8.

[30] Raymond (1953): 109-100.

[31] Raymond (1953): 109-100.

[32] Raymond (1953): 109-100.

[33] Kagan (1987): 24-29.

[34] Kagan (1987): 22, 24-28.

Alexander had deliberately ceased the minting of his octadrachms and tetradrachms in the early years of Group III (c.454 B.C), preferring to mint smaller coins for the remainder of his reign (c.454 – 451 B.C). Raymond proposed that this dynamic demonstrated Alexander's attempt to circumvent Athens' economic policies, which were becoming increasingly restrictive.[35]

The coinage of Alexander I is the subject of this thesis. As Alexander I was a crucial commercial partner for Athens, the Chalcidice and Persia, his activities are vital to our understanding of the economies of northern Greece during the fifth century B.C. The aim of this thesis is to examine the evidence for a change in Alexander's mint activity, as a result of Athens' economic aspirations in the North. It strives to achieve this by assembling a larger corpus of tetradrachms (Appendix A) than was previously available, and by conducting a comprehensive analysis of weight, die distribution and coin output. The new corpus expands Raymond's original sample of tetradrachms by including new specimens from public collections, publications and the numismatic market. The goal is to evaluate the validity of the Athenian weight system theory and Raymond's interpretation of mint activity using new evidence and modern techniques. Based on the results of this analysis this thesis reframes the study of Alexander's coinage in terms of coin utility, resource control and power. It is my contention that the interpretation of "Alexander Philhellene" is not accurate. It is my contention that this interpretation draws on a perceived Athenian element in Alexander's coinage, which does not exist. Examining this issue is key to advancing the study of the economic and martial priorities of the Macedonian state during the reign of Alexander I.

[35] Raymond (1953): 134-5.

CHAPTER ONE

‘ὦ βασιλεῦ, κοῖόν τι χρῆμα ἐποίησας, ἀνδρὶ Ἕλληνι δεινῷ τε καὶ σοφῷ δοὺς ἐγκτίσασθαι πόλιν ἐν Θρηίκῃ, ἵνα ἴδῃ τε ναυπηγήσιμος ἐστὶ ἄφθονος καὶ πολλοὶ κωπέες καὶ μέταλλα ἀργύρεα, ὅμιλός τε πολλὸς μὲν Ἕλλην περιοικέει πολλὸς δὲ βάρβαρος, οἳ προστάτεω ἐπιλαβόμενοι ποιήσουσι τοῦτο τὸ ἂν κεῖνος ἐξηγέηται καὶ ἡμέρης καὶ νυκτός,’

(Herodotus V.23.2)

Wood For Oars, Mines For Silver

In this passage, Herodotus imagines a dialogue between the Great King Darius and his general, Megabazus. Darius had gifted land in the Strymon basin to the Greek tyrant, Histiaeus. As Megabazus marched through Thrace towards Sardis, the newly enslaved Paeonians in tow, he noticed how quickly Histiaeus had fortified his new land. Upon his return to Sardis, Megabazus cautioned Darius about the danger of supplying an ambitious man with access to the three great resources of northern Greece: wood, silver and mercenaries.[36]

In passages V.23.1-V.23.2, Herodotus allies tyrannical power with resource ownership in northern Greece. His conclusion is supported by the Peisistratid legend. In I.64.1 Peisistratus is said to have drawn revenues from lands in the Strymon basin. Furthermore, King Amyntas I of Macedonia (father to Alexander I) reportedly offered Hippias a gift of land in Anthemus, a city in the Chalcidice (V.94). Similarly, Thucydides noted that fertile land abundant in natural resources was more likely to attract aspiring dynasts and invaders (I.2.4).

This chapter introduces the reader to the resource-wealth of northern Greece and the relational development of power and coinage in the region between 513 and 451 B.C. It then examines the Persian influence on coining in the region and the “kinship” between Persia and Macedonia. This is contrasted with the “aspiring hellenism” of King Alexander I. Alexander’s priorities arguably reflect his changing politico-economic aspirations between 476/5 and 451 B.C. As the monarch disappears from the historical record after the Persian Wars, a study of the coinage is central to this investigation.

[36] Theophrastus *Enquiry Into Plants*, 1.9.2, 3.3.1, 5.2.1, 5.7.1, 9.3.1–3; Archibald (2013): 16, 249-70; Kremydi (2011): 159; Millet (2010): 474; Archibald (1998): 155; Borza (1990) 3-5; Hammond & Griffith (1979): 8.

Map 2.1: Macedonia, Thrace, Chalcidice and the Greek Coastline 513-495 B.C.[37]

Ancient references to the geography of early Macedonia are vague and contradictory.[38] The ancient limits of Macedonia remain largely unexplored, still awaiting systematic survey and as a result, barely understood. Our best opportunity to investigate early fifth century Macedonia is by exploring Alexander's role in the exchange of resources between states. Here the evidence of the coins will be crucial.

According to Theophrastus, only Italy, Thrace and Macedonia held timber reserves large enough to supply the Greek states with wood for trireme construction.[39] Theophrastus specifically attests to the Greek preference for Macedonian timber (V.2.1). More importantly, he notes the superiority of Macedonian fir and pitch for the building of triremes (V.7.1, IX.3.1-3). Meiggs confirmed that the length and smooth quality of Macedonian fir made it ideal for shipbuilding, as opposed to cedar, which was employed by the Phoenicians purely due to its availability.[40] It has been suggested that the Macedonian Kings may have supplied Greek and North Aegean communities with "πολλοὶ κωπέες" as part of politico-military alliances. *IG* $1^3$89 records an agreement between King Perdiccas II (son of Alexander I) and Athens c.423/2, whereby Macedonia would supply Athens with oars, to the exclusion of all others.[41]

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[37] Wittke, A M, Olshausen, E & Szydlak, R (2014) 'The development of the Macedonian Kingdom from the 7th cent. until 336 BC' in *Brill's New Pauly supplements I Vol. 3, Historical atlas of the ancient world.* Map altered by this student.

[38] Archibald (1998): 89, 90-91.

[39] Theophrastus 4.5.5; Kremydi (2011); 161-162; Millet P (2010): 473-474, 484; Hatzopoulos & Paschidis (2004) in Hansen & Nielsen (2004): 794, 795; Archibald (2004) in Hansen & Nielsen (2004): 883; Borza (1990): 109; Raymond (1953): 109.

[40] Meiggs (1986): 111, 118, 405.

[41] IG 13 89 = SEG 10.86. Millet P (2010): 485.

In 393/2, Amyntas III forged a treaty with the Chalcidian League at Olynthus.[42] Its purpose was to secure military co-operation. It included one crucial economic condition. Once the treaty came into affect, the Chalcidian cities could import Macedonian pitch and timber without paying taxes. Fir, the optimal variety of timber for building triremes, could be imported if the King was notified first and the Chalcidians paid the agreed-upon rates.[43] From these examples, we can see that priority access to timber was often a key component of a military alliance with Macedonia.[44] There is no literary or epigraphic record extant which can testify to similar agreements involving Alexander I. Yet, it is likely that the volume of timber required to build Athens' vast naval force may have necessitated an alliance with the King of Macedonia.[45]

In addition to the commodity of timber, the alluvial basins of the Pangaion, Rhodope and Dysoron Mountains provided Thrace and Macedonia with significant deposits of precious metals.

Map 2.2: Major Silver Sources of Northern Greece.[46]

The Thracian tribes had been exploiting these areas for precious metals since at least the early sixth century.[47] The demand for silver from customers in Persia and Egypt facilitated the

[42] Millet (2010): 474; Hatzopoulos (1996): 20 (inscription no. 1).
[43] Millet (2010): 474; Hatzopoulos (1996): 20 (inscription no. 1).

[44] Borza (1987): 32, 33, 34.

[45] Kremydi (2011); 161-162; Millet (2010): 473-474, 484; Borza (1990): 109; Borza (1987): 32-52. Raymond (1953): 109.

[46] Wittke, A M, Olshausen, E & Szydlak, R (2014). Map altered by this student.

[47] Archibald (2013): 5; Archibald (1998): 21; Archibald (2004) in Hansen & Nielsen (2004): 883; Price & Waggoner (1975): 22-39.

exchange of Thracian bullion for grain and corn.[48] This exchange dynamic has been confirmed by the presence of northern Greek coins in bullion hoards discovered in Egypt and the Near East.[49] The date of the following eastern hoards *IGCH* 1638, 1644, 1639, 1645, CH 8.48, 1646, 1482 and 1790, suggests that coins from northern Greece began making their way around the Mediterranean in the early fifth century.[50] In particular, the volume of northern Greek coins in *IGCH* 1482, 1790 and *CH* 8.48, testify to the commercial relationship between this region and Persia. Around 480/65 B.C, they were joined by the octadrachms of Alexander I.[51]

The stimulus for coining in northern Greece has been variously attributed. Raymond has argued that Ionian revolt coinage inspired Thracian tribes to experiment with minting in electrum.[52] Kroll has proposed that the Aeginetans transmitted the practice of artificially inflating the value of silver through minting coins.[53] It has also been argued that the catalyst for consistent minting in silver was the need to pay taxes to the Persian king Darius during his invasion of Thrace.[54]

Relations With The Persians

In Herodotus V.2.2, Megabazus is commanded to conquer Thrace: "ὁ Μεγάβαζος τὸν στρατὸν διὰ τῆς Θρηίκης, πᾶσαν πόλιν καὶ πᾶν ἔθνος τῶν ταύτῃ οἰκημένων ἡμερούμενος βασιλέϊ." Tribes living near Lake Prasias were enslaved and transported to Asia (V.15.3). Envoys were then dispatched to request "γῆν τε καὶ ὕδωρ" from the King of Macedonia (V.17.1). Amyntas I received the envoys and obliged (V.18.1).

Submitting to Darius need not have been abhorrent. Herodotus recognised that Persian vassalage may have been advantageous for autocracies (IV.137.2).[55] This passage refers to Ionia, where Greek cities could opt for "δημοκρατέεσθαι μᾶλλον ἢ τυραννεύεσθαι" in the absence of the Persian threat. Macedonia, however, was a monarchy. An alliance with Darius

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[48] Rowan (2013): 105 – 127.

[49] IGCH 355, 690, 1638, 1173, 357, 1644, IGCH 365. See also Kroll (2011): 31-36; Kroll (2008): 35-56. Picard (2008): 465. Psoma (2006): 93; Archibald (1998) 83-84.

[50] Rowan (2013): 105-127; Kroll (2008): 35-36; Picard (2005): 269-82; Picard (2008): 465; Archibald (1998): 83.

[51] IGCH 1644, 1482, 365, 1790.

[52] Raymond (1953): 36-37.

[53] Kroll (2011): 35,36. See also Kraay (1964): 83.

[54] Picard (2008): 465; Psoma & Zannis (2011): 42-43; Kroll (2008): 35 – 36; Archibald (1998): 89-90; Hammond & Griffith (1979): 8; Kraay (1976): 142.

[55] Archibald (1998): 83-84.

must have brought benefits. Meiggs suggests that the timber requirements of land armies surpassed that of navies in the ancient world.[56] The opportunity to supply the invading force with timber alone may have been enough to influence Amyntas I. The alliance between Macedonia and Persia soon resulted in kinship ties. In V.21 Herodotus notes that Amyntas' daughter, Gygea, was married to the Persian general Bubares. Once Gygea had produced a son, the Temenid house of Macedonia was bound to Persia by blood (VIII.136). Given Alexander's preeminent role in Mardonius' invasion, it appears that Alexander I continued to foster this relationship after his father's death.

Justin (7.4.1), places the death of Amyntas around the time that Bubares was summoned from Macedonia by Darius (c.498/7 B.C).[57] It is believed that Alexander had assumed the throne around this time. Alexander appears to have cultivated a relationship with the Greek states during the early years of his reign.[58] According to Herodotus V.22.1-2, Alexander asserted his Argive heritage before the *Ἑλληνοδίκαι* in Olympia c.496 B.C, when he applied to compete in the stade race.[59] The King is also reported to have dedicated a golden statue at Delphi (VIII.121.2). It appears that around this time, Alexander had been designated *πρόξεινός* (VIII.136, VIII.143.3) by the Athenians.[60] This diplomatic title recognised his economic value to the Athenian state.[61]

In 492, the Persian general Mardonius led a force into northern Greece and installed garrisons at Eion and Doriskos (Hdt. VII.25.2, VII.113.1). Persian forces occupied Thrace for a period of twelve years.[62] Many mints in the region appear to have opened between 490 and 475.[63] It has been proposed that this development facilitated the payment of tribute to the Great King.[64] The discovery of hoards within the Persian Empire containing early fifth century tribal coins suggests that the Persian presence did not inhibit foreign exchange.[65] In fact, Xerxes' invasion may have brought many economic opportunities to the region.

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[56] Meiggs (1982): 154, 159, 165.

[57] Borza (1990): 103.

[58] Borza (1990): 130.

[59] Borza (1990): 130.

[60] Kremydi (2011): 164; Sprawski (2010): 139, 141; Hansen & Nielsen (2004): 115-102.

[61] Hansen & Nielsen (2004): 98-100; Millet (2010): 474-477; Borza (1990): 109.

[62] Archibald (1998): 79, 84.

[63] Archibald (1998): 89; Borza (1990): 126; Kraay (1979): 139-43; Kraay (1976): 141; Hammond & Griffith (1979): 69-91; Price & Waggoner (1975): 2-19.

[64] Briant (2002): 144.

[65] Cf. Footnote 53.

Herodotus (VII.119.2) mentions the Persian demand for silverware, but the invader would have also required wood for bridges, metal for weapons, tools, soldiers and slaves.[66]

In Hdt.VIII.136.1, Mardonius sends Alexander I to procure an alliance with the Athenians. He was assigned the mission in view of his kinship to Persia and his political ties to Athens (VIII.136). At the Battle of Plataea, Alexander could no longer maintain his competing loyalties. He had to pick a side. A Macedonian contingent of the Persian army was expected to marshal opposite the Athenian troops on the field (Hdt.IX.31.5). Unable to procure a prophecy of Persian victory, Mardonius perpetually delayed the battle (IX.43-44.1). Perhaps motivated by the oracle's grim pronouncements, Alexander seized the opportunity for a tactical betrayal. He approached the Athenians in secret and advised them to abstain from battle another day to increase the likelihood of a Greek victory (Hdt. IX.44.1).

The Persian forces began a protracted withdrawal through northern Greece around 479 B.C.[67] Alexander may have sought to fill the resultant power vacuum by expanding his territory in 479/8.[68] Thucydides attests that Alexander expanded into Pieria, Bottiaia, Mygdonia, Eordia and Almopia (II.99.3-5). Additionally, he is reported to have conquered tribes dwelling in Anthemus, Krestonia and Bisaltia (II.99.6).

Map 2.3: Macedonian Expansion Under Alexander I (c.480 B.C.).[69]

According to Herodotus this expansion extended to Lake Prasias, where a large silver mine

[66] Archibald (1998): 89.

[67] Archibald (2013): 4; Archibald (1998): 90.

[68] Hatzopoulos & Paschidis (2004) in Hansen & Nielsen (2004): 794; Archibald (1998): 90; Kagan (1987): 23,24-25. Kraay (1981): 1-3; Price & Waggoner (1975): 39.

[69] Wittke, A M, Olshausen, E & Szydlak, R (2014). Map altered by this student.

was located (VII.107).[70] From this mine, he reportedly drew a talent of silver per day: "ἐξ οὗ ὕστερον τούτων τάλαντον ἀργυρίου Ἀλεξάνδρῳ ἡμέρης ἑκάστης ἐφοίτα," (V.17.2). As a consequence, Alexander is believed to have started minting coinage between 480/79 and 465 B.C.[71]

The era of Alexander's coinage corresponds to a period of great turbulence in northern Greece. In 479 B.C. the Delian League was formed.[72] Under Kimon's leadership, it set about driving Persian garrisons from Thrace and imposing penalties on medising cities of the North.[73] The Athenians expelled the Persians from Eion and took the city for themselves (Thuc. I.98). The Athenians later attempted to establish a colony further inland at Ennea Hodoi with a view to establishing economic dominance in the region (Thuc.I.100).[74] The expedition halted at Drabescus, where 10,000 Athenian colonists were massacred by a united Thracian front (Thuc. I.100.2). Both Eion and Ennea Hodoi were in close proximity to the gold and silver mines of the Pangaion basin.[75]

As Kallet has recently emphasized, Athens' growing economic interest in the Strymon gulf may have jeopardised Thasian mining operations on the mainland. This may have prompted Thasos to revolt from the Delian League in 465 B.C (Thuc.I.100.2-101.3; Hdt.VI.46).[76] Athens subdued the rebellion around 463 B.C. The Thasians were made League tributaries and their mines were confiscated (Thuc.1.100.2).[77] Thus, by 463 B.C., Alexander I and Athens had emerged as key beneficiaries of the Persian Wars. Alexander had conquered Lake Prasias and extended his kingdom to the east bank of the Strymon River.[78] The Athenians had established hegemony in the Strymon gulf, controlling maritime access to and from the major coastal cities of northern Greece.[79]

It has been suggested that the mutual success of Macedonia and Athens may have been

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[70] Cf. footnote 26. See also Raymond (1953): 85; Head (1887) *HN*: 218; Babelon (1907): 1080.

[71] Psoma (2006): 78; Liampi (2005): 141; Hatzopoulos & Loukopoulou (1992): 17-25; Kagan (1987): 24-25; Price (1987): 43-47; Price (1974): 19; Raymond (1953): 85; Head (1887) *HN*: 218; Babelon (1907): 1080.

[72] Kallet (2013): 44.

[73] Hdt.VII.107; Thuc.I.98; Plut. *Kimon* 7.1-2; Kallet (2013): 43-44; Archibald (2013): 4; Sprawski (2010): 140.

[74] Kallet (2013): 43; Archibald (2013): 4,11; Psoma (2006): 78; Liampi (2005): 141; Hatzopoulos & Loukopoulou (1992): 17-25. Price (1987): 43-47.

[75] Kallet (2013): 44.

[76] Kallet (2013): 48; Archibald (2013): 16; Archibald (1998): 249-70.

[77] Kallet (2013): 43; Archibald (2013): 4, 11; Psoma (2006): 78; Liampi (2005): 141; Hatzopoulos & Loukopoulou (1992): 17-25. Price (1987): 43-47.

[78] Thuc.2.99.3-6; Hatzopoulos & Paschidis (2004): 794; Borza (1990): 123-124.

[79] Kallet (2013): 44.

the result of an arrangement between Alexander I and Kimon.[80] Pericles accused Kimon of taking a bribe from Alexander I to keep the Delian League out of Macedon (Pericles 10.5, Kimon 15.5). The historicity of this episode is difficult to evaluate.[81] Thucydides makes no mention of Kimon being put on trial for bribery. Given that Pericles levied the charge, it should be given little credit. It was likely a political tactic: an attempt by Pericles to capitalise on poor public sentiment towards Kimon, after the disaster at Ennea Hodoi.[82]

Alexander I: The Coinage

Alexander I disappears from the ancient sources after the initial push of the Delian League into the North Aegean. He was the first Macedonian king to mint a regal coinage. Herodotus claims that Alexander was king by the time that Mardonius commenced his invasion of Thrace. As previously discussed, it is believed that his reign commenced between around 498/7 B.C. Based on Alexander's assumed age for the stade race at Olympia c.496 B.C., his death is thought to have occurred around 454 or 451 B.C.[83] His coinage can, therefore, be dated with an acceptable level of certainty.

The obverse and reverse types of the royal coins reference the Temenid legacy.[84] The obverse of larger denominations features the main type of a rider on a horse, wearing a petasos (hat) and chlamys (cloak) and carrying two spears. A variation of this type, commonly used for Alexander's octadrachms and octobols, is the rider walking beside his horse, wearing a petasos and chlamys and carrying two spears. The reverse designs commonly feature one of two iconic symbols: the goat (a testament to the Argead origin story) and the helmet (a reference to the military strength of Macedon). The significance of these symbols has been discussed above.[85]

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[80] Borza (1990): 123; Cole (1978): 48-49.

[81] Borza (1990): 123; Cole (1978): 48-49.

[82] Borza (1990): 122.

[83] Borza (1990): 111; Raymond (1953): 86; see also Beloch (1912) *Griechische Geschichte*, III 2: 49ff.

[84] Borza (1990): 128; Hammond & Griffith (1979): 81, 86, 104-5; Raymond (1953): 53-60.

[85] Raymond (1953): 53 – 60.

CHAPTER TWO

The coinage of Alexander I is important to the economic history of the region. Few northern Greek coinages from the early fifth century B.C can be dated with precision.[86] Since Eckhels first attributed the coins to Alexander I in 1792, the coinage has been placed between 492 and 451 B.C.[87] This range effectively calibrates the chronology of many coinages of Thrace and the coastal North Aegean. As a consequence, how we interpret the coinage of Alexander influences our understanding of political economy in this region between 490 and 451 B.C.[88]

Two chronologies have shaped the study of regal Macedonian coins of the fifth century B.C. The first chronology places the minting of Alexander's coinage between 480 and 451 B.C. This chronology, proposed by Head, was based on Curtius' history of the Persian Wars.[89] Svoronos, Babelon and Gaebler later supported this date.[90] Raymond used this date and two others to propose a more defined chronology.[91] She divided the coins into three groups; Group I began c.480 B.C., Group II c.476/5 B.C., and Group III, which closed c. 451 B.C. This three-group system continues to be applied to the coinage. The discovery of an Alexander octadrachm in the Asyut Hoard prompted Price & Waggoner to suggest place Raymond's Group II before Group I, and then to down date the beginning of Group I to 476/5 B.C.[92] Kraay and Howell each rejected this revised date evidence of the internal consistency of Raymond's typology.[93] It wasn't until the discovery of the Decadrachm Hoard that sufficient evidence for a reduced date was provided.[94] The Decadrachm Hoard did not contain any coins of Alexander I. It did, however, contain a large volume of Bisaltai octadrachms.[95] These coins bore strong stylistic similarities to Alexander's Group I octadrachms. Large numbers of Attic and Corinthian coins present in the hoard suggested a close of c.465 B.C. It

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[86] Babelon (1907): 1080-1081.

[87] Eckhels (1792): 84.

[88] Psoma (2007): 425.

[89] Head (1879): 156; See Curtius (1868), Vol. 2, Chapter 1.

[90] Babelon (1907): 1035-79; Svoronos (1919): 33; Gaebler (1935): 148, 149, 150, 151.

[91] Raymond (1953): 85-99, 108-125, 129-135.

[92] Price & Waggoner (1975): 22-39.

[93] Kraay (1977): 231; Howell (1978): 598, 599.

[94] See Kagan (1987); and Fried (1987).

[95] Kagan (1987): 24-25. See also *CH* 8.48.

was, therefore, proposed that the date for the beginning of Group I the start of Alexander's coinage be further reduced to 465 B.C.[96]

The chronology of Alexander's coinage is determined, to an extent, by the Bisaltai coins. The notion that the Bisaltai tribe formerly possessed the Lake Prasias silver mine, conquered by Alexander I during his expansion, suggests that the cessation of Bisaltai coinage and the beginning of Alexander's coinage would share the same approximate date. The Decadrachm Hoard indicates that the Bisaltai were still minting by 465 B.C. This means Alexander could not have come into possession of the Lake Prasias mine until c.465 B.C. Herodotus does not explicitly say that the Bisaltai tribe was in possession of the mine before Alexander conquered it.[97] The linking of the Bisaltai tribe and the Lake Prasias mine is based on a few select passages from Herodotus (V.17.2, VII.107; V.115) and Thucydides (II.99.3-6). The possibility that this tribe did not possess the mine may necessitate a revision of the 465 B.C. start date.

In each chronology, Athens is identified as (a) the cause of a change in Alexander's coin output and/or (b) the catalyst for Macedonian expansion. Alexander's alleged introduction of the Athenian weight system sets Raymond's Group II start date. Alternatively, a 465 commencement for Alexander's coinage is justified by Athens' well-documented disruption of the Strymon region between 476 and 463 B.C.[98] This disruption may have provided Alexander with the opportunity to expand his territory.[99] This chapter explores the historical development of the chronology of Alexander's coinage through coin weight and mint activity. It begins by discussing how the two prevailing chronologies have incorporated Raymond's order of issues. It examines the role that the Athenian weight system theory has played in driving Raymond's chronology. It looks at the claim that Alexander employed a dual standard to mint his coinage, and examines why this second standard came to be regarded as Athenian. Finally, this chapter will explore Raymond's claim that Alexander changed his minting strategy to facilitate more commercial opportunities with Athens.

Typology

In Raymond's typology, the tetradrachms of Alexander I depict a Macedonian hunter riding a horse. He carries two large hunting spears in one hand and the reins in the other. The hunter is

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[96] Psoma (2006): 78; Liampi (2005): 141; Hatzopoulos & Loukopoulou (1992): 17-25; Kagan (1987): 24-25; Price (1987): 43-47; Price (1974): 19.

[97] See Kraay (1976): 142.

[98] Thuc.I.98, I.99, I.100; Kallet (2013): 43-48; Archibald (2013): 249-70.

[99] Kagan (1987): 24-25.

featured wearing a petasos; a hat that curves up at each end and particularly identifies the peoples of Thrace and Macedonia. Persian documents, for example, refer to the peoples of Thrace and Macedonia as "Petasus-wearing Yauna" (Ionians) across the sea.[100] The hunter's body is draped with a chlamys (cloak), typical of the Macedonian region, often with an additional tunic. The horse is always bridled and walking, proudly, with its foreleg raised. This is a point of distinction between the tetradrachms of Alexander I and Perdiccas II. The horse depicted on Alexander's tetradrachms is walking or prancing. It is never depicted rearing up on its hind legs.

This design constitutes the main tetradrachm obverse type, and it does not change across the order of issues. Minor stylistic flourishes distinguish different series or issues. These include a dotted or linear border, the addition of the caduceus on the rump of the horse, or the inscription 'A' on or above the exergual line.

Table 3.1: Raymond's Tetradrachm Typology

Group	Raymond Type Obverse		Raymond Type Reverse	
I	A.I	Mounted warrior-hunter, holding reins and two spears, wearing chlamys and petasos; in dotted circular border.	CC.I	Head of goat in incuse square.
	A.I.a	Spears in back of horse.	CC.I.a	In dotted square border.
	A.I.b	Spears across body of horse.	CC.I.b	In linear square border.
			DD.I	Crested helmet with nose, neck, and cheek pieces is incuse square.
II	A.II.a	Mounted warrior-hunter r., holding reins in r.h., spears in l.h., wearing chlamys and petasos, exergual line and linear circle.	CC.II	Forepart of Goat r., in linear square within incuse square.

[100] Archibald (1998): 83. This is generally accepted to mean the Macedonians.

III	A.I	Mounted warrior-hunter, holding reins and two spears, wearing chlamys, tunic and petasos.	CC.III	Forepart of Goat r, head reverted.
	A.I.a	Spears in back of horse.		
	A.I.b	Spears across body of horse.		

As the main obverse type displays little variation, it can be difficult to determine the order of production. By contrast, the main reverse type varies greatly. According to Raymond's order of issues, Alexander's reverse type progresses from the iconic goat head, to crested helmet, to goat forepart with the inscription ΑΛΕ, to goat forepart with the head reverted. Thus, a change in the reverse type is regarded as a new series.

Raymond's order of issues was challenged by the contents of the Asyut Hoard (IGCH 1644). The Athenian and Corinthian coins indicted a deposition date of c.480 to 475 B.C.[101] Other northern Greek coins present in the hoard could be placed within this date range. The one exception was a single octadrachm of Alexander I.[102] The Asyut Alexander possessed an inscribed quadripartite incuse reverse. This type was dated to 465/0, according to Raymond's order of issues.[103] This coin suggested that the hoard remained open for a further ten years. Price and Waggoner reasoned that the anomaly required a revision of Raymond's order of issues.[104] It was proposed that Raymond's Group II (to which the Asyut Alexander belonged) came before.[105] This re-classification would mean that the coin could now be placed between 480 and 475 B.C., bringing it into line with the rest of the hoard.[106]

Price & Waggoner's proposed amendment to Raymond's order of issues had further implications. Placing Alexander's inscribed octadrachms in Group I would also mean placing the reverse-inscribed octadrachms of the Bisaltai around the same time.[107] This would not accommodate the stylistic development of the Bisaltai octadrachms (from un-inscribed coin,

[101] Price & Waggoner (1975): 23.

[102] Kagan (1987): 22; Price & Waggoner (1975): 22, 23, 38-39.

[103] Price & Waggoner (1975): 22.

[104] Price & Waggoner (1975): 22-23.

[105] Price & Waggoner (1975): 22; Kraay (1981): 1-3.

[106] Price & Waggoner (1975): 38, 39.

[107] Kraay (1977): 190-193.

to inscribed obverse, to inscribed reverse).[108] The discovery of an inscribed coin of the Bisaltic King Getas and an inscribed octadrachm of Alexander I in the Jordanian Hoard (IGCH 1482) provided a further indication that the revision of Price and Waggoner was incorrect.[109] The find suggested that these coins were contemporary.

Kraay and Holloway argued against the amendment to Raymond's order of production.[110] They claimed that the proposed date of 479/75 B.C. for the Asyut Alexander was symptomatic of the entrenched idea that Alexander began minting coinage immediately after the Persian withdrawal.[111] As Alexander had assumed the throne by at least 492 B.C., it was entirely possible that he began minting his regal coinage during the Persian occupation of Thrace. [112] Various Thracian tribes appear to have opened mints during Persian occupation.[113] Why then should we assume that Alexander did not have the same opportunity? Kraay and Holloway thus defended the integrity of Raymond's order of issues, insisting that the Asyut Alexander be dated " no later than the issues of the Samians at Zankle and the Abdera magistrate *ER.*"[114]

The discovery of the Decadrachm Hoard had significant implications for Raymond's chronology. These will be examined in the following section. Though Kagan down dated Raymond's chronology by ten years, he acknowledged the integrity of Raymond's order of issues.[115] Similarly, a study of seven Alexander tetradrachms from *CH* 9.9 identified a die link between Group I and Group II issues, validating Raymond's order.[116]

Though new types and sub-types of Alexander's tetradrachms have surfaced since Raymond's study, the integrity of her typology and her order of issues has been proven, time and time again. The distribution of dies, per issue, appears to accurately reflect the distribution of dies over time. For these reasons, I have chosen to retain Raymond's order of issues for my own study of the tetradrachm corpus. I have modified her typology to incorporate the "tribal alliance staters" of Alexander I, which were referenced in Raymond's analysis, but not studied. I have also allocated the A-series tetradrachms their own sub-type.

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[108] Kagan (1987): 22.

[109] Kraay (1981): 1-3; Kraay (1977): 193.

[110] Kraay (1977): 190-193.

[111] Holloway (1978): 598.

[112] Holloway (1978): 598.

[113] Kraay (1976): 142.

[114] Holloway (1978): 599.

[115] Kagan (1987): 29.

[116] Wartenberg (2002): 85.

The number of A-series die-links indicates that these coins appear to be part of a single issue or series of issues. I felt that this warranted an A-series subtype classification.[117]

Developing Chronologies for Alexander's Coinage

Thucydides claimed that Alexander I extended the limits of his kingdom to the east bank of the Strymon River (II.99.3-6). These territorial gains were passed onto his son, King Perdiccas II (II.99.3-6). According to Herodotus, the land of Bisaltia comprised the city of Argilos, a city situated on the Strymon gulf, and the land beyond it (Hdt.VII.115.1). In (V.15.3), Herodotus (V.15.3) identified the tribes living as far north as Lake Prasias: the "Παιόνων Σιριοπαίονές τε καὶ Παιόπλαι." In V.16.1 he reported that Megabazus never conquered the tribes living directly within the Prasias basin ("τῇ λίμνῃ κατοικημένους"). In V.17.2 he locates the Prasias basin near Mount Dysoron. This mountain is believed to be located in modern Kerkini, placing Lake Prasias close to Bisaltai territory (but also equally close to the territories of the Edones, Paeonians and Krestonians). In this area, Herodotus (V.17.2) claimed the existence of a prolific silver mine from which Alexander extracted a talent of silver per day.

Map 3.1: Thrace and Macedonia, c.480 – 451 B.C.[118]

Herodotus does not specify how far north the land of Bisaltia extends. Nor does Thucydides. It is clear from the passages cited above, however, that the Bisaltai tribe did not occupy the Prasias basin.[119] How then did this tribe come to be central to the chronology of Alexander's coinage?

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[117] A revised typology is provided in Three.

[118] Wittke, A M, Olshausen, E & Szydlak, R (2014). Map edited by this student.

[119] Archibald (1998): 85, 86-90.

Curtius used passages from Thucydides (II.99.4-6) and Herodotus (V.17.2, VII.115.1) to propose that Alexander conquered the Bisaltai tribe and the Lake Prasias mine c.480 B.C.[120] Head thus argues that Alexander began minting coinage c.480 B.C.[121] The similarities in type and fabric between the octadrachms of Alexander I and the Bisaltai, seemed to support this theory.

Fig 3.1: Octadrachms of Alexander I and the Bisaltai Tribe.

On the basis of the reconstruction of events proposed by Curtius, Babelon, accepted a start date of 480 B.C.[122] By comparing regional types, he found evidence to support the theory of Persian invasion as a catalyst for minting coins in Thrace and Macedonia.[123] The tribal coinages available to Babelon at the time did not appear to progress (from an anonymous, quadripartite reverse, to a quadripartite reverse bearing the inscribed name of the issuing authority). As Alexander's coinage bears his name, initial or type, this practice has been interpreted as a convention of minting after the Persian wars; when local kings and rulers, having been freed from the Persian yoke, could be recognized as the issuing authority.[124] The absence of such inscriptions on tribal coins led Babelon to conclude that the Persian withdrawal from northern Greece c.479, removed the need for tribes to mint coinage to pay tribute.[125] As a result, these tribes stopped minting.[126]

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[120] Curtius (1868): see Chapter 1.

[121] Head (1879): 156; Curtius (1868).

[122] Babelon (1907): 1079.

[123] Babelon (1907): 1040.

[124] Babelon (1907): 1040. See also Svoronos (1919): 33.

[125] See also Picard (2005): 465.

Like Curtius and Head, Babelon placed Alexander's acquisition of the Lake Prasias mine during his expansion into Bisaltia.[127] The similarity in obverse types between the Bisaltai octadrachm and the Alexander octadrachm seemed to support the conclusion that Alexander I conquered the mines, and employed the type and weight of the Bisaltai coinage to mint his Group I octadrachms.[128]

Svoronos was also an advocate of the Persian-withdrawal catalyst theory. He had argued that during the Persian occupation of Thrace, subject tribes and cities did not have economic independence.[129] He proposed that from 513 to 480 B.C. such conditions prevented the kings of Macedonia from minting coins.[130] The absence of coins bearing the name of Amyntas seemed to support Svoronos. As no coinage appeared to be struck by Alexander's forebears, Svoronos suggested that the Temenid house of Macedonia did not possess any gold or silver mines until Alexander's conquest of Lake Prasias c.480/79.[131]

By Gaebler's study in 1935, 480 B.C had been accepted as the date of Alexander's conquest of "silver-rich Bisaltai territory".[132] He rejected, however, the proposal that Alexander started minting coinage after this date.[133] *Die Antiken Munzen: Makedonia* ordered thirty-five coins into a typology according to their reverse designs. The coins are grouped into seven types (*a – g*): *a-e* representing the earliest coins, and *f-g*, the latest.[134] Gaebler placed types *a-e* before 480 B.C. and types *f-g* after 480 B.C, though he did not explain this chronology.[135]

In 1953, Raymond amended Gaebler's chronology and his order of production. She restored a number of misidentified tetradrachms.[136] Her corpus now included 193 specimens. This corpus and die study was published as part of her seminal work *Regal Macedonian*

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[126] Babelon (1907): 1040.

[127] Babelon (1907): 1039-1040.

[128] Babelon (1907): 1035.

[129] Svoronos (1919): 33.

[130] Svoronos (1919): 33.

[131] Svoronos (1919): 33.

[132] Gaebler (1935): 148.

[133] Gaebler (1935): 148, 149.

[134] Gaebler (1935): 148, 149-151.

[135] Gaebler (1935): 148.

[136] Gaebler (1931): 21-23.

Coinage to 413 B.C.[137] It remains the most comprehensive study of the coins of Alexander I. Raymond imposed a three-group chronological framework on Alexander's coinage:

- Group I: 480/79 – 477/6 B.C.
- Group II: 476 – 460 B.C.
- Group III: 460 – 451 B.C.

This framework is still applied today.[138] Raymond supported the initial proposal of 480 B.C., put forward by Babelon and Svoronos, as the beginning of Alexander's coinage.[139]

Her suggestion of 476/5 B.C. as the opening date for Group II, was based on her observation that certain tetradrachms, octobols and light tetrobols, were minted on the Attic weight standard.[140] The octobols in Raymond's corpus all possess the same obverse and reverse types. This indicated that the coins may have been part of a single issue.[141] The average weight of this denomination was approximately 4.36g, which Raymond aligned to the Attic drachma (4.3g).[142] She also noted that the light tetrobols resembled the Attic triobol (2.15g).[143] Finally, the combined weight of eight tetradrachms in Raymond's corpus, bearing the goat-forepart reverse type, suggested an average weight of 12.50g. This average is significantly distant from the Athenian tetradrachm weight of 17.20g. Raymond, however, argued that the base unit of measurement (i.e, the Attic drachma) was more indicative of the weight system used than the total weight of the coin.[144] As the eight tetradrachms approximated to three Attic drachmas, Raymond also considered these coins to be of Attic weight.[145]

476/5 B.C. was proposed as the start date for Alexander's "Athenian" coins, because it corresponded to the conquest of Eion by the Delian League.[146] This event marked the

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[137] Raymond (1953): 78-135. I have excluded the 'H' series coins from the total number of specimens attributed to Alexander I in Raymond's study. This series has since been reattributed. For reattribution to Eion, see Kallet (2013): 48; Psoma (2006). For reattribution to the Edone tribe, see 74-77 Hammond (1972): 107; Hersh (1991): 3-19.

[138] Kremydi (2011): 163-4; Borza (1990): 129-30.

[139] Raymond (1953): 85; Head (1887): 218; Babelon (1907): 1080.

[140] Raymond (1953): 33, 34, 35, 86, 109, 110.

[141] Raymond (1953): 100-126.

[142] Raymond (1953): 109.

[143] Raymond (1953): 109.

[144] Raymond (1953): 34-5.

[145] Raymond (1953): 109.

[146] Kallet (2013): 43; Archibald (2013): 4, 11; Psoma (2006): 78; Liampi (2005): 141; Hatzopoulos & Loukopoulou (1992): 17-25; Price (1987): 43-47.

beginning of Athens' increased presence in the Strymon gulf. The attempt to settle Ennea Hodoi later that year resulted in a Thracian uprising.[147] It has been suggested that Eion and the attempted colonisation of Ennea Hodoi were part of systematic attempt on Athens' behalf to co-opt the network of metals production and transport in the Pangaion region.[148] This may have resulted in the Thasian revolt in 465.[149]

Raymond's historical interpretation of the coinage is based on the belief that Alexander saw economic opportunities through cooperation with Athens. While Thasos and Thracian tribes of the Pangaion region were fighting against Athens, Raymond argued that Alexander began minting coins on the Attic standard in order to facilitate economic activity between Macedonia and Athens.[150] Thus, her date for the beginning of Group II is based on the tetradrachms, octobols and light tetrobols of Attic weight, "whose commencement is shown clearly by the coins to be 476/5 B.C." [151]

The death of Alexander, and the end of his coinage, is placed between 454 – 451 B.C.[152] Raymond had suggested 451 B.C. She argued that mint activity in Group III could be linked to the transfer of the Delian League treasury, from Delos to Athens, c.454 B.C.[153] She suggested that the larger coins of this group were discontinued in favour of the light tetrobols "which could pass as Attic triobols from that date until [Alexander's] death in 451."[154] Thus, two key dates in Raymond's chronology have been linked, by weight, to Athens' military and economic activity in the Strymon region.[155] As I have already mentioned, the exception is the start date of Group I (480 B.C.).

The appearance of Alexander's Group II octadrachm in the Asyut Hoard led Price and Waggoner to suggest reversing the order of Raymond's Group I and Group II.[156] In his rebuttal, Kraay argued that assigning an earlier date of 475 B.C. to the octadrachm was not the right approach. It was symptomatic of a chronology, which placed the start of Alexander's coinage after the Persian withdrawal c.480/79 B.C.[157] Kraay raised the possibility that

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[147] Thuc. I.100; Kallet (2013): 44.

[148] Kallet (2013): 49-52; Archibald (2013): 16; Archibald (1998): 155.

[149] Kallet (2013): 49-52; Archibald (2013): 16; Archibald (1998): 155; Borza (1990): 123.

[150] Raymond (1953): 109.

[151] Raymond (1953): 86, 109.

[152] Raymond (1953): 86; Beloch (1912): 49ff.

[153] Raymond (1953): 132, 134.

[154] Raymond (1953): 132, 134.

[155] See Raymond 109-110, 129-135 respectively.

[156] Price & Waggoner (1975): 22, 38-9.

[157] Kraay (1977): 231.

Alexander had been minting since the early years of his reign.[158] Furthermore, he suggested that the Bisaltai tribe did not possess the mine at Lake Prasias. Rather, he proposed that the Derrone tribe were its former owners.[159] This theory accommodates the prolonged minting of Bisaltai coinage. It is also supported by the chronology of the Derrone coinage. After their appearance in the Asyut Hoard, the occurrence of Derrone coins in foreign hoards is significantly reduced.[160] Despite the large volume of tribal coins within the Decadrachm Hoard (c.465 B.C), only one Derrone coin is present.[161] Derrone coins cease to appear in hoards altogether after *CH* 8.48, which has been dated to c.460 B.C.[162] This may indicate that the Derrone tribe stopped minting coinage in the 470's.

The discovery of the Decadrachm Hoard cast Raymond's dating of Group I start date into doubt. [163] A total of sixty-eight Bisaltai octadrachms were present, comprising the bulk of northern Greek silver represented in the hoard.[164] No coins of Alexander I were present for comparison. In *The Decadrachm Hoard: Chronology and Consequences,* Kagan noted that the coins of the Edoni, Bisaltai, Orescii, Ichnai, Tuntenii tribes and the coins of the North Aegean cities, appeared to be at the same stage of stylistic development. Thus he judged them to be contemporary.[165] Fried placed the coins between 480/475 and 460 B.C.[166] Kagan noted that the prolonged minting of un-inscribed Bisaltai coins once again supported Raymond's typology and order of issues.[167] He suggested that a later date for Alexander's "neatly inscribed reverse" should be considered. He cautioned, however, that dating these issues beyond 460 would only leave ten years for Alexander's mint to develop the more superior Group III style.[168]

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[158] Kraay (1977): 231.

[159] Kraay (1976): 142.

[160] See IGCH 355, 690, 1644, 1645 and CH.8.48.

[161] CH.8.48.

[162] See IGCH 1646, 1482, 365, 1790 and CH 9.9.

[163] *CH* 8.48 (Emali). This student acknowledges that *CH*.8.48 is only a part of the original Decadrachm hoard and that a complete catalogue of the hoard contents is currently being undertaken. See also Kagan (1987): 21-29, where the large volume of Bisaltai coins comparative to other regional coinages is discussed in depth.

[164] Kagan (1987): 24-25; Fried (1987); 1-20; *CH* 8.48 (Emali).

[165] Kagan (1987): 21.

[166] Fried (1987): 1-20.

[167] Kagan (1987): 23.

[168] Kagan (1987): 23.

Kagan's down dating challenged the notion that Alexander conquered the Lake Prasias mine immediately after the Persian withdrawal.[169] As the Bisaltai cessation of minting now appeared to have occurred closer to 465/0 B.C., he suggested that it was the Bisaltai tribe who first capitalised on the Persian withdrawal.[170] When and how did the mine come into Alexander's possession? The cessation of Bisaltai minting coincided with the Athenian colonisation effort an Ennea Hodoi c.465/4 B.C.[171] Kagan proposed that the chaos caused by Athens in the Strymon region, provided Alexander with the opportunity to wrest the silver mine from the Bisaltai.[172]

Based on the contents of the Decadrachm Hoard, Hatzopoulos, Loukopoulou, Liampi and Psoma have accepted a revised dating of the late Bisaltic coins to the 465/0 B.C.[173] Consequently, a start date of 465 B.C. has been proposed for the start of Alexander's inscribed coinage.[174] This amendment seems to support Kagan's insight that Alexander only possessed significant reserves of silver during the last ten years of his life.[175]

In both Raymond's chronology and Kagan's chronology, Athens is a key factor. Raymond's argument that Alexander minted his Group II tetradrachms, octobols and light tetrobols on the Attic standard is the strongest evidence for a causal link between Alexander's mint and the Athenian presence in the Strymon gulf.[176]

Athenian Weight System Theory

Many weight systems appear to have been employed concurrently in northern Greece, during the early fifth century B.C.[177] The "Thraco-Macedonian" standard, the Thasian Standard and the Lydo-Milesian standard predominated in Macedonia, Thrace and the northern coastline.[178] The Thraco-Macedonian standard is a modern construct. The term suggests that the tribes and

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[169] Kagan (1987): 24.

[170] Kagan (1987): 24.

[171] Kagan (1987): 25.

[172] Kagan (1987): 25.

[173] Psoma (2006): 78; Liampi (2005): 141; Hatzopoulos & Loukopoulou (1992): 17-25; Kagan (1987): 24-25; Price (1987): 43-47; Price (1974): 19.

[174] Kagan (1987): 25.

[175] Psoma (2006): 78; Liampi (2005): 141; Hatzopoulos & Loukopoulou (1992): 17-25; Kagan (1987): 24-25; Price (1987): 43-47.

[176] Kremydi (2011): 163-4; Borza (1990): 120; Hammond (1979): 107; Raymond (1953): 62-64,109-110.

[177] Picard (2008): 465; Psoma & Zannis (2011): 32-33; Psoma (2006): 85-87; Kraay (1979): 139-43; Hammond & Griffith (1979): 69-91; Price & Waggoner (1975): 2-19; May (1966): 82-115; Babelon (1907): 1035-79.

[178] Babelon (1907): 1035-1036.

kingdoms of Thrace and Macedonia used a common weight system. This system produced octadrachms of thirty to forty grams in weight, and tetradrachms of twelve to fourteen grams.[179] The octadrachms and tetradrachms of Alexander I are placed within these weight ranges.[180]

If Alexander I used the Thraco-Macedonian weight system, how did the Athenian weight standard theory develop? Alexander's larger coins are not easily divisible by his smaller coins. In *A Cataloge of Greek Coins In The British Museum: Macedonia, Etc.* Head described the weight system used by Alexander as Graeco-Asiatic.[181] This identification reflected the variety of weights in his sample. Of the fifteen coins Head attributed to Alexander I (not "Alexander I & Perdiccas II"), three were octadrachms (44.75g, 44.2g, 40.2g) and twelve were smaller denominations (6.6g, 6.13g 3.44g, 3.1g, 1.52g, 1.37g, 1.2g, 1.66g, 1.55g, 1.22g, 0.87g, 0.82g).[182] Among these weights, Head could not identify a basic unit of measurement, which would unite all coins in a common weight system; the octadrachms in particular appeared to have belonged to a separate system. He therefore proposed that Alexander employed two systems for the minting of his coinage. Alexander's first octadrachms, he argued, were minted in the capital Aegae on the Babylonia (Persian) standard.[183] To explain the introduction of the Graeco-Asiatic standard, Head suggested that Alexander moved the capital to Pydna after conquering the Bisaltai c.480 B.C.[184] He claimed that moving to Pydna would have brought Alexander into contact with Greek cities of the coast, the Chalcidic peninsula, and the Pangaion region, who used the Graeco-Asiatic system.[185] In order to participate in this economy Alexander may have then started to mint his coinage on this standard, from Pydna.[186]

Contrary to Head, who proposed that mints of the Strymon region employed a single system, Babelon observed that, in fact, a variety of systems were used throughout northern

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[179] Picard (2008): 465; Psoma & Zannis (2011): 32-33; Psoma (2006): 85-87; Liampi (2005): 141; Cahn (1970): 179, 184, 185; May (1966): 82-115.

[180] Liampi (2005): 141; Cahn (1970): 179, 184, 185; Kraay (1976): 145; Price & Waggoner (1975): 22, 23; May (1966): 82-115; Raymond (1953): 19-41.

[181] Head (1879): 156-161.

[182] Head (1879): 156 – 158. For coins, which Head gave the combined attribution of "Alexander I & Perdiccas II", but have since been reattributed to Alexander I, see pp.158-60.

[183] Head (1879): xlviii.

[184] Head (1879): xlviii.

[185] Head (1879): xlvii.

[186] Head (1879): xlviii.

Greece, c.480 B.C.[187] Some weight standards were location-specific (i.e, common to a particular area) while other standards were used only for certain denominations.[188] For example, Babelon noted that while Alexander's octadrachms were in the same weight range as the coins of the Edoni, Orrescii, Bisaltai and Ichnai tribes, they also shared this range with the coastal city of Abdera.[189] He thus suggested that Alexander's octadrachms were minted on a common regional standard.[190] Alexander's tetradrachms, however, possessed different characteristics. In Babelon's study, the tetradrachms ranged from 12g to 13.57g.[191] He observed that this range closely resembled that for a Lydo-Milesian tetradrachm weighing of 14.56g.[192] To justify this dual system, Babelon drew from Head's initial hypothesis. He suggested that Alexander I probably opened another mint in Pydna to participate in the North Aegean economy.[193] As a result, the mint at Aegae, and the mint at Pydna would have employed two different standards during Alexander's reign; a common regional standard (used by the northern tribes and the city of Acanthus) and the Lydo-Milesian standard (used by the coastal cities).[194]

Raymond introduced the Athenian weight standard theory into the study of Alexander's coinage. Her corpus contained twenty-seven octadrachms, fifty-four tetradrachms, twenty-four octobols, twenty-eight heavy tetrobols and sixty light tetrobols for study.[195] Working from a larger sample of coins, Raymond established an order of issue for each denomination. She identified three anomalies. Firstly, the octobols appeared to have been minted as a single issue at an average weight of 4.36g, which was comparable to the Athenian drachma.[196] Secondly, the Group II tetradrachms (A.II/C.III) and H-series light tetrobol coins yielded an average weight comparable to the Athenian triobol.[197] Finally, the tetradrachms, bearing the reverse type of a goat forepart, facing right (A.I/C.IV) demonstrated

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[187] Babelon (1907): 1035-1079.

[188] Babelon (1907): 1035 – 1036.

[189] Babelon (1907): 1036.

[190] Babelon (1907): 1039 – 1040, 1079 – 1080.

[191] Babelon (1907): 1035 – 1036.

[192] Babelon (1907): 1035 – 1036. The Milesian standard was revived as a viable model for Alexander's coinage by Cahn in 1970 – see Liampi (2005): 242. Cahn (1970): 179-192. See also Babelon (1907): 1035 - 1037.

[193] Babelon (1907): 1079 – 1080.

[194] Babelon (1907): 1039 – 1040, 1079 – 1080.

[195] I have excluded the H series coins from the light tetrobols, as these have since been reattributed.

[196] Raymond (1953): 22, 109.

[197] Raymond (1953): 109.

an average weight of 13.09g.[198] This average was significantly distant from the Athenian tetradrachm weight of 17.20g. Raymond argued that the octobol might have in fact been a *trite*.[199] Multiplied by three, the octobol would produce a tetradrachm of approximately 13.17g. Therefore, as the octobol was comparable to the Athenian drachma, the tetradrachms in question would roughly be the equivalent of three Athenian drachmas.[200]

Having reasoned that three issues displayed characteristics of the Athenian weight system, Raymond concluded that the weight standard had a temporal significance. Athens' conquest of Eion c.476/5 and the attempted conquest of Ennea Hodoi c.465/4 provoked a united military reaction from local Thracian tribes, which culminated at Drabescus (Thuc. 1.100). Raymond suggested that Alexander's reaction was economic; he perceived an opportunity to extend his commercial relationship with Athens.[201] To Raymond, there was little doubt that the octobols and light tetrobols in particular, were minted by Alexander "to facilitate trade by the [Athenian] troops with Macedonian *κἀπηλοι*.[202]" Athens' intentions in the north could not have become apparent until Eion was conquered c.476/5 B.C.[203] Therefore, Raymond proposed that this date should correspond to Alexander's three issues of Athenian weight. 476/5 marked the end of Alexander's first issues, and the beginning of Group II.

What about the rest of the issues? According to Raymond's corpus, octadrachms of Thraco-Macedonian weight were retained throughout Alexander's reign. The development of the regional weight system, she argued, also had Attic roots.[204] A single electrum coin, bearing a centaur on the obverse design, was discovered at Lysimachia in Thrace.[205] Raymond identified the coin as a Thracian tribal issue, claiming that the obverse displayed a "distinctly Thracian type".[206] The style and fabric of this coin resembled the electrum coinage of the Ionian revolt, believed to have been minted between 500 – 494 B.C.[207] According to Raymond, the Ionian cities minted the electrum double stater (14.04g) specifically "to be

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[198] Raymond (1953): 109.

[199] Raymond (1953): 24 – 25.

[200] Raymond (1953): 109.

[201] Raymond (1953): 110.

[202] Raymond (1953): 110.

[203] Raymond (1953): 117.

[204] Raymond (1953): 33 – 38.

[205] Raymond (1953): 34; *BMC* 'Ionia', p.9, 42.

[206] Raymond (1953): 34.

[207] Raymond (1935): 34, 35.

exchangeable with silver Attic tetradrachms" (17.2g).[208] Raymond argued that Alexander's Group I tetradrachms (12-13g) were thus modeled on the Ionian electrum double stater.[209]

Given that Alexander's octobols also resemble the trite, Babelon seems to have been correct in arguing that the Lydo-Milesian weight standard (although slightly reduced) was employed for Alexander's coinage.[210] As Raymond stated, multiplying the average octobol weight by three resulted in a tetradrachm weight of 13.17g. This closely resembled the average weight of 13.09g produced by her study.[211] It also resembles the Lydo-Milesian tetradrachm weight of 14.10g.[212]

The Lydo-Milesian system was widely used in Asia Minor, Lydia, Lindos and Milos.[213] As Asia Minor and the Near East were key export markets for northern Greek silver during the early-mid fifth century B.C., it has been suggested that the Thraco-Macedonian weight system initially derived from the Lydo-Milesian.[214] Given that Alexander's tetradrachms and octobols resemble the Lydo-Milesian trite and tetradrachm, the Lydo-Milesian standard theory seems more likely than the Athenian standard theory. Furthermore, if the Thraco-Macedonian system did derive from the Lydo-Milesian, is there any evidence that Alexander employed a dual system at all?

By conducting an analysis of the new tetradrachm corpus, I mean to determine that Alexander did not mint tetradrachms to be exchangeable with Athens. I aim to prove that his coinage was minted on a light variation of the Lydo-Milesian tetradrachm standard throughout his reign.

Mint Activity

In the absence of literary or epigraphic records of state finances, the best way to approach an understanding of mint activity is to produce a die study (based on the identification of common dies for obverse and reverse types). The number of dies present in the sample is then used to calculate the number of dies used to mint the coinage.[215] The method produces an

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[208] Raymond (1935): 35.

[209] Raymond (1935): 35.

[210] Babelon (1907): 1039 – 1040, 1079 – 1080.

[211] Raymond (1953): 34.

[212] Liampi (2005): 242; Cahn (1970): 179, 184, 185.

[213] Liampi (2005): 242; Liampi (1994): 27; Cahn (1970): 179; Babelon (1907): 1035-1036.

[214] Liampi (2005): 242; Liampi (1994): 27; Cahn (1970): 179, 184, 185; Babelon (1907): 1035-1036.

[215] De Callatay, 2011: 17; Esty, 2006: 359; Esty, 1997: 817; De Callatay, 1995: 290; Buttrey, 1992: 339.

obverse-to-reverse die ratio.[216] This ratio permits an estimate of minting intensity. The distribution of die-links across an order of issues may suggest patterns of production increase and decrease. Such patterns may be interpreted as reflections of state expenditure.[217]

Raymond's die study of the coins of Alexander I in Groups I, II and III produced a total of eighty-eight reverse dies and one-hundred-and-nine obverse dies.[218] The number of dies per chronological group the number of dies per group appears as follows:

	Reverse	**Obverse**
• Group I (480/79 – 475 B.C.):	34	38
• Group II (476/5 – 460 B.C.):	29	42[219]
• Group III (460 – 451 B.C.):	17	21

The decrease in dies in Group III reflects the decreased number of octadrachm and tetradrachm dies. According to Raymond's chronology, octadrachm and tetradrachm dies decreased in the last decade of Alexander's reign: "...It appears that Alexander voluntarily suppressed the main part of his coinage in 454, and thereafter struck only the light tetrobols, which could pass as Attic triobols, from that date until 451."[220] The Group I tetradrachms were the product of twelve dies with only two obverse die links, suggesting the largest issues were minted during this period. Group II contained eight dies with no obverse die links, suggesting a slight decrease in output. Finally, from only five dies in Group III, one obverse die link was identified. The high number of reverse die links, however, suggested that this sample contained a high percentage of the reverse dies used in this period.

It should be noted that Raymond's study of the light tetrobols identified nine obverse dies in Group II, which produced eight obverse die links. In Group III, nine obverse dies were identified, but no die links were present. This indicated that the light tetrobols were minted in far greater quantities during Group III.

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[216] Raymond (1953): 61.

[217] The method can be ineffective when dealing with enormous coin volumes (Roman civic issues, for example). Attributing obverse and reverse patterns to their respective dies is time-intensive. The amount of time required to die-link tens of thousands of coins may make the exercise impractical. It also increases the chance of human error. Greek coinages of the early fifth century, however, are typically much smaller samples. In this context, a die study is both achievable and useful.

[218] Raymond (1953): 62.

[219] Excludes H series. See Raymond (1953): 72.

[220] Raymond (1953): 134-5.

Raymond related the decrease in tetradrachms to the increase in light tetrobols.[221] She suggested that from the moment the Delian League treasury was moved to Athens (c.454 B.C.), Alexander anticipated a more restrictive economic climate and changed his minting strategy accordingly.[222] She proposed that Alexander ceased the minting of large coins, in favour of light tetrobols.[223] These coins were equal to the Athenian triobol, and therefore, could still permit trade.[224] To substantiate this theory, Raymond supported Robinson's dating of the Athenian coinage Decree to c.449/8 B.C.[225] Based on Robinsons' date (which has since been revised) Raymond proposed that from c.454 B.C., Athens had started to employ a more cumbersome economic policy in the North Aegean, which culminated in the Athenian Coinage Decree c. 449/8 B.C.

Mattingly has down dated the Athenian Coinage Decree to c.420 B.C., and this date is now generally accepted.[226] In light of this, Alexander would not have been affected by the Decree. Can Raymond's theory, that Alexander ceased the minting of octadrachms and tetradrachms in favour of light tetrobols, be proven by the study of a larger corpus? An examination of the smaller denominations is not within the scope of this thesis. A die study of a larger sample of tetradrachms, however, has been conducted and the results are presented in Chapter Four. The first aim of my die study, based on a larger corpus of coins, was to test the validity of Raymond's claim that fewer tetradrachms were minted in Group III.

The second aim of this die study is to incorporate quantification methods into the analysis, and evaluate their usefulness. Statistical models for quantifying ancient coinage started being developed from the 1960's.[227] Raymond, therefore, could not simulate the die coverage of her corpus, the total number of dies used to mint the coinage, or the potential volume of coins produced. The primary quantification methods take the following approach:

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[221] Raymond (1953): 131-132.

[222] Raymond (1953): 132-135.

[223] Raymond (1953): 133.

[224] Raymond (1953): 132-133.

[225] Robinson (1949): 324 – 340; Raymond (1953): 133.

[226] Mattingly (1961): 148-188.

[227] Esty (1986): 185-215; Carter (1983): 195 – 206; Lyon (1970): 16, 19.

1) The total number of coins, the total number of (obverse or reverse) dies, and the total number of singletons present in the sample are used to calculation the percentage of die coverage within the sample (C_{est}).[228]

2) This coverage estimate is then used in a second model (D_{est}) which produces an estimate of the total number of dies potentially employed to mint the total coinage.[229]

Historians, economists and numismatists continue to debate the validity of formulae for calculating die population. Esty published a comprehensive assessment of the primary methods in 1986.[230] It reviewed contributions to the field made by Lyon, Guilbald, Good, and Carter.[231] Esty himself was a proponent of the Good method for estimating coverage (J1/J2, K1). In 2006, he proposed a method for estimating die coverage based on Good's J1 formula.[232] According to Esty, J1 adequately accounted for variation in coin-output, per die.[233] He also suggested a method for calculating the total number of dies which was a simplified version of Carter's H5 formula.[234] Approximating and simplifying Brown's formula, an associated method for calculating confidence intervals was provided.[235]

Esty Model			**Derivation**	
Calculating Die Coverage	F1	$C_{est} = 1- d_1/n$	GOOD J1	$C' = l-(N_1/n)$
Calculating The Number of Dies	F2	$D_{est} = (d/C_{est})(1+d_1/2d)$	Carter H5	$k_2'= k'[l+ n/(pd)]-n/p = k'+ n(k'- d)/(pd)$
Confidence Intervals for D_{est}	F4	$e+(2e/n)^2 +/- (2e/n)\ SR2e$	Brown C2	$X= b+2b^2/T +/- (2b/T)[T(\bar{b} – 1)+b^2]^{1}/^{2}$

[228] Esty (2006): 359; Sheedy K (2006): 153-4; De Callatay (1995): 299; Esty (2011): 43-58; Esty (1986): 182-3, 186-215; Lyon (1989): 1-12.

[229] De Callatay (2011): 13.

[230] Esty (1986): 185-215.

[231] Esty (1986): 185-215; Lyon (1970): 16, 19; Carter (1983): 195 - 206.

[232] Esty (1986): 185.

[233] Esty (2006): 185; Esty (1986): 208.

[234] Esty (2006): 185; Esty (1986): 205.

[235] Esty (2006): 185; Esty (1986): 201.

Other models (Lyon, Carter and Brunetti) can still be used with confidence, where the coin-to-die ratio of a given sample is approximately 3:1.[236] Esty's methods, however, (formula 1, 2, and 4) are considered to be less sensitive to die variation and therefore, more reliable.[237]

To estimate the second unknown (the potential number of total coins produced), the method is much more empirical. The die estimate (D_{est}) is multiplied by the average number of coins minted per die.[238] The average number of coins produced, per die, for early classical Greek coins is an estimate derived from largely from inference. As Esty, remarked, "the mean number of coins [per die] is not accurately known.[239]" Sellwood attempted to recreate the process of minting ancient silver tetradrachms in 1963.[240] His objective was to gauge how often bronze dies tended to break during minting. His experiment suggested an average of 10,000 to 16,000 tetradrachms per obverse die.[241] These volumes appear quite conservative compared to Kinns' analysis of the Amphictionic coinage from Delphi.[242] Inscriptions *FD* II, 5, 49-50 and *CID* II 75-76 attest to the amount of silver used to mint the coinage of the Amphictionic League c.336/335 B.C.[243] Based on the quantity of silver recorded and the number of coins produced, Kinns estimated that the average obverse die minted between 23,333 and 47,250 coins and the average reverse die minted between 11,053 and 27,563 coins.[244] A conservative average of 20,000 coins per obverse die and 10,000 coins per reverse die for ancient Greek silver coinage has thus been suggested.[245] In order to account for the large range of difference, de Callatay has suggested dividing the average number of coins by two in order to produce a lower estimate (10,000), and multiplying it by two in order to produce an upper estimate (40,000).[246]

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[236] Esty (1986): 185, 198. See also, Carter (1983): 195 – 206; Lyon (1989): 1 – 12; Esty (1986): 1257 - 1260.

[237] De Callatay (2011): 13, Esty (2011): 43, 58; Esty, (2006): 359; De Callatay, (1995): 299; Esty, (1986): 185-215.

[238] De Callatay (2011): 13; De Callatay (1995): 299.

[239] Esty (1986): 189.

[240] Sellwood (1963): 217-231.

[241] Sellwood (1963): 217-231.

[242] Kinns (1983): 1-22.

[243] Sheedy (2006): 12; Kinns (1983): 1-22.

[244] De Callatay (1995): 299; Kinns (1983): 1, 8, 10-17, 18-19; See also Raven (1950): 11-13. Marchetti (1999): 109 estimates an average of 23,333 coins per die, based on 100 talents, and 14,350 based on 61.5 talents.

[245] De Callatay (2011): 13; De Callatay (1995): 299; Buttrey (1992): 339 – 340.

[246] De Callatay (2011): 13; De Callatay (1995): 299; Buttrey (1992): 339 – 340.

Buttrey and Howgego remind us of the dangers inherent in using statistics to produce volume calculations.[247] In particular, Buttrey doubts the value of averages. Dies might produce "extremely erratic" numbers of coins.[248] They also break frequently. By contrast, the purpose of an average is to arrive at a single number to represent the entire sample.[249] Thus, Buttrey cautions that averages effectively 'suppress the variation' of a sample.[250] A response to this valid criticism has been to clarify the proper utility of quantification methods. De Callatay reminds us that the aim of quantifying issues is not to produce an absolute figure; rather, it is "to circumscribe the uncertainty to an acceptable level."[251] The number produced is intended to be indicative to produce a sense of scale.[252]

The criticism of Buttrey and Howegego has forced historians and numismatists to consider the value and utility of these estimates. Regarding the average number of coins produced, per die, for ancient Greek silver coinage, the level of uncertainty is very high. Producing volume estimates to reconstruct the size of the original coinage is not the best application of these methods. Without epigraphic records attesting to mint activity, such numbers cannot be critically evaluated. I believe these methods add value to a die study by allowing us to gauge the impact of fluctuations in die use on coin output. These methods can enable us to test the validity of historical interpretations of mint activity. To expand on Raymond's work and evaluate her interpretation of mint activity, a die study has been conducted of the new tetradrachm corpus. The results are discussed in Chapter Four.

This Chapter has critically examined how modern interpretations of coin weight and mint activity have influenced the chronology of the coinage of Alexander I. It has evaluated the integrity of modern frameworks, standards and methods applied to the coinage. In Chapter Four I reconsider the question of mint chronology by examining the weight standard of Alexander's tetradrachms. With one hundred and thirteen specimens found, the new catalogue almost doubles the number of tetradrachms in Raymond's original corpus. This permits a reexamination of the claim that Alexander introduced the Attic weight standard c.476/5 B.C. It also permits a reexamination of the claim that Alexander decreased his tetradrachm output in order to increase the production of light tetrobols of Attic weight.

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[247] Buttrey (1992): 347; Howgego, C (1992): 4-31.

[248] Buttrey (1992): 347.

[249] Buttrey (1992): 347

[250] Esty (1997): 817; Buttrey (1992): 343.

[251] De Callatay (2011): 8; De Cecco (2000): 273; Esty (1997): 817.

[252] De Callatay (1995): 297.

CHAPTER THREE

"The change in denomination was a simple one: for the heavy tetrobols (2.45) was substituted a unique issue of octobols (4.36). This substitution made the exchange between Attic and Macedonian currency a simple affair, for the octobol was the equivalent of an Attic drachma, the light tetrobol was in weight an Attic triobol, and the tetradrachm of 13.09, of the worth of three Attic drachms."

(Raymond *RMC*... 109)

Raymond's tetradrachm typology, analysis of weight and die distribution was determined by the fifty-four coins available for study. Her Athenian weight system theory proposes that Alexander introduced the Athenian standard for tetradrachms in Group II and Group III. This denomination, therefore, is crucial to Raymond's chronology and her interpretation of mint activity between 476/5 and 451 B.C. Can the characteristics of Raymond's tetradrachm sample be reproduced using a larger sample of coins? If Raymond's theory is correct, a larger corpus should demonstrate a linear change in the average weight of the coins of each main type, according to Raymond's order of issues. Furthermore, a larger corpus should also demonstrate a steep decrease in tetradrachm output in Group III. This dynamic supports the hypothesis that Alexander ceased issuing tetradrachms by 454 B.C.

The catalogue, contained in Appendix A of this thesis, contains one hundred and thirteen tetradrachms. I have included the fifty-four specimens from Raymond's original corpus, together with coins from public collections, hoards, and specimens that have surfaced on the numismatic market.[253] A weight analysis of this corpus challenges the Athenian weight standard theory and suggests that Alexander may have used a single weight system to mint his coinage, one modeled on the Lydo-Milesian system. In order to examine mint activity a die study and quantification analysis has been conducted. The die study confirms the integrity of Raymond's order of issues. It also replicates the pattern of linear decrease demonstrated by Raymond's original corpus. The comparative die numbers in Group II and Group III are quite modest. The significance of the decrease in production in Group III is therefore difficult to estimate. In order to critically assess Raymond's argument that tetradrachms were discontinued within the first six years of Group III, I have employed the obverse die numbers in statistical models for estimating the total number of dies. Using the Good/Esty

[253] See catalogue in Appendix A.

quantification method, the potential number of tetradrachms per type has been simulated. These simulated volumes enable a comparison of coin output between Group II and Group III.

Typology

The Bisaltai coins discovered within the Decadrachm hoard led Fried and Kagan to suggest a revised chronology for Alexander's coinage. Raymond's order of issues, however, continues to be used. Though the number of tetradrachms now available requires a revision of Raymond's typology, they do not necessitate a revision of Raymond's order of issues. The stylistic development of Alexander's coins, across each main type, can be accommodated by Raymond's suggested order. Her order of issues has been retained for this study and used as the temporal framework for the coins. New types or sub-types have simply been inserted into this order, based on the sophistication of the obverse carving.

Two changes have made been made to Raymond's typology. Formerly identified as an early tribal alliance issue, tetradrachms bearing an uninscribed quadripartite reverse have been incorporated into Group I as Alexander's earliest issue. This follows S. Kremydi, who incorporated the "tribal" series of tetradrachms into Alexander's regal coinage as a Group I issue in *SNG* Greece II.[254] These coins clearly conform to the conventions of Alexander's main obverse type: a rider wearing a petasos and chlamys and carrying two spears, mounted on a horse standing proudly with its foreleg raised. There is no reason to exclude the series simply due to the lack of inscription on the reverse. I have supported Kremydi's reclassification and have altered the typology to reflect this. The second change is the division of Group II tetradrachms into two types: the mounted warrior-hunter (A.I), and the mounted warrior-hunter with "A" inscribed on or above the exergual line (A.I.a). The change was intended to distinguish the A type coins as a separate series. The variety in style and technique employed to carve the A type dies indicates that this design cannot be attributed to a particular artist. The inscription was clearly employed to distinguish these issues.

Table 4.1: Revised Typology

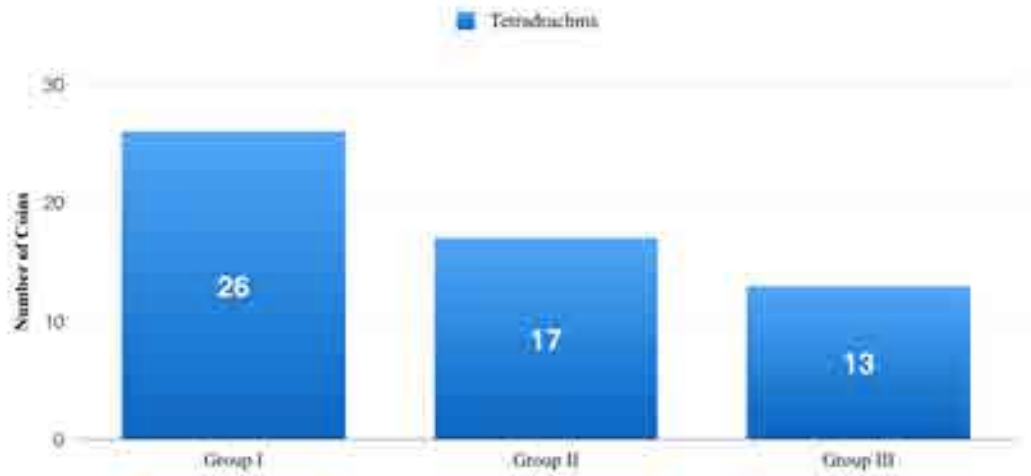
Group	Main Type Obverse		Main Type Reverse	
I	A.I	Rider holding reins and two spears,	CC.I	Quadripartite incuse square.

[254] See *SNG* Greece II (2000): fig. 5298, 5301, 5299.

		wearing chlamys and petasos; in dotted circular border.	CC.II	Head of goat in incuse square.
			DD.I	Helmet.
II	A.II	Rider r., holding reins in r.h., spears in l.h., wearing chlamys and petasos, exergual line and linear circle.	CC.III	Forepart of Goat r., in linear square within incuse square.
	A.II.a	With "A" below horse.		
III	A.I	Rider holding reins and two spears, wearing chlamys, tunic and petasos.	C.IV	Forepart of Goat r., in linear square within incuse square.
			C.IV.a	Forepart of Goat, Head reverted

Studying the weight, die distribution and output of each type was intended to produce an interpretation of mint activity, free from the bias of a three-group chronology. When distributed across three groups, Raymond's sample clearly demonstrates a decrease in production over time.

Graph 4.1: Raymond's Sample per Group



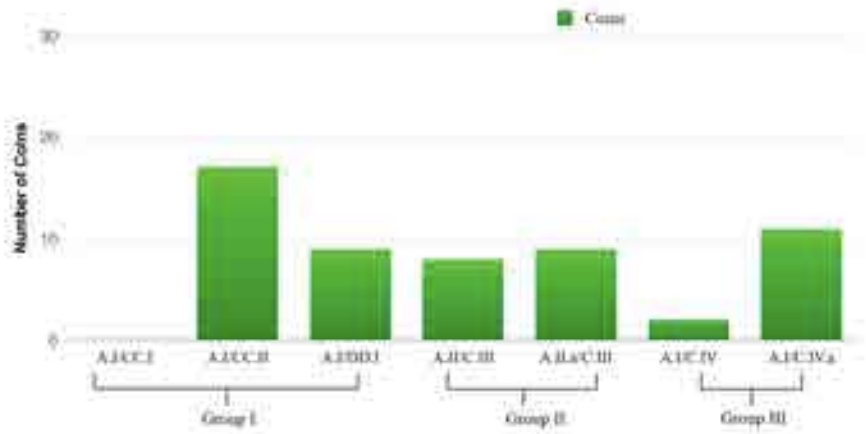
This linear decrease in coins (and dies) led her to conclude that Alexander only struck a limited issue of tetradrachms, and probably within the early years of Group III (465-454 B.C.).[255] This supported Raymond's theory that Alexander "voluntarily suppressed" his octadrachms and tetradrachms, in anticipation of Athens' anti-competitive coinage policy.[256]

[255] Wartenberg (2002): 86.

[256] Raymond (1953): 134-135.

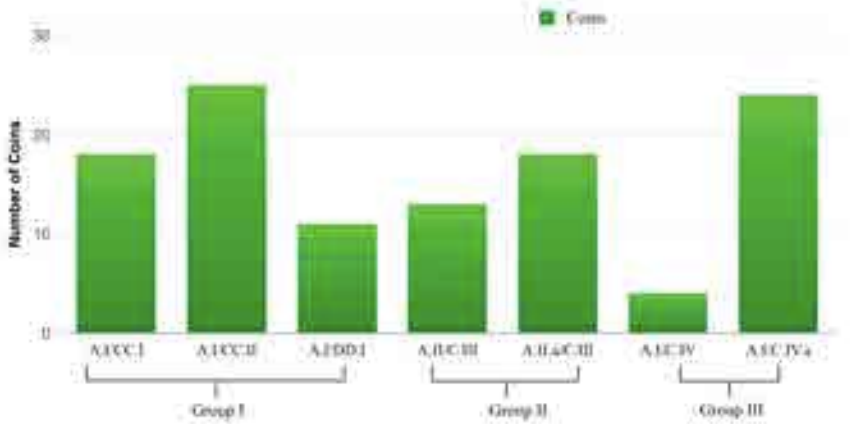
When we look instead at the distribution of coins, per type, according to Raymond's order of issues, the trend is not so apparent.

Graph 4.2 Raymond's Sample Per Type



Approaching the sample by coins per type, the sample demonstrates much more stable tetradrachm output over time. [257] With the exception of A.I/CC.II and A.I/C.IV, the number of coins per type appears to have been produced in similar volumes. Alexander's final issues (the coins of type A.I/C.IV.a) also appear to have been minted in slightly greater volumes that Group II types A.II/C.III. Only when Raymond combines these coins under the one main type, does production appear to spike in Group II and decrease in Group III.

Graph 4.3: Coins of The New Corpus.



Contrary to Raymond's original sample, the new tetradrachm corpus demonstrates greater variation in the number of coins minted, per type. The coins indicate that production

[257] Within each group, Raymond placed only regal Macedonian types. As already discussed, coins of type A.I/CC.I were identified as a tribal alliance issue and were not included in her study: see Raymond, 53. Only select specimens were included as examples: see Raymond 1953 Pl. II, 7 & 8.

progressively increased over Group II. The number of coins comprising type A.I/C.IV.a, suggests that production may have continued increasing towards the end of Alexander's reign.

The Athenian Weight System Theory

Raymond's weight analysis of Group II produced an average tetradrachm weight of 13.03g.[258] Divided by three (4.34g) the average produces a number that is equivalent to the average weight of Alexander's octobols (4.36g). Raymond argued that the average octobol weight resembled the weight of an Athenian drachma (4.30g). If, however, these coins were to be divided into three units and were minted on a slightly reduced version of the Lydo-Milesian standard we should probably identify them as 'staters' rather than tetradrachms.[259]

The notion that Alexander derived tetradrachms from an octobol of Athenian weight underpins Raymond's Athenian weight system theory. This theory, in turn, has influenced Raymond's interpretation of mint activity in Group II and Group III.[260] The Athenian weight system theory is one way of explaining the disparate relationship between Alexander's larger and smaller denominations. In order to consider its validity, I propose to examine the average weight for each type, according to the revised typology. From these averages, a new average weight is proposed for each chronological group.

This approach is intended to address Buttrey's concern regarding the responsible use of averages.[261] The coins vary between 14g and 10g, displaying a wide range of weights. Coins of particular types tend to share similar weights. Any change in standard may be discernable by comparing the average weight of each type. Moreover, by calculating the average weight per type, prior to calculating the average weight per group, we can check that the variety of weights, within each type, is captured by the average. Rather than "suppressing variation", we can be confident that these averages are representative of the variety of weights within the corpus.

The aim of this analysis is not simply to compare the new Group II average to Raymond's. It is also to assess whether or not a change of system can be detected (from the Thraco-Macedonian tetradrachm standard to the Athenian standard, for example). Raymond claimed that Alexander introduced the Athenian system in Group II, to facilitate trade with Athenian forces in the region.[262] In order to assess the validity of this claim, the Group II

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[258] Raymond (1953): 109-110; 117-199.

[259] Liampi (2005): 242; Cahn (1970): 179, 184, 185; Babelon (1907): 1039-1040.

[260] See Raymond 108-125; 129-135.

[261] Buttrey (1993): 343.

[262] Raymond (1953): 109, 110.

tetradrachms/staters must demonstrate a significant change in average weight when compared with the coins of Group I.

Table 4.2: Average Weights Per Type

Group	Main Type Obverse		Main Type Reverse		No. of specimens	Ave. Weight
I	A.I	Rider holding reins and two spears, wearing chlamys and petasos; in dotted circular border.	CC.I	Quadripartite incuse square.	18	12.42
			CC.II	Head of goat in incuse square.	25	12.71
			DD.I	Helmet.	11	12.61
II	A.II	Mounted warrior-hunter r., holding reins in r.h., spears in l.h., wearing chlamys and petasos, exergual line and linear circle.	CC.III	Forepart of Goat r., in linear square within incuse square.	13	12.36
	A.II.a	With "A" below horse.			18	12.79
III	A.I	Rider holding reins and two spears, wearing chlamys, tunic and petasos.	C.IV	Forepart of Goat r., in linear square within incuse square.	4	12.69
			C.IV.a	Forepart of Goat, Head reverted	24	13.05
				TOTAL	**113**	**12.66**

The summary table below orders the average weight per type, from lightest to heaviest, in order to establish the weight range for Alexander's tetradrachms/staters.

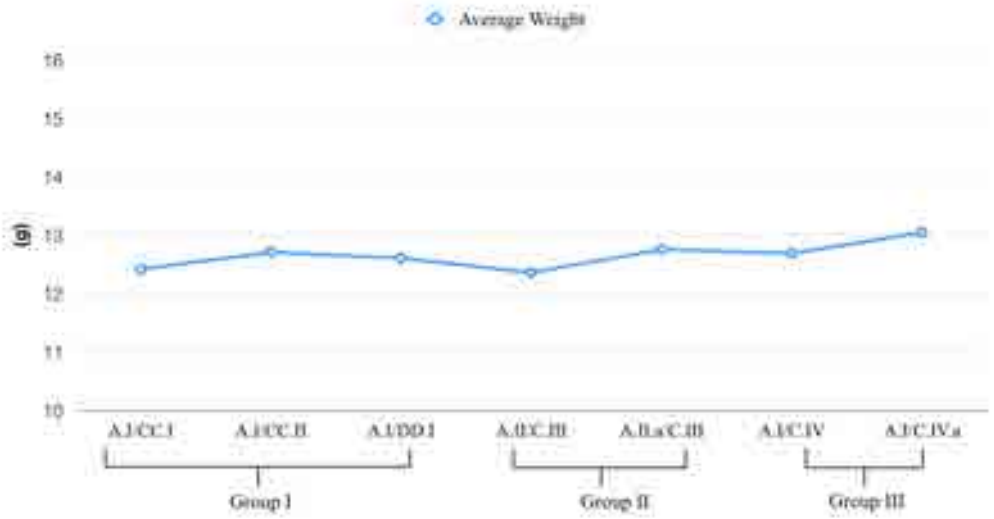
Table 4.3: Lightest Type to Heaviest Type

Group	New Obverse Type	New Reverse Type	Ave. Weight
II	A.II	CC.III	12.36
I	A.I	CC.I	12.42
I	A.I	DD.I	12.61
III	A.I	C.IV	12.69
II	A.II.a	CC.III	12.79
III	A.I	C.IV.a	13.05

As demonstrated in the table, average weight of the tetradrachm/staters varies only by 0.72g. The heaviest average is produced by the coins of A.I/C.IV.a This is a Group III type. The

lightest average is produced by A.II/DD.I: a Group I type. There is less than one gram of difference between them. At a glance, the weights do not demonstrate a progressive increase or decrease in weight: the weights of Group I and II are varied. To identify any evidence of a change in the tetradrachm/stater standard (i.e, a change significant enough to suggest that a different weight system had been introduced), Raymond's order of issues has been applied to the data and visualized in the graph below.

Graph 4.4: Average Weight Per Type



This graph clearly demonstrates that the average tetradrachm weight remains remarkably stable, over Raymond's order of issues. The exception is the final Group III type (A.I/C.IV.a), which displays an increase in the average weight.

The average weight yielded by the twenty-nine coins of Group II is 12.66g; this is significantly lighter than Raymond's average of 13.03g. Divided by three, as per Raymond's method, these averages yield a base unit weight of 4.22g. Raymond's theory depended on the introduction of the octobol as the basic unit of weight in Group II. She had calculated the average octobol weight to be 4.36g, which was equivalent to the Athenian drachma. The results of this study confirm that Raymond's theory cannot be substantiated. Each Group produces the same approximate base unit of weight (4.19, 4.12 and 4.29 respectively). This suggests that the octobols were not introduced in Group II to be a coin of Attic weight from which to derive 'tetradrachms'.

The new average tetradrachm/stater weight (12.66g) is compared to the Athenian and Lydo-Milesian weight systems below. This comparison demonstrates the proximity of Alexander's coins in relation to these two weight standards.

Table 4.4: Weight Systems

Denomination	Alexander I	Athenian	+/-	Lydo-Milesian	+/-
Tetradrachm/stater	12.66g	17.2g	**-4.34g**	14.10g	**-1.44g**
Octobol/Drachma/trite	4.36g	4.30g	**+0.09g**	4.70g	**-0.34g**

This supports Cahn's hypothesis that the Thraco-Macedonian tetradrachm was based on the Lydo-Milesian weight standard of 14.10g.[263] The Lydo-Milesian system, as noted above, employed a stater divided into thirds. Alexander's octobols might then be recognised as 'thirds'. When multiplied by three, the octobols give a tetradrachm/stater weight of 13.17g, only 0.51g lighter than the average weight produced by this corpus.

Where do we go from here? The octobols appear to be the only denomination minted by Alexander to weigh between three and four grams. As such, they may be the base unit of measurement for Alexander's tetradrachms/staters. If this is correct, the octobols were not introduced in Group II. They may have been minted throughout Alexander's reign. The alternative of course, is that the octobols are not the base unit. This would cast doubt on the Lydo-Milesian system theory, given that no other denomination in Alexander's corpus could roughly equate to the Lydo-Milesian trite. A re-examination of Alexander's smaller coins is necessary in order to further this investigation.

This analysis has proven that Raymond's Athenian weight system theory cannot be substantiated by a larger sample of coins. Though Raymond's order of issues was retained for the analysis, the coins of Group II did not give any indication that the Athenian weight system had been introduced between 476/5 and 460 B.C. Rather, it appears that Alexander gradually increased the average weight of his coins in his last issues. This is reflected in the analysis of average weights over time (Graph 4.4) and number of coins per type (Graph 4.1). These factors suggest that Alexander may have increased his tetradrachm/staters output in Group III. This conflicts with Raymond's argument that tetradrachm/staters output was decreasing during the early years of Group III and ceased altogether around 454B.C.[264]

Mint Activity

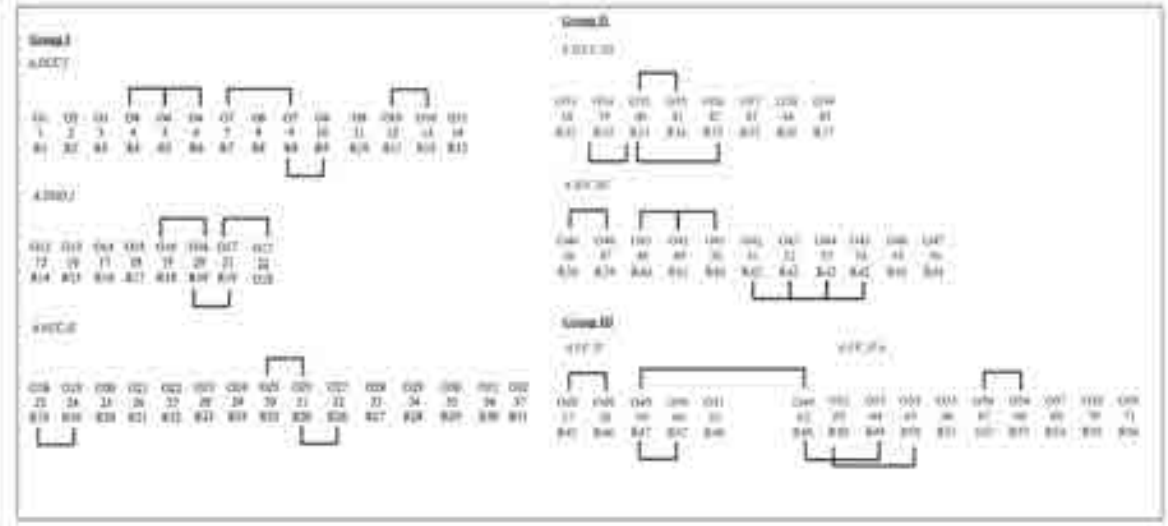
To quantify the potential number of tetradrachms/staters minted per type, I have conducted a die analysis of the new corpus. Following the revised typology, coins were grouped by main

[263] Liampi (2005): 242; Cahn (1970): 179, 184, 185.

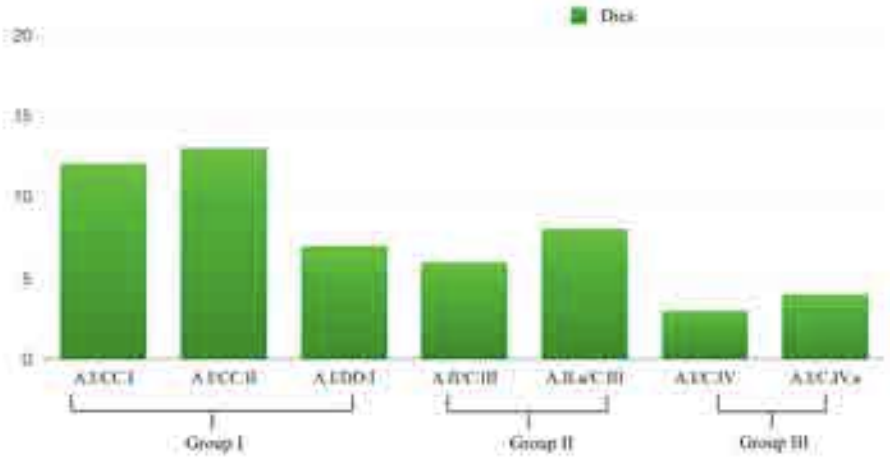
[264] Raymond (1953): 132, 133, 134.

reverse type. Coins were then divided into reverse sub-types and linked to dies. Raymond's order of issues was preserved and a new die classification system was employed.

Fig 4.1: Die-Link Diagram of The New Corpus



Graph 4.4: Number of Dies Per Type



This study produced a total of fifty-nine obverse dies and fifty-six reverse dies. The die ratio demonstrated by the corpus is 1.056 obverse dies: 1 reverse die. The die link diagram above shows that types A.I/CC.I (Group I), A.II/CC.III (Group II) and A.I/C.IV.a (Group III) contain the highest number of die links. This may be a sign of increased minting. It may also simply indicate that the sample captures a high number of surviving dies used to mint the coins of types A.I/CC.I, A.II/C.III and A.I/C.IV.a.

How far can we extrapolate using these figures? We can be confident that the new corpus is a sufficiently random sample. Of one hundred and thirteen specimens, only seven

originate from a single hoard (6%).[265] Given this small percentage, it is not likely that the characteristics of these coins (weight and type) would skew the data. We can therefore assume that the diversity of dies in the corpus is representative of the original population of surviving dies. To estimate how representative the sample is, a quantification study has been conducted. Esty's 'Formula (1)' was first employed to calculate the percentage of surviving dies represented in the corpus.[266] Formula (2)' was then used to calculate the total number of dies employed to mint the coinage.[267] Finally, 'Formula (4)' was applied to calculate the margin of error, based on a 95% confidence interval.[268]

Table 4.6: Estimating The Total Number of Dies Using the Good/Esty Method.

Group	Type	Coins (n)	Dies in the sample (d)	No. of Singletons (d_1)	Coverage Estimate (C)	Total Die Estimate (D)	Lower Limit of Confidence	Upper Limit of Confidence
Group I	A.I/CC.I	18	11	5	0.722	18.69	10.22	35.62
	A.I/CC.II	25	15	10	0.600	33.33	11.8	55.35
	A.I/DD.I	11	8	4	0.636	15.74	7.86	39.89
GI Total		54	34	19	0.648	67.11	44.49	102.08
Group II	A.II/CC.III	13	8	4	0.692	14.44	7.44	31.33
	A.II.a/CC.III	18	11	2	0.889	13.5	7.96	23.54
GII Total		31	19	6	0.806	27.28	17.37	43.37
Group III	A.I/C.IV	4	5	1	0.750	7.3	6.61	34.7
	A.I/C.IV.a	24	10	4	0.833	14.4	9.4	22.28
GIII Total		28	15	5	0.821	21.304	13.69	33.55
TOTAL		113	68	30	0.735	113	86.93	147.07

The new corpus is estimated to contain 73.5% of the total number of surviving dies used to mint Alexander's tetradrachms. Based on this number, it is calculated that 113 dies were employed to mint the total number of Alexander's tetradrachms/staters. In order to calculate the average number of tetradrachms/staters potentially minted throughout Alexander's reign per group, the die estimate per type has been multiplied by an average of 20,000 coins per

[265] CH 9.9. See Wartenberg (2002): 85-86.

[266] Esty (2006): 359, Formula (1).

[267] Esty (2006): 359, Formula (2).

[268] Esty (2006): 360, Formula (4).

obverse die.[269] Following de Callatay's suggestion, the volume estimate has been halved to produce a lower limit, and doubled to produce an upper limit.[270]

Table 4.6: Estimating The Total Number of Coins Produced

Group	Type	Total Die Estimate (D)	Ave. Estimate: Coins Produced	Lower Estimate	Upper Estimate
Group I	A.I/CC.I	18.69	373,800	186,900	747,600
	A.I/CC.II	33.33	666,600	333,300	1,333,200
	A.I/DD.I	15.74	314,800	157,400	31
Group II	A.II/CC.III	14.44	288,800	144,400	577,600
	A.II.a/CC.III	13.5	270,000	135,000	540,000
Group III	A.I/CC.IV	7.3	146,000	73,000	292,000
	A.I/CC.IV.a	14.4	288,000	144,000	576,000
TOTAL CORPUS		113	2,260,000	1,130,000	4,520,000

Using Esty's methods, it is estimated that Alexander I potentially minted between 1,130,000 and 4,520,000 tetradrachms/staters during his lifetime. The most prolific issues appear to have been minted under the A.I/CC.II, A,I/CC.I and A.I/DD.I types. These types each fall into Group I according to Raymond's chronology. The smallest issues comprised A.I/CC.IV. This is a Group III type. Final Group III type A.I/CC.IV.a and the largest issues of Group II (A.II/CC.III) are estimated to have produced approximately the same number of coins.

As the activity of Alexander's mint is not attested by literary or epigraphic evidence, we cannot confirm how close these estimates may be to the actual numbers. To paraphrase de Callatay, the absolute number of tetradrachms minted by Alexander I is "not inexistent" but ultimately unknowable.[271] The estimates produced should not be considered conclusive. They do, however, give us a sense of scale. If we apply Raymond's three-group chronology, to these volume estimates, it appears that Alexander only minted 124,000 coins fewer in Group III, but in much less time.

A larger corpus of tetradrachms/staters provided a more diverse range of weights, facilitating a more thorough examination of the standard employed. A study of one hundred and thirteen

[269] De Callatay (2011): 11-12; Allen (2004): 49; De Callatay (1995): 257, 299; Buttrey (1993): 341-342; Kinns (1983): 1, 8, 10-17, 18-19; Raven (1950): 11-13.

[270] De Callatay (2011): 10; De Callatay (1995): 299.

[271] De Callatay (2011): 8.

tetradrachms/staters proved that there was no change in weight standard. Furthermore, conducting a weight and die analysis of the new corpus by type has demonstrated the bias in Raymond's three group chronology. My corpus does not appear to indicate a linear decrease in production outside of Raymond's chronology. This has significant implications for the historical interpretations of the coinage. Group II's 476/5 commencement is based on the assumption that Alexander I struck his Group II tetradrachms, octobols and light tetrobols on the Attic standard. This thesis has proven that the tetradrachms/staters can no longer be used to support this hypothesis. As a result, the integrity of this chronological limit now rests on a systematic analysis of the octobols and light tetrobols.

CONCLUSIONS

The aim of this thesis has been to reconsider the 'Athenian element' in Alexander's coinage. It has endeavoured to achieve this aim by using new evidence to examine the Athenian weight system theory and critically evaluate its validity. Conducting a die study of the tetradrachms/staters and employing quantification methods to estimate output has allowed me to explore Alexander's mint activity in greater depth than my predecessors. Approaching the coinage by type has elucidated the bias inherent in the three-group chronology. When this chronology is removed there doesn't appear to be a significant decline in Group III tetradrachm issues. Certainly, more dies appear to have been employed to mint Alexander's early (Group I) issues. The Group II issues employ fewer dies. It must be noted, however, that Group I spans only a period of four years according to Raymond's chronology. The dies in Group III marginally decline with a single issue, however they demonstrate an increase in Alexander's final issues. As the quantification estimates suggest, the difference in coin output between Group I and Group II is approximately 124,000 coins. To interpret this difference as evidence of minting cessation is misleading. Raymond's Group II spans a period fifteen years. Raymond's Group III spans only eight years. The three-group system significantly skews the data. The evidence is thus too weak to support Raymond's claim that tetradrachms ceased to be minted c.454 B.C.

This study has proven that there is no Athenian element in the tetradrachms/staters of Alexander I or his minting strategy. This denomination demonstrates consistency, not decline; both in terms of the weight system employed and in terms of mint activity. As a result, this thesis proposes that the Athenian weight system hypothesis can no longer be applied to the 'tetradrachms'. It is my contention that Alexander I minted his coins using a single weight system, during his reign. This appears to be a reduced version of the Lydo-Milesian weight standard.[272] Raymond's hypothesis that Alexander ceased minting tetradrachms in favour of smaller denominations cannot be substantiated by this study. A study of a much larger sample of light tetrobols and fractions is now necessary to validate the claim.[273] Esty's quantification methods will prove important in this context. We now need to quantify the potential number of light tetrobols produced, per type and compare this to the estimated number of tetradrachms/staters.

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[272] Cahn (1970): 179, 184, 185; Babelon (1907): 1035-1036.

[273] Raymond (1953): 134.

The study of smaller coins and fractions will be challenging. The types employed to mint the coins of Alexander are also used by Perdiccas II. As a result, there are many coins that require reattribution. In recent years, two additional fractional types have been attributed to Alexander I and Perdiccas II.[274] These coins bear the inscription 'TPIH' and 'ΔIOB', respectively, within their quadripartite incuse reverse. These inscriptions were intended to indicate the weight of the coin: a 'TPIOBOΛ' and 'ΔIOBOΛ' respectively. The triobol and diobol are coins of the Athenian weight system.[275] Note that the coins have been attributed to both Alexander I *and* Perdiccas II.[276] I would like to suggest that these coins be reattributed to Perdiccas II for the following reasons. No other coin minted by Alexander I bears an inscription attesting to its weight. The obverse types of the inscribed triobols and diobols in question depict a horse rearing up on its hind legs. This style of horse is a characteristic of the coinage of Perdiccas II, not Alexander I.[277] The style in which 'TPIH' and 'ΔIOB' are carved on the obverse of the coins in question, also closely resembles the style in which 'ΠΕΡΔΙΚΚΑΣ' is inscribed on within the incuse border of his helmet-reverse type tetrobols.[278]

Alexander I: an ambitious man with wood, silver and mercenaries.

The epithet "Alexander Philhellene" conceals his very complex relationship with the Greek city-states. Alexander's aspiration to be considered Hellenic contradicts what Herodotus VIII.136.1, V.III.140-143.3) tells us about the king's status, prior to the Persian Wars. Alexander had already acquired the status of *πρόξεινος* prior to Xerxes' invasion of Greece c.480 B.C.[279] He had already developed a politico-commercial relationship with Athens. What seems to be continually overlooked is the growing power of his kingdom. Expanding his dominion over the peoples of Macedonia required military might. It was a large area with no natural geographic boundaries.[280] We still don't fully understand how he ruled over such a vast kingdom, or to what extent Alexander controlled the economic fortunes of the peoples

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[274] Psoma (2006): 87. See 97 for images of the actual coins.

[275] Kremydi (2011): 163; Psoma (2006): 85-98 ; Borza (1990): 129; Price & Waggoner (1975): 28, 29, 38-39; 117-19.

[276] Kremydi (2011): 163; Psoma (2006): 85-98. Note that the title of Raymond's study is *Regal Macedonian Coinage to 413 B.C.* It is a study of the coins of Alexander I and Perdiccas II.

[277] Raymond (1953): See the heavy tetrobols of Plates XIV – XV.

[278] See Raymond 152.

[279] Hansen & Nielsen (2004): 98-100.

[280] Hammond & Griffith (1979): 8-10, 81-85; Millet (2010): 475-477; Archibald (1998): 90-91.

within it.[281] Expanding a kingdom, keeping control over sources of silver and timber and defending his frontiers from displaced tribes would have required a good number of soldiers and significant sums of money. To determine whether or not Alexander's primary motivation for minting coinage was to sustain a full-time military force and a protracted campaign of conquest requires a new approach to the coinage.

Wartenberg suggested that Alexander I did not commonly issue staters.[282] But my study has shown that the Macedonian king may have minted as many as 2.2 million tetradrachms/staters. If we multiply the average stater weight (12.66g) by the minimum number of coins produced, as calculated in Table 4.6, Alexander would have required at least 14.091 tonnes of silver to mint his staters. This estimate is very high. At the very least, it indicates that the volume of coinage was significant. Raymond suggested that larger coins were produced in fewer numbers than smaller coins, but this is not a good indication of utility. What was the purpose of these evidently large tetradrachms/stater issues? The tetradrachm/staters were almost certainly intended to serve a completely different function to the smaller denominations.[283] It is probable that their primary function was to facilitate the efficient transaction of large state purchases.[284] Wartenberg has argued that these larger coins may have only been minted for specific transactions.[285] The analysis presented in this thesis, however, indicates that the tetradrachm/staters were minted in consistent volumes, per type, over time. This may imply that the state had a regular expenses for which such coins were deemed necessary.

By approaching the coinage by type, rather than by chronological group, this thesis has attempted to reorient the study of Alexander's coinage. The current chronologies imply that minting was continual. As a result, we are bound to interpret Alexander's coinage in terms of increase and decrease. The historical record is then consulted in order to establish causality. We do not know enough, however, about coin utility to assume that Alexander I minted continuously. As I have attempted to demonstrate through the tetradrachm/stater corpus, the diversity of reverse types may represent a large variety of issues. A new issue may imply a break in minting. Rather than assigning particular issues a temporal significance, a better approach may be to approach them as individual sums raised to cover a range of specific expenditures.

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[281] Millet (2010): 465, 466, 467.

[282] Wartenberg (2002): 85-86.

[283] Kagan (2006): 52-54; Wartenberg (1995):11; See also Martin (1987).

[284] Borza (1990): 129; Rowan (2013): 105.

[285] Wartenberg (2002): 86.

Using the order of issues as the temporal framework for interpreting the coins, we can focus instead on coin utility. Pursuing the function and usefulness of particular issues will enhance an investigation of the political economy of early fifth century Macedonia. Rather than struggling to position Alexander and his kingdom in terms of Athens, we can reexamine Macedonian economic and military activity through a better understanding of resource ownership, mint activity and coin utility. The more we come to understand about Alexander's application of coinage, the more he shows himself to be a ruthlessly efficient monarch. His skill in manipulating the land's wealth in wood, silver and manpower (including mercenaries) arguably set a precedent for the policies of Philip II.

This thesis has set the groundwork for a more extensive investigation of coin utility and political economy during the reign of Alexander I. Extending the tetradrachm/stater corpus to include all known coins of Alexander I would facilitate the first complete study of the fractional coinages of Alexander I. A study of a new corpus would permit a more thorough investigation of Macedonian economic and military priorities during the reign of Alexander I.[286] Such an endeavor would significantly advance our understanding of the early Macedon state. It has the potential to recalibrate our understanding of political economy in northern Greece between 480 and 451 B.C. It is my intention to undertake this larger project as a PhD candidate.

[286] Millet (2010): 472 – 503.

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APPENDIX A: CATALOGUE

ABBREVIATIONS LIST

ANS = ANS-ETN = American Numismatic Society.

Athens NM = Numismatic Museum of Athens.

SNG Ashmolean = *SNG Volume V: Ashmolean Museum Oxford, Part III Macedonia* (London: 1976).

Berlin = Berlin, Staatliche Museen.

SNG Berry = *SNG The Burton Y. Berry Collection. Part I: Macedonia to Attica* (New York: American Numismatic Society. 1961).

Boston = Museum of Fine Arts, Boston.

BMC = British Museum. *BMC Macedonia etc*. (London: 1879).

Cambridge = Fitzwilliam Museum. *SNG IV Fitzwilliam Museum, Leake and General Collections IV*.

CH = Coin Hoards.

Copenhagen = Nationalmuseet, *SNG Copenhagen. The Royal Collection of Coins and Medals*. Danish National Museum (Copenhagen: 1944): 2, Thrace and Macedonia.

Cop = *SNG Copenhagen. The Royal Collection of Coins and Medals*. Danish National Museum (Copenhagen: 1944): 2, Thrace and Macedonia.

CNG = Classical Numismatic Group.

Dewing = *The Arthur S. Dewing Collection of Greek Coins: Ancient Coins In North American Collection*s (New York: American Numismatic Society 1985).

Empedocles = The Empedocles Collection, Numismatic Museum of Athens.

Gorny Gmbh = Gorny & Mosch, Munich.

Giessener Munzhandlung = Gorny & Mosch Giessener Münzhandlung, Munich.

Gillet

SNG Greece II = *SNG Greece II. The Alpha Bank Collection. Macedonia I: Alexander I - Perseus.* Athens. 2000.

SNG Greece 4 = *SNG*: *Greece 4, Numismatic Museum, Athens. 'The Petros Z.Saroglos Collection'. Part 1: Macedonia.*

Hamburger = Hamburger, L. Frankfurt.

Hirsch = Munzhandlung Gerhard Hirsch, Nachfolger, Munich.

Lanz = Numismatik Lanz, Munchen

SNG Lockett = SNG *Great Britain III, R.C. Lockett Collection*. Part 3: Macedonia - Aegina, gold and silver. (London, 1942).

London = British Museum. *BMC Macedonia etc*. (London: 1879).

MM = Munzen und Medaillen AG, Basel.

Munich = Staatliche Munzsammlung.

NAC = Numsimatica Ars Classica

Naville = Naville & Ars Classica, Lucern.

New York = Amercian Numsimatic Soceity.

Numismatic Circular = Spinks Numsimatic Circular.

Oxford = Ashmolean Museum, Herberden Coin Room.

Paris = Bibliotheque Nationale, Cabinet des Medailles.

Peus = Dr. Busso Peus, Nachf. Munzhandlung, Frankfurt a. M.

SNG = *Sylloge Nummorum Graecorum.*

Tkalec = Tkalec, Switzerland.

Vienna = Kunsthistorisches Museum.

Weber = L. Forrer, Descriptive Catalogue of the Collection of Greek Coins formed by Sir Hermann Weber M.D, vol. 3, London 1929.

Tetradrachm AG.

Group I

1. O1 A.I. Rider on horse walking r. (foreleg raised); holding traditional hunting spears in left hand (behind horse); reins in right hand; wearing *petasos* and *chlamys*.

R1 CC.I. Quadripartite incuse square.

*a) 12.70. Dewing 1088.

2. O2 A.I. Similar; within dotted border.

R2 CC.I. Similar.

*a) 10.77. Copenhagen. SNG Cop 479.

3. O3 A.I. Similar; within dotted border.

R3 CC.I. Similar.

*a) 12.18. Copenhagen. SNG Cop 478.

4. O4 A.I. Similar; within dotted border.

R4 CC.I. Similar.

*a) 10.81. CNG (2011) 247, 38.

5. O4 A.I. Same.

R5 CC.I. Similar.

*a) 12.59. New York. SNG ANS 3; SNG Berry 56.

6. O4 A.I. Same.

R6 CC.I. Similar.

*a) 12.88. CNG 2003 63 143.

7. O5 A.I. Similar; spears across body of the horse; within dotted border.

R7 CC.I. Similar.

*a) 12.86. New York. SNG ANS 2; SNG Berry 55.

8. O6 A.I. Similar; within dotted border.

R8 CC.I. Similar.

*a) 12.29. New York. SNG ANS 4.

b) 12.80. Alpha Bank. SNG Greece II 5301.

9. O7 A.I. Similar; within linear border.

R9 CC.I. Similar.

a) 12.70. New York. SNG ANS 5.

*b) 12.74. Alpha Bank. SNG Greece II, 5300.

10. O8 A.I. Similar within linear border.

R9 CC.I. Same.

*a) 12.20. Alpha Bank. SNG Greece II, 5298.

11. O9 A.I. Similar; within dotted border.

R10 CC.I. Similar.

a) 13.22. Copenhagen. SNG Cop. 477.

*b) 12.71. Alpha Bank. SNG Greece II 5299.

12. O10 A.I. Similar; within dotted border.

R11 CC.I. Similar.

*a) 12.56. CNG (2006) 72 236.

13. O10 A.I. Same.

R12 CC.I. Similar.

*a) 13.20. Gorny *Giessener Munzhandlung* 196 1375.

14. O11 A.I. Similar; within dotted border.

R13 CC.I. Similar.

*a) 12.70. Dewing 1089.

15. O12 A.I. Similar; spears diagonal; within linear border.

R14 DD.I. Crested helmet, facing right within dotted incuse border.

*a) 13.73. Peus (1998) 28 263.

16. O13 A.I. Similar.

R15 DD.I Similar.

*a) 12.21. Cambridge. McClean II, 3273; Hirsch 1905, 1042; Raymond 10a.

17. O14 A.I. Similar.

R16 DD.I Similar; within linear incuse border.

*a) 12.60. Copenhagen. SNG Cop 484; Raymond 8a.

18. O15 A.I. Similar.

R17 DD.I Similar.

a) 14.97. Ratto 1911, 251; Sotheby 1909, 102; Hirsch 1905; 1041; Raymond 9a.

19. O16 A.I. Similar; spears parallel; within dotted border.

R18 DD.I Similar; no border.

*a) 12.80. Weber 2010; Lambros 1985; Raymond 11a.

20. O16 A.I. Same.

R19 DD.I Similar; within linear border, bevelled background.

*a) 13.38. CNG (2005) 133

21. O17 A.I Similar; spears diagonal.

R19 DD.I Same.

*a) 12.83. New York. ANS 1944.100.12119; SNG ANS 11; ANS-ETN; Cahn 1928, 383; Raymond 12a.

b) 10.80. Paris (de Luynes, 1926, 1577).

22. O17 A.I Same.

R18 DD.I Similar.

a) 11.38. Philippopel; Raymond 13a.

b) 12.58. Naville, 1931, 826; Hirsch 1905, 1040.

c) 12.67. Empedocles.

23. O18 A.I. Similar; walking left; spears diagonal; on exergual line

within dotted border.

R19 CC.II. Goat head; facing right within dotted incuse border.

*a) 13.09. CH 9.9, 2.

b) 12.67. Lanz (2005) 121 173

c) 13.11. New York. ANS 1963.268.35; SNG ANS 12; SNG Berry 58.

24. O19 A.I. Similar.

R19 CC.II. Same.

*a) 13.17. Athens NM. SNG Greece 4 (Saroglos) 1; Hirsch 1905, 1037 = Sotheby 3-11.2.1909, 419 (Franck Shermon Benson Collection).

b) 13.13. Tkalec 18.

25. O20 A.I. Similar.

R20 CC.II. Similar; facing left; within linear incuse border.

*a) 13.19. Alpha Bank. SNG Greece II 7542.

26. O21 A.I. Similar.

R21 CC.II. Similar; with reversed caduceus at base of neck.

*a) 13.18. New York. ANS 1963.268.36; SNG ANS 13; SNG Berry 59.

27. O22 A.I. Similar.

O22 CC.II. Similar.

*a) 13.20. New York. ANS 1963.268.37; SNG ANS 14.

28. O23 A.I. Similar.

R23 CC.II. Similar; with ivy leaf in the bottom left corner,

*a) 13.07. Vienna; Egger 1912 545; Egger 1906, 238; Hirsch 1905, 1038; Raymond 15a.

b) 13.13. Berlin (Lobbecke).

29. O24 A.I. Similar.

R24 CC.II. Similar.

*a) 13.20. Lanz (2009) 146 99.

b) 12.95. Peus (1970) 29 1553.

30. O25 A.I. Similar; foreleg shorter.
R25 CC.II. Similar; facing right.
*a) 13.15. Dewing; Kellad; Raymond 16a.

31. O25 A.I. Same.
R26 CC.II. Similar; with caduceus at the base of neck.
*a) 13.10. Paris; de Luynes 1926, 1576; Raymond 17a.
b) 11.35. Vienna; Welzl 1844 2405.
c) 11.35. Hamburger 1930 17.
d) 12.44. London (BMC Mac…158, 1)
e) 13.19. Naville 1923 681; Hirsch 1909 463.

32. O27 A.I. Similar; walking right.
O26 CC.II. Same.
*a) 13.19. Alpha Bank. SNG Greece II, 5369.

33. O28 A.I. Similar.
R27 CC.II. Similar.
a) 12.61. Cambridge. McClean II 3276; Raymond 18a.

34. O29 A.I. Similar.
R28 CC.II. Similar.
a) 12.68. Weber 2018; Raymond 19a.

35. O30 A.I. Similar.
R29 CC.II Similar.
a) 12.70. Paris; Raymond 20a.

36. O31 A.I. Similar; within linear border.
R30 CC.II. Similar; with small caduceus at the base of neck.
*a) 12.86. New York. ANS 1963.268.38; SNG ANS 15; SNG Berry 61.
b) 13.33. Boston P ,144; Raymond 21a.
c) 13.24. Copenhagen. SNG Cop 492; Raymond 21b.

37. O32 A.I. Similar; wearing a tunic.

R31 CC.II. Quadripartite incuse square with caduceus.

*a) 12.72. Alpha Bank. SNG Greece II 5303.

b) 11.85. Alpha Bank. SNG Greece II 5302.

Tetradrachm Ag.

Group II

38. O33 A.II. Rider on horse walking r. (foreleg raised); holding traditional hunting spears in left hand, diagonally; reins in r. hand (behind horse); with *petasos* and *chlamys*; no border; on exergual line.

R32 CC.III. Forepart of goat; facing right within linear incuse border.

a) 11.75. Hirsch 1908 1170; Ratto 1896; 917; Raymond 58a.

39. O34 A.II. Similar.

R33 CC.III. Same.

a) 12.34. London (BMC *Mac*...159, 2); Raymond 59a.

40. O35 A.II. Similar.

R33 CC.III. Same.

a) 12.61. New York. ANS 1967.152.191; Raymond 60a;

*b) 12.58. CNG (2006) 72 241.

c) 12.67. Naville, 1929, 190; Weber 2017; Ready, 1887.

d) 12.46. Berlin (B.B.II, p. 177, 91).

e) 12.14. Berlin, Imhoof.

f) 12.97. Cahn

41. O35 A.II. Same.

R34 CC.III. Similar.

*a) 11.02. SNG Berry 63.

42. O36 A.II. Similar; within linear border.

R33 CC.III. Same.

*a) 12.79. Gorny (1991) 56 177.

43. O37 A.II. Similar.
R35 CC.III. Similar.
a) 12.71. SNG Lockett, 3, 1383; Naville, 1921, 821; Raymond 61a.

44. O38 A.II. Similar.
R36 CC.III. Similar.
*a) 13.04. Alpha Bank. SNG Greece II, 5305.

45. O39 A.II. Similar; within linear border.
R37 CC.III. Similar.
*a) 13.06. NAC (1991) 1324.

46. O40 A.II.a. Rider on horse walking r. (foreleg raised); holding traditional hunting spears in left hand (behind horse), diagonally; reins in r. hand; wearing *petasos* and *chlamys*; with A on exergual line.
R38 CC.III. Forepart of goat; facing right; within linear incuse border.
*a) 13.13. New York. ANS 1963.268.40; SNG Berry 64.
b) 11.91. Numismatic Circular 10, 6888.

47. O40 A.II.a. Same.
R39 CC.III. Similar.
a) 12.54. CNG (2006) 73 122.

48. O41 A.II.a. Similar.
R40 CC.III. Similar.
a) 12.81. Bank Leu (1968) Hess 36 152.

49. O41 A.II.a. Same.
R41 CC.III. Similar.
*a) 12.77. CH 9.9, 3.

50. O41 A.II.a. Same.

R40 CC.III. Similar.

*a) 12.66. ANS-ETN. Hirsch 1905 1039; Raymond 62a.

b) 13.40. Berlin.

c) Brussels.

d) 12.83. Six Coll; Hamburger 1930 16; Sotheby 1911 83; Sotheby 1904 139.

e) 12.56. Empedocles.

51. O42 A.II.a. Similar.

R42 C.III. Similar.

a) 12.72. New York. SNG ANS 26; SNG Berry 65.

*b) 13.57. Alpha Bank. SNG Greece II 5307.

52. O43 A.II.a. Similar; A above exergual line.

R42 CC.III. Same.

*a) 13.10. Alpha Bank. SNG Greece II 5308.

53. O44 A.II.a. Similar; A above exergual line

R42 CC.III. Same.

*a) 12.78. Numismatic Circular 5 4696.òò

54. O45 A.II.a. Similar; A above exergual line

R42 CC.III. Same.

*a) 12.65. Paris. Raymond 63a.

55. O46 A.II.a. Similar.

R43 CC.III. Similar.

*a) 12.76. London. Sotheby 1896, 209; Raymond 64a.

56. O47 A.II.a. Similar.

R44 CC.III. Similar.

a) 12.50. Ravel; Raymond 65a.

b) 12.72 Hunter, 294 2; Raymond 65b.

Tetradrachm Ag

Group III

57. O48 A.I. Rider on horse walking r. (foreleg raised); holding traditional hunting spears in left hand (behind horse), diagonally; reins in r. hand; wearing *petasos* and *chlamys*; raised; on exergual line; within linear border.

R45 C.IV. Forepart of goat; facing right; within linear incuse border.

a) 12.79. CH 9.9, 4.

*b) 12.77. Sydney, ACANS 06A13.

58. O48 A.I. Same.

R46 C.IV. Similar; ΑΛΕ within square.

*a) 13.07. CNG (2009) 215 47.

59. O49 A.I. Similar.

R47 C.IV. Similar.

*a) 13.17. Paris; Raymond 112a.

b) 13.11. Boston Warren 618; Raymond 112b.

60. O50 A.I. Similar.

R47 C.IV. Same.

a) CH 9.9, 5; Hersh.

*b) 13.10. CNG 76 3019.

61. O51 A.I. Similar.

R48 C.IV. Similar.

*a) 12.78. Alpha Bank. SNG Greece II 5309.

62. O49 A.I. Similar.

R49 C.IV.a. Similar; with head reverted.

*a) 13.37. Athens NM. SNG Greece 4 (Saroglos) 113; Raymond 113a; Weber 2009.

63. O52 A.I. Similar.

R50 C.IV.a. Similar; with head reverted.

*a) 12.62. Vienna; Raymond 114a.

b) 13.25. Paris; Raymond 114b.

c) 12.48. Cambridge. SNG IV 3 2003; Raymond 114c.

64. O53 A.I. Similar;

R49 C.IV.a. Similar; with head reverted.

*a) 13.35. Raymond 115a; Sotheby 1937 34.

b) 13.60. Navile 1925 420.

c) 13.02. Boston Warren 619

d) 13.26. Gillet; Jameson 971.

65. O54 A.I. Similar; back leg raised.

R50 C.IV.a. Forepart of goat; A in the top; left corner.

*a) 13.40. Oxford. SNG Ashmolean 3, 2408.

b) 12.96. D.M Robinson; Cahn 1951 238; Raymond 116a.

c) 12.87. Berlin.

66. O55 A.I. Similar; only foreleg raised.

R51 C.IV.a. Forepart of goat; head reverted.

*a) 12.25. Munich; Raymond 117a.

67. O56 A.I. Similar.

R52 C.IV.a. Similar.

*a) 13.21. Alpha Bank; SNG Greece II 5304.

b) 12.71. CH 9.9, 6.

68. O56 A.I. Same.

R53 C.IV.a. Similar.

*a) 13.29. CH 9.9, 7.

b) 13.62. Bank Leu (2003) 86 343; Bank Leu /Numismatic Fine Arts 1984, 188; Naville X, 1925, 420; Naville I, 1921, 822.

69. O57 A.I. Similar; horse prancing; within linear border.
R54 C.IV.a. Similar.
*a) Peus (1971) 25

70. O58 A.I. Similar.
R55 CC.IV.a. Similar.
*a) MM (1955) 145 3

71. O59 A.I. Similar.
R56 CC.IV.a. Similar.
a) 12.91. CNG (2009) 209 51
*b) 12.47. New York SNG ANS 34; SNG Berry 6

APPENDIX B: PLATES

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