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### Dedication

This work is lovingly dedicated to the two people who never told me I wasn't capable of doing something: my late father, Earl Beattie, and my late dear friend Alexandra Smith.

Chapter One

Introduction

**Part I. Introduction:**

Though studies of Roman warfare are a mainstay of academia, and many different permutations and aspects of the field have been examined, what has not been looked at exclusively is that of adaptation (or lack thereof) to arid environments, in this case comprising both the East and North Africa, including Egypt. This study endeavours to address that lack by an examination of Roman military operations in desert environments from 108 BC to AD 400. In this study I will argue that there was no overall 'way of war' in the East that was different from that of the West. I will instead argue that the Romans presupposed little or nothing with regard to desert operations and allowed the circumstances, including factors of climate, terrain and enemy fighting styles, to dictate their actions. Therefore, for example, because so many of Rome's opponents were light cavalry (which required a certain type of terrain and a certain type of response) they developed similar countermeasures in different places.

The spatial boundaries of the study are restricted to those areas which are arid year-round, and in which water and food supplies would have consequently been scarce. With regard to North Africa I follow Mattingly, who points out that Tripolitania is the only African province (apart from Egypt, generally considered part of Asia by the Romans) to be a fully desert *limes* zone;<sup>1</sup> as such, I will only be discussing Numidia and Mauritania in the context of desert campaigning (e.g., the revolts of Jugurtha, Tacfarinas and Firmus, as well as Paulinus' brief campaign into Mauritania). Likewise, I will not be focusing upon any semi-desert areas (e.g., Iberia, Lusitania) as the climatology of these areas roughly equal that of many areas of Greece which are not considered semi-desert, and summers in Rome are drier than summers in many areas of Southern Spain, based upon admittedly modern climatic data. Because all of these regions would thus have to be included

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<sup>1</sup> Mattingly D. *Tripolitania*. London, BT Batsford Press, 1995, p 68.

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in order to include Iberia, I have decided to exclude all of said regions to focus more deeply upon the East and North Africa.

The temporal boundaries of this work are that of Jugurtha's revolt beginning in 108 BC and AD 400, date of the *Notitia Dignitatum*. These dates were chosen in order to cover most Republican and Imperial campaigns in arid environments for which we have literary evidence as well as both the expansion and stabilisation of the Empire. Multiple archaeological excavations and surveys, albeit somewhat irregularly grouped, are also available from within this time period, allowing that data to likewise be used.

I have endeavoured to utilise both literary/historical and archaeological data in this study. Lack of access and irregular overall studies of much of the region, however, has meant that I have been forced to rely more heavily upon the extant literary sources. This has, unfortunately, meant that I have been left without the ability to corroborate literary evidence with material remains in many cases.

With regard to content, I have decided to focus primarily upon tactical and logistical adaptation. This is in part due to constraints of word count and also due to the wide range of literature which already is concerned with strategic discussion in the spatial-temporal bounds within which this study operates. Wider strategic concerns will be touched upon as applicable but will not be a main topic of discussion.

The organisation of the study will proceed as follows. This chapter will introduce both the Roman conception of the desert (inasmuch as that conception can be determined) and modern definitions for deserts, their types and features. The second chapter will review the pertinent secondary sources and discuss how they contribute to this particular study. Chapter three will be an examination of various aspects of campaign preparation such as geographical foreknowledge and logistics in arid environments. The fourth chapter will address adaptations made for pitched battles

and sieges, whilst chapter five will examine adaptations with regard to asymmetrical warfare. The final chapter will summarise the conclusions determined and discuss any adaptations over time and space in the arid areas of Roman operation.

## **Part II. Roman Conception of the Desert:**

The Romans do not seem to have had a particularly strong ideological impression of the desert. There is little anthropomorphising seen, and what little there is generally takes the form of having a camel stand in for a conquered Arabia on coins as discussed elsewhere. I shall thus begin with an examination of the usual terms for desert in Greek and Latin. The Greek term is ἔρημος, a term that usually translates as 'empty,' 'solitary' or 'bereft'; due to its legal usage as an undefended case one can speculate that absence of something expected is a main connotation and because these undefended cases are lost by default most usage of the word is negative.<sup>2</sup> The Latin *desertus*, a participial form of *desero* means literally 'to cut away' or 'to sever a connection' (*de-sero*).<sup>3</sup> The term has been in use since the Augustan period for arid regions, suggesting that the desert was seen as separate somehow from what was perceived as the 'normal' world.

There are extant histories which take place at least in part in deserts and some discussion of desert areas in extant geographic works (which shall be discussed below) but no author says anything on the order of 'in my day, this is how we thought of the desert'. Herodotus relates that the Sahara was believed to be devoid of life south of a zone of wild beasts for at least 'many days' (πολλῆσι ἡμέρησι) until a group called the Nasamonians were reached;<sup>4</sup> whether this view of a lifeless waste was still held by the Roman era is unclear. The closest we have is Lucan's *Pharsalia*, which, though not ideal for its history does, at least, give an idea of how the poets encapsulated the abstract idea of the desert.

<sup>2</sup> 'ἔρημος', *LSJ*, [online] <http://www.perseus.tufts.edu/hopper/morph?l=erhmos&la=greek#lexicon> (accessed 10/10/11). In Pl.Lg.862e 'ἀνδρῶν κακῶν ἔρημος πόλις' ἔρημος has a meaning of 'free from,' but all other cases have negative connotations.

<sup>3</sup> 'desero,' *L&S*, [online] <http://www.perseus.tufts.edu/hopper/morph?l=desero&la=la#lexicon> (accessed 10/10/11).

<sup>4</sup> Hdt. 2.32.5-6.

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Lucan spends much of Book Nine talking about the Libyan desert, specifically his tale of Cato's expedition in Book 9.302 ff. Lucan gives us the longest description of the desert as a fearsome place, full of sudden deadly sandstorms and venomous creatures, where anything could happen; this is supported by Libya being one of the few places in Lucan connected to mythological history specifically, something which further supports a liminal status.<sup>5</sup> Allowing for poetic licence and factoring in Lucan's Stoic influences biasing him toward a universal view of chaos versus order, this does support the idea that the desert was an unknown entity, not just a country full of peoples with whom the Romans were unfamiliar, but an area where the laws of Nature might change, or perhaps not apply; Lucan says of the Syrtes that they were *in dubio pelagi terraeque reliquit by natura*.<sup>6</sup> Whilst this can certainly be translated as being merely an area where the sea was full of sandbars and the coastline varied widely based upon tides and storms, it can also be interpreted in a more abstract manner, suggesting that this area, which includes a wide swathe of the Libyan desert, is an Other, or a liminal space of uncertain or shifting properties. This can perhaps be supported by the above parsing of the term *desero*, meaning that the desert was seen as having been cut off from the 'normal' world. Whilst extrapolating the average Roman's conception of a desert merely from this small bit of evidence is certainly suspect, this is the only extant data we have which suggests any sort of perspective on the subject.

With regard to the duties of the Romans who found themselves stationed in the deserts, they include logistical support (Chapter Three), conquest during the Roman expansionist phase (Chapter Four) and low-intensity/policing duties once a region has been taken over (Chapter Five).

### **Part III. Modern Deserts:**

Generally, a region is classified as 'desert' if its average annual rainfall is under 250 mm per

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<sup>5</sup> Bartlett, C., 'Geography, Venom, and Misinformation: Snakes in Lucan *De Bello Civili* IX.587-937,' given at *Approaches to Ancient Medicine* 2010, 23-24/8/10.

<sup>6</sup> Lucan, 9.303-304.

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year, and 'semi-desert' is its average annual rainfall is between 250 and 500mm per year.<sup>7</sup>

Temperatures vary; there are hot deserts, cold deserts and even polar deserts; as the regions with which we are concerned are exclusively hot and arid, we will ignore this particular differentiation.

Two differences we cannot ignore, however, are the differences between desert regions within our spatial bounds and those between modern and ancient times. I shall begin with the latter. Palaeoclimatology is problematic at best, but Cremaschi argues that, though the regions with which we are concerned would have been arid over the course of our time period, overall they would have been growing increasingly arid, with hyperaridity in the Sahara (and possibly parts of the East) setting in during the third and fourth centuries.<sup>8</sup> This has, by some, been argued to be a contributing factor to the seeming increase in nomadic movement (and possible increase in raiding, something discussed in chapter five) during this time period. Because our evidence is not year-by-year but overall trends, we cannot be specific about exact conditions; we must however keep in mind both that conditions may well have been slightly wetter earlier in the temporal bounds (and thus having a slightly higher carrying capacity) but were growing more arid as time moved on, and that some scholars do not take this into account.<sup>9</sup>

The other consideration is that all deserts are not created equally. In the regions under study here, we have the Sahara (including the Western Desert of Egypt) which is a sand sea with predominantly oasis settlements and *foggaras*. This is in contrast to the rockier Eastern Desert and Negev (actually the same geologic region) which are prone to flash floods and use natural subsurface deposits for water.<sup>10</sup> The Syrian desert features waterless hardpan surfaces and a combination of oases (e.g., Palmyra and Damascus), *qanats* and river systems. This means that,

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<sup>7</sup> USGS, 'What is a Desert?' [online] <http://pubs.usgs.gov/gip/deserts/what/> Accessed 2/8/10.

<sup>8</sup> Cremaschi, M. 'Steps and Timing of Desertification during Late Antiquity. The Case Study of the Tanezuft Oasis (Libyan Sahara)' in Liverani, M. (ed). *Arid Lands in Roman Times: Papers From the International Conference (Rome July 9<sup>th</sup> -10<sup>th</sup> 2001)*. Firenze, All'Insegna del Giglio, 2003, pp 1-14.

<sup>9</sup> e.g., Mattingly D. *Tripolitania*. London, BT Batsford Press, 1995.

<sup>10</sup> This is not to say that there are no sandy areas in this region; when excavating in the Negev (Yotvata 2005) I myself sunk into sand up to my ankle.

though all areas are arid and life is thus centred around water, each individual area must be analysed in its own geological context as well as cultural and historical contexts.

Though there is not room in this study for an exhaustive discussion of deserts and their geomorphology, let us consider certain specific landforms and characteristics of the desert.<sup>11</sup>

**A. Desert Types:** There are two distinct types of deserts. The former, basin-and-range, are characteristic of Central Asia and Persia, and, as such, are not relevant to our current discussion. Therefore, I shall focus upon the second type: the shield and platform desert. These are typically in tectonically stable environments and consist of flat plains with occasional mountains or other raised features.

**B. Ergs and Dunefields:** The most common conception of 'desert' is that of an expanse of dry sand, frequently featuring sand dunes. These areas do exist in the areas with which we are concerned; called 'ergs' or 'sand seas' if they exceed 30000 square km and 'dunefields' if they do not, these regions are common to the Egyptian Western Desert and the Sahara.<sup>12</sup> They are characterised by sand and dust overlying harder bedrock, though the dunes themselves are frequently nothing but massed sand, creating a problem for foot traffic as well as animals and carts or any kind.

Because of the high amount of lightweight material, there is a high degree of variability in the landscape from day to day, if not more frequently. This, rather obviously, can pose a problem for travellers, even those familiar with the region. The numerous examples of this from our time period will be discussed in later chapters.

**C. Playas:** The term 'playa' has been chosen for this work from the many local terms which represent any sort of salt flat or clay-silt terrain in the desert environment. They are extremely common throughout all deserts. This type of terrain is, in many cases, suitable for foot, animal and wheeled traffic (modern 4X4s can be supported in some places), but is also both extremely variable

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<sup>11</sup> For extensive discussion, the reader is directed to the standard textbook on the subject, Cooke, R., et al. *Desert Geomorphology*, London: CRC Press, 1993.

<sup>12</sup> Cooke et al, *Ibid*, pp. 18-20.

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and very vulnerable to changes in either the groundwater level or to flooding. Springs are common, but are often brackish at best, fatally saline at worst.

**D. Aeolian Processes:** This term refers to any activity of wind upon the desert. As stated above sand and dust are easily moved by strong winds, and the North African desert especially is subject to regular, seasonal strong winds, e.g. the Trades and the monsoons. These winds, though seasonal are somewhat variable in strength, and such the amount of sand and dust movement is unable to be estimated. It is, however, not believed to have varied enough for differences to have affected ancient military operations, and even now it is very difficult to predict these changes.

Seasonal winds, however, are not the full extent of the difficulties. Though microclimates are predominantly characteristic of basin-and-range deserts, due to differential heating or sometimes areas of intense heating, many areas are subject to smaller-scale sandstorms or duststorms. As the only difference between the two is in the size of particles; we can consider both to be the same for our purposes. Small areas of intense heating produce dust devils; these are also frequently seen in areas that have recently suffered fires due to the combination of solar and ignition heating and large amounts of ash and dust.

**E. Rainfall:** In addition to the predominantly wind-based storm activity above, there can be sudden and/or extreme precipitation in deserts. This is relevant not only for those caught in the particular storms but also because of the knock-on effect of run-off. This can take the form of simple flash-flooding or river flooding, but more dangerous is the effect of sudden influx of water into a playa basin. If the playa is clay-rich, then it would have a low permeability to water; i.e., run-off would stay upon the surface until it evaporated. If the area was clay-poor and salt-rich, as is also quite common, then the water would dissolve the salt in the surface layers, making the previously solid surface crumble.

In the case of run-off raising the underground water table, this too has an effect upon surface

conditions. From a solid surface the ground can become mud or marsh from infiltrating water, and if the area is salt-rich then any springs could become saline.

#### **Part V. Conclusion:**

As can be seen from the above, an arid environment presents a significant difference to what the Romans would typically have faced elsewhere. Due to variability and frequent unsuitability of terrain, limited availability of food and water, as well as few peoples from whom to pillage or purchase, incursion routes would be severely limited. Climate would also be problematic, as even acclimatised troops would still be at the mercy of unpredictable extremes of weather.

Furthermore, the Romans did not seem to have any particular ideological views or conception of the desert beyond as a vast expanse of heat and aridity. They had views on the peoples who dwelt in these regions, as will be discussed in chapter three, but the desert itself to them seemed almost blank, apart from the somewhat unsatisfying evidence from Lucan. Perhaps it relates to a belief that the desert regions of their south and east were the edges of the world, which were then surrounded by Ocean? Or may they have instead thought that such areas were not worth the effort? Or even so unnatural as to surpass understanding? At any rate, they seem not to have invested much in the way of philosophical or abstract thought upon the matter.

With that, let us now turn to more concrete matters. As there is virtually no evidence on concept of deserts, we may instead opt to look at the practicalities, and see how the Romans adapted or not to military operations in arid environments. A review of the relevant literature on major arguments in Roman military studies will comprise Chapter Two of this study. Chapter Three will be a study of logistics in arid environments. Chapter Four will discuss tactical operations in the Roman desert (e.g., pitched battles and sieges), with Chapter Five addressing small force operations and policing. Finally, Chapter Six will review and contextualise these findings.

Chapter Two

Literature Review

**Part I. Introduction:**

There are four main arguments with regard to this study with which I shall concern myself. One of these, that of the function of Roman forces occupying the desert *limes* zones, will be discussed in chapter five; the other three shall be discussed now.

The first argument I wish to discuss is that of the ancient sources. I agree with the prevailing belief that literary sources are deeply problematic at best, though the irregularity of well-studied and published material remains in the areas with which I am concerned mean that at times I am forced to rely upon these texts alone or with incomplete corroborating evidence. Secondly, I discuss whether or not one can apply modern views, theories and methods of warfare onto ancient war. I will argue that, though in certain instances modern data can be used to understand ancient, it is likewise deeply problematic and can only be used with caution. Finally, I will argue that the changes in the Roman army seen in the desert are an adaptation to local conditions, though because the Romans were facing enemies on multiple fronts who engaged in asymmetric warfare and who required a higher degree of tactical mobility and flexibility, we find similar changes occurring in the Empire.

**Part II. Ancient Sources:**

Multiple ancient sources discuss desert campaigns of the Romans within the stated time frame. Each of these authors and works have their own set of problems, however. Though specific instances shall be discussed as they are encountered, the general problems are that most literary works were written at temporal remove, each author has his own particular biases, many works are incomplete and many are abbreviated epitomes.

The only authors from this study who were eyewitnesses to the events of which they wrote

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were Ammianus and Josephus. The latter is problematic on three counts. The first difficulty is that Greek was not his native language. This means that a close reading for military terminology (such as will be done in chapter five) may be impacted by Josephus' potential misunderstanding of nuance or amalgamation of different operational units or procedures under blanket terms. The second problem is that Josephus was an unreliable source. His actions in *BJ* 3 show him to be very self-serving, including flattery and support of the Romans, thus we cannot take what he says at face value. Finally, the problem that he and Ammianus share is that, though both were eyewitnesses to events, the accounts were written after the fact. This means that they can be given 'spin', as Josephus shows or accidental errors can creep into the narratives. This is borne up by recent studies of battlefield archaeology of medieval battlefield sites, which have shown that, even with several primary sources available from eyewitnesses, the picture developed from the material remains can differ widely from that developed from textual sources.<sup>13</sup> Whilst it is true that a footprint does not look like a boot, the artefact assemblages do still call into question just how much of these battle reports can be trusted, even if written in the immediate aftermath by an eyewitness.<sup>14</sup>

These problems are only magnified if writing at a temporal remove, such as Polybius, Appian, Sallust, Tacitus, Vegetius, Cassius Dio and Livy did. These authors not only would fill in gaps in their data with assumptions from their own time periods, but they would also use a number of sources of varying degrees of accuracy with various levels of critical analysis; for example Vegetius cherry-picked from various periods of Roman army practice. There is also the problem of these sources only existing as quotes in other, later works, which allow corruptions in. There is also the matter of what are term rhetorical or literary *topoi*, e.g., the 'deceitful foreigner' who maliciously sends the Roman army into danger, something commonly come across in the sources for this study (see Chapter Three). These *topoi* are particularly problematic as we are not in any position to

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<sup>13</sup> Lynch T, Cooksey J., *Battlefield Archaeology*, Stroud: Tempus, 2007, p. 18.

<sup>14</sup> Eyewitness statements even now are often flawed, as is frequently found during law enforcement and legal investigations.

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evaluate them well with regard to military operation. The fact that these 'stock pieces' are used in fictional narratives pre-dates even our temporal bounds here; Plato (*Republic 10.601a-b*) states:

'And similarly, I believe, we shall say that the poet himself, knowing nothing apart from how to imitate, puts on with words and phrases the colours of the many skills in such a way that those equally ignorant who see things only via words, will rate his words most excellent, should he speak in metre, rhythm and harmony about shoemaking or generalship or anything whatsoever.'<sup>15</sup>

This presents us with a double problem. The first is that authors writing military operations in their narratives may or may not strive for accuracy so much as plausibility, using earlier warfare narratives as their basis for how the battle unfolded. This also means that, since these works were written by and for elites who may or may not have had actual experience, that these *topoi* became truth, that they might have rejected as false or flawed any eyewitness accounts that did not accord with their expectations. This means that these accounts may have been lost due to 'proper' battle narratives being preferentially copied and preserved over the years.

Additionally, many of these authors had underlying agendas, with Livy promoting the new Augustan Empire and Sallust, Tacitus and Vegetius being great moralisers, Vegetius especially trying to flag up a 'golden age' of Roman military prosperity (by combining practices from several periods into one). There are also multiple works of uncertain author (e.g., the *Notitia Dignitatum*) and the *SHA*, which purports to be by six authors from the reigns of Diocletian to Constantine I but is actually by an unknown number of authors from an unknown time. This added to the fact that the extant manuscripts are often the umpteenth copy of an original, meaning that errors and scholiasts' notes can creep in, not to mention the unconscious biases brought into matters by modern translators and scholars, means that any text must be used with great caution.

In order to offset these liabilities, one can attempt cross-checks of the data. In some

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<sup>15</sup> 'οὕτω δὴ οἶμαι καὶ τὸν ποιητικὸν φήσομεν χρώματα ἅττα ἐκάστων τῶν τεχνῶν τοῖς ὀνόμασι καὶ ῥήμασιν ἐπιχρωματίζειν αὐτὸν οὐκ ἐπαῖοντα ἀλλ' ἢ μιμεῖσθαι, ὥστε ἐτέροις τοιοῦτοις ἐκ τῶν λόγων θεωροῦσι δοκεῖν, ἐάντε περὶ σκυτοτομίας τις λέγη ἐν μέτρῳ καὶ ῥυθμῷ καὶ ἁρμονίᾳ, πάνυ εὖ δοκεῖν λέγεσθαι, ἐάντε περὶ στρατηγίας ἐάντε περὶ ἄλλου [601β] ὁπουοῦν:....'

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instances there are multiple literary accounts, which allows for some fact-checking assuming that text A is not the source for text B. A better option is the use of archaeological and epigraphic data, including administrative items such as ostraka and papyri. Because my work is desert-based, papyrological evidence is a viable source as are ostraka, though these are frequently incomplete, damaged, and/or in a deposit of other material of differing dates and provenance. This can make context difficult to determine.

The main problem associated with this type is the slow rate of publication; this is a problem for epigraphic and archaeological data as well. Much as with the modern interpretation of ancient literature, archaeological and epigraphic data are similarly influenced by the unconscious biases of those who interpret them; as such, these studies must be read as critically as the literary works. Because the area under consideration is also politically unstable in large part, and has been so for some time, access to both sites and publications is irregular at best. That said, whenever possible I have attempted to cross-check literary sources with archaeological data and to integrate both into this study.

### **Part III. Modern Interpretations and Associated Problems:**

' The same sort of thinking that interpreted the Roman conquest of north Africa as a blessing for its indigenous peoples has traditionally understood the Roman frontiers to be lines of demarcation that distinguished and separated the civilised (that is, Roman) world from the barbarism that was thought to be beyond it.'

(Cherry, 1998, p 24).

The modern biases scholars unconsciously bring into ancient studies leads us to the next major argument. With regard to Roman military operations (including strategy, tactics and logistics) there is one school of thought that endorses the use of modern military thinking onto ancient, and its opposite school wherein it is attempted to understand ancient operations in their own terms. The former school of thought, for our purposes, is most clearly expressed by Edward Luttwak in his 1979 work *The Grand Strategy of the Roman Empire*. Luttwak, a strategist for the

United States government, has essentially mapped Cold War strategy upon the Romans, arguing that the Empire pursued a coherent, long-term strategy of defence-in-depth against high-intensity external threats. Conversely, Benjamin Isaac's *The Limits of Empire* from 1993 argues for an *ad hoc* arrangement emphasising control of traffic and what would in modern terms be considered police work against low-intensity threats. Though I do not wish to engage deeply with these well-trod arguments,<sup>16</sup> it does warn the scholar against the imposition of modern thought upon ancient, especially as evidence from other contexts shows that the ancients thought differently.<sup>17</sup> As Cherry points out in the quote that introduces this section, there is also the problem of imposition of modern biases in the sense of colonialist thought (e.g., the 'White Man's Burden') in which the Romans are held to be a stand-in for a Western empire whose duty it is to spread 'civilisation'. Awareness of this tendency, especially in older works, must be maintained in order to avoid idealising the Romans; one can of course argue that postcolonial works can lead to one demonising the Romans unfairly. The best practice is to attempt to keep in mind these tendencies and filter modern scholarship through them.

With regard to tactics, literature which discusses reconstruction of battles is common, and tend to follow one of two schools of thought. The first, based upon Whatley's 1964 paper,<sup>18</sup> states that full reconstruction of any ancient battle is impossible, based upon a lack of immediate and/or official reports from each engagement. He also points out that the modern scholar should be wary of assuming that the ancient generals were necessarily expert; his fourth point states that generals sometimes do idiotic things, something which is certainly borne up by the sources and will be discussed as appropriate below.

There is also the so-called 'Face of Battle' school of thought, developed by John Keegan in a

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<sup>16</sup> I will return to these arguments with regard to function in the *limes* zone in Chapter Five, including the effects of Isaac's Israeli heritage upon his interpretation of the Roman forces stationed there.

<sup>17</sup> Barker, G. and Gilbertson, D. 'Themes in the Archaeology of Drylands' in Barker, G. and Gilbertson, D. (eds). *The Archaeology of Drylands: Living at the Margin*. London, Routledge, 2000, pp. 1-18.

<sup>18</sup> Whatley, N., 'On the Possibility of Reconstructing Marathon and Other Ancient Battles,' *JHS* 84, 1964, pp. 119-139.

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work of that name with regard to later battles. This approach, adapted for the Roman army by Goldsworthy, Gilliver, Lee and others, attempts to reconstruct the view of battle from an average soldier's perspective. Though this is also not without difficulty, most notably the absence of written accounts from 'the common soldiery,' it is not entirely incompatible with Whatley's view, and a blend of both will be used in this study.

Taking into account the above discussion of the frequent disjunction between eyewitness accounts and archaeological evidence, I thus agree with Whatley that a full and exact account of any given battle is impossible, and this work will avoid such a pitfall. This does not, however, mean that a reasonable approximation of battle experience for a common soldier cannot be made, though it will be subject to modern biases and assumptions.<sup>19</sup> This work will, where possible and with proper caveats, attempt such an approximation.

Logistics suffer from much the same problems as above, with the added issue in our case of whether or not modern conditions of climate, terrain and physiology can be used. Chapter three will feature more specific discussions, but, with regard to climate and terrain there is uncertainty. Chapter One discussed the changing environment over the course of the centuries in this study; we do not have exact details for how arid every site was every year, however, nor are we able to say more than we believe there was an increasing aridity in the desert regions. Terrain is likewise unclear; though we can occasionally use archaeological remains to reconstruct how the land was used, the flow of rivers and the like, we cannot know for certain. This automatically means that we must frequently rely upon modern climate and terrain conditions infused with educated guesswork, meaning that we must automatically presume there are differences that we cannot define. The best way to address this problem is to combine such ancient and modern data as we do have, and keep in mind that everything involved is speculative.

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<sup>19</sup> e.g., height and weight of soldiers having to be averaged, modern figures of ideal nutritional requirements being pushed back onto ancient, *et cetera*.

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With regard to physiology of humans and animals, we are slightly better served. Material remains of both from within our time period show physiognomic changes but no evidence for physiological changes. This means that, altering for lower height and weight, we can use modern physiological data on nutrition, hydration and other medical requirements. This is not perfect, however, as one must remember that modern humans in the desert are often performing different tasks under different conditions than their ancient counterparts. For example, much of the recent physiological studies on humans in deserts have been done on modern Western (mostly American) soldiers serving in the Near East. Apart from some infantry patrols and special forces operations, modern soldiers are generally not as physically active as they are aided by modern technology (e.g., whereas ancient soldiers marched or rode mounts, moderns drive in vehicles), they generally have recourse to shade at worst, portable air conditioning units at best, as well as modern medical treatment and ample nutrition. That said, we can still use the modern data to make approximations, something I explore in chapter three.

**Part IV. The Changing Nature of the Roman Army:**

In the conclusion of his chapter in the Blackwell *Companion to the Roman Army*, Wheeler states the following:

'Efforts to discern a distinctive Roman way of war in the East are misguided... Roman needs for better and more cavalry, light infantry, and missiles were already evident in the West...conditions in the East reinforced existing tactical trends. ...In the East, Roman absorption of native skills in cavalry and archery reflected local conditions. Rome, as always, adapted to circumstances.'<sup>20</sup>

In short, Wheeler is addressing whether or not the changes in the Roman army which occurred over the course of the Empire were institution-wide or if they were geographically based. I would argue that there was a change evidenced throughout the Empire, but that it was based upon local conditions. As the Principate turned to the Dominate, both the needs of the Romans changed from

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<sup>20</sup> Wheeler, E.L., 'The Army and the *Limes* in the East', in *A Companion to the Roman Army*, P. Erdkamp (ed), Oxford: Blackwell, 2007, p.263.

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that of an expansionist army to that of a consolidation force and their main enemies were low-intensity raiding parties and internal unrest rather than a high-intensity external force. This led to what can be termed parallel development, in which forces which had similar purposes and similar enemies developed similar tactics, though specific local factors were also highly influential. As Gilliver states, the Romans changed their operations with regard to local conditions, which means that, for example, in the desert where camels were present and well-adapted to the environment, their incorporation was part of the adaptation; this also means that units stationed in a particular location also took on some of the characteristics of that region's fighting styles as a countermeasure.<sup>21</sup>

**Part V. Conclusion:**

This study will thus operate upon the following arguments. First, all ancient sources (including material remains) will be both analysed critically based upon data known about the author, work, deposition and interpretation. Secondly, I will only use modern data with regard to physiology and, to a degree, climate, and even these will be adapted to take into account known differences with ancient conditions. With regard to military operations I will based my arguments upon extant ancient data rather than modern operations. Finally, I will operate under the assumption that the changes in the Roman army, though similar all through the territory, are reactions to the needs of local conditions, rather than institutional changes directing the army on how to operate in the East as opposed to the West. Now that these have been established, let us begin our in-depth analysis in the following chapters.

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<sup>21</sup> Gilliver, C.M., *The Art of War*, Tempus: Stroud, 1999, p161.

Chapter Three:

Logistics

**Part I. Introduction:**

In order for any campaign to succeed, adequate preparation must be made. This includes four main elements: determining where one is going and how to get there, what or who might be waiting for one upon arrival, supply and logistics, and communications.

All of the above considerations are heavily impacted by the geography and climate of the particular area of operations. The desert, naturally, is no exception to this. Though the specifics of desert geology, geomorphology and climate (and ancient understanding of same) are discussed in chapter one, each section of this chapter will address the effects of desert conditions upon each aspect of campaign preparation and any adaptations made to compensate (or lack thereof).

**Part II. Geographic Knowledge and Mapping, Communications and Intelligence:**

Intelligence gathering is one of the most important aspects of military operations. Austin & Rankov's seminal book *Exploratio* contains a detailed assessment of Roman intelligence-gathering procedures, but no attempt is made to subdivide the methods based upon environment. This could, theoretically cause it to appear that the Roman methods were uniform across their domain. Looking at the primary sources, however, it does appear that Austin and Rankov are somewhat justified in that blanket approach. For example, messages were smuggled to Ammianus via the inside of a scabbard,<sup>22</sup> information from and inducements to deserters were used in all major campaigns and scouting parties, usually light cavalry, were used frequently in the desert (as they were in other environments) something discussed more extensively in chapters four and five. Frontinus, perhaps the most obvious source for data of this type, further supports a lack of differentiation. He cites several examples of the use of spies, including how to use a known spy to spread false information<sup>23</sup>

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<sup>22</sup> Amm Marc 18.6.17.

<sup>23</sup> 1.1.6

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and how to disguise spies and intelligence gathering activities, such as by pretending to chase a runaway horse.<sup>24</sup> Though these events all took place in desert areas, they are not adaptations based upon environment; we find comparable activities taking place elsewhere.<sup>25</sup> Thus by and large all intelligence gathering activities were conducted the same way regardless of area.

Geographic and ethnographic knowledge was likewise of vital importance, with Strabo, in 1.1.16-17 of his *Geography* citing various times in which military operations have been won or lost based upon knowledge of the area, including the Roman/Parthian conflict of his day. By the Roman Empire, maps and itineraries were available,<sup>26</sup> but their accuracy is questionable at best.<sup>27</sup> Millar points out that their lack of topographic understanding would make a 'global' strategic awareness impossible;<sup>28</sup> in a region known for difficult and changeable conditions of both climate and terrain this problem of lack of knowledge would be even more acute.<sup>29</sup> Though the prevalence of 'malicious native guides' in the literature suggests a *topos*,<sup>30</sup> the apparent danger suggests a reliance upon local knowledge, rather than a pre-existing awareness of conditions.

The reliability of what data were available with regard to those who lived in the desert is likewise hit-and-miss. It is difficult to assess whether or not most data were gathered with regard to

<sup>24</sup> 1.1.3 and 1.2.1.

<sup>25</sup> Cf Frontinus 1.1, 1.2, wherein stratagems of the same general category are grouped, and the same principles apply regardless of environment.

<sup>26</sup> Nicolet divides the typology of Roman maps into three parts; geographies, which refer to global conceptions, chronological, which feature land and shore contours, and itineraries, or lists of road stations. Nicolet, C. *L'inventaire du monde : géographie et politique aux origines de l'empire romain*, Fayard, 1988, p 111. It is the latter two with which this study is most concerned.

<sup>27</sup> Ancient mapping is a discipline all its own; see Graham, M., *News and Frontier Consciousness in the Late Roman Empire*, University of Michigan, Ann Arbor, 2006, Lee, AD, *Information and Frontiers: Roman Foreign Relations in Late Antiquity*, Cambridge: CUP, 1993, Dilke, OAW, *Greek and Roman Maps*, London : Thames and Hudson, 1985, Nicolet, C. *L'inventaire du monde: géographie et politique aux origines de l'empire romain*, Fayard, 1988.

<sup>28</sup> Quoted in Isaac, B. *The Limits of Empire*. Oxford, Clarendon, 1993, pp.401-2.

<sup>29</sup> Pliny *NH* 6.33 points out that the only way to Arsinoe from Pelusium if one goes across the sand is to use reeds that have been fixed in the soil along the route because of the aeolian processes.

<sup>30</sup> e.g., Gallus, who was given spurious advice by the Nabatean Syllaeus. Gallus was told that he needed to take a long sea route, which ultimately cost him a large (but otherwise unspecified) number of troops. Upon arriving at Leuke Come, he was told of a much shorter, better-provisioned land route that the locals used. (Dio 53, Strabo 16.4.22-24, Pliny 6.32). Pompey was led astray by guides in Northern Mesopotamia leading to the deaths of many of his men (Dio 37.3.5-6). Antony's lack of foreknowledge of the road from Praaspa to Armenia led to his troops being lost and the victims of disinformation by their enemies. (Dio 49.28.3-4). Emperor Julian, on the advice of local guides, decided to move away from the Euphrates river and go north, which would have trapped him in high desert. (Amm. Marc 24.7.3). Lucan, though a poet rather than historian, gives several short examples of incoming troops being surprised due to ignorance of the terrain. (Lucan 3.240-266).

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ethnography, military intelligence, or some combination of both; all are subject to the usual Roman 'Othering'. Pliny seems to have as his purpose a more scientific study, wherein he is discussing cultural characteristics more for the sake of knowledge than practical military value. Strabo, as stated above, begins his geography by a discussion of how necessary such data are for military success; thus whilst not perhaps writing the equivalent of a CIA fact-book per se, he does seem to have at least been considering the use his work might have for a military audience. Ptolemy seems most concerned with maps and navigation, something borne up by his astronomical work. Though possessed of military experience he seems more to be interested in the places and their locations (as well as points of mutual interest to military and civilians, such as harbours). He does list the names of those who reside in each area, but there is no detail extant about them in the work. This suggests little ethnographic interest and little expectation of military use with regard to one's opponents, though the work would be useful to anyone attempting to travel from point A to point B.

The purpose behind expeditions into various areas, such as Gallus' into Nabatea, the expedition to Arabia Felix and Nero's expedition to the source of the Nile are open to interpretation. These may have been missions of exploration that would either be followed up by either diplomatic or military operations based upon what was found, or they may have had pre-existing purposes, such as a surreptitious examination of military strength of an area or an assessment of economic potential. These are not, however, mutually exclusive goals. We can take as an example the 61 AD Nile expedition, which Seneca states was exploratory and Pliny military.<sup>31</sup> The expedition, though not ultimately finding the source of the Nile, did make diplomatic contact with the Nubian Candace at Meroe and was given a military escort for the rest of their journey. Thus this mission of exploration would have allowed the Romans to evaluate whether or not military or further diplomatic action would be worthwhile. Much as with the expedition to Arabia Felix, there was no subsequent mission recorded, suggesting that military action was not considered worth the potential

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<sup>31</sup> Seneca, *NQ* 8.3-5, Pliny *NH* 6.35.

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risks.<sup>32</sup> The expedition into Arabia, on the other hand, was followed up by Roman expansion, first as client kingdoms and then coming under direct Roman control. Certain expeditions can also be classed as punitive, such as the Garamantes expedition due to their support of Tacfarinas, Paulinus' excursion into the Sahara against the Mauri (Dio 60.9-1-6; Pliny NH 5.14-15) and several expeditions as part of the Judean revolts, all of which are discussed in chapter five.

As can be seen, the level of geographic understanding and its associated uses during the Republic and Empire was quite low in comparison with the modern day. That being said, though we do have examples of their methods not being adequate, these do seem more the exception than the rule. There would be no reason to include mention of a routine journey simply because it would not be particularly interesting or exciting for the audience. Similarly, when discussing the peoples of the desert, only those who were exceptional (or who the writer wanted the audience to perceive as being exceptional) would be specifically discussed. Unlike actual battles, which would have a guaranteed large audience demographic, the mundanities of intelligence gathering and geography would be of interest only to specialists.

### **Part III. Logistics:**

The importance of an army's supplies in campaign, battle and peacetime is something that few, if any, would deny. Vegetius, in his handbook states '*Saepius enim penuria quam pugna consumit exercitum, et ferro saeuior fames est*'.<sup>33</sup> He was referring to food, but we can include any sort of supplies, including both raw materials and finished items required by an army either in garrison or on campaign. Without arms, armaments and some method of conveyance, an army cannot fight; without water, food, and salt, an army cannot survive, let alone function.

Supplies could be acquired one of two ways, either by bringing items into an area or by finding them once one arrives. Both of these options were used, and there are a variety of different

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<sup>32</sup> Cf Kirwan, L.P., 'Rome Beyond the Southern Egyptian Frontier,' *The Geographical Journal*, Vol. 123, No. 1 (Mar., 1957), pp. 13-19.

<sup>33</sup> 3.3.2-3.

methods that can be used for either option, which will be discussed below.

### **A. Rations and Supply:**

The main problem with the modern works on logistics, especially in regard to the daily supply requirements of soldiers and carrying capacities over animals, is that they take only averages. As discussed above, with regard to animals and humans both, they fail to take into account the differences in exertion that differences in climate and terrain cause. More specifically, they do not address the specific problems which one faces in the desert.

**1. Humans:** There are certain changes in needs based around environment. There is, unfortunately, very little extant data in the ancient sources on this matter, however. We do have several instances where heat and/or aridity caused problems. Sallust 51.3 states that both the Roman and Numidian troops were badly affected by heat. Dio 40.23.4 states that Crassus' troops were badly affected by heat, dryness and dust. Antony is said to have lost more troops from disease and climate than battle on the march back from Parthia.<sup>34</sup> According to Herodian 3.9.6, at the siege of Hatra by Severus, heat and dryness severely afflicted the besieging Romans. Ammianus repeatedly describes the heat and dryness as being severely distressing, along with lack of food, in the Amida interlude (18-19), as well as in 25.1.3, 25.7-8. Theodosius, when awaiting his troops' arrival in North Africa to suppress Firmus' revolt, was concerned not only for the difference in fighting style, to be discussed in chapter five, but also because his troops were used to a cooler climate.<sup>35</sup> Julian, in *Oration I* 23B-C discusses how Constantius succeeded despite heat and troops unaccustomed to it. Zosimus 3.91 attributes heavy losses of Jovian to aridity, though there is nothing further stated explicitly. Pliny (*NH* 5.14-15) and Cassius Dio (60.9.1-5) state that the only recorded incursions of the Romans into the Western Sahara were thwarted by both the heat and aridity, as well as the inability to find food and water through lack of familiarity with the region.

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<sup>34</sup> Plutarch *Antony* 50.1.

<sup>35</sup> Amm Marc 29.5.7.

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We can perhaps extrapolate from some small missions (to be discussed in chapter five) supposedly designed to train (or retrain) Roman troops who were either inexperienced or who had become idle may have been in part to acclimatise them, but there is nothing specifically stated supporting that as an intended outcome.

In the absence of data from the ancient world discussing how arid-environment requirements changed or how that was addressed, we must look at modern data and extrapolate backward; due to the current major theatres of war being in arid areas, since Roth and Erdkamp's works there are a number of studies that have been done on adaptation to the desert. This sort of extrapolation does have a number of problems, however, though none are insurmountable. The major differences between modern and ancient military soldiers are physiognomy, function and recourse.

Physiognomy can be compensated for through the use of standardised height to weight ratios (discussed below) so that can at least be estimated to a reasonable standard. Function is a bit more difficult. Modern soldiers, unlike ancient ones, do not generally have to march everywhere. Apart from some foot patrols, most soldiers will use vehicles of some type when travelling. Modern soldiers also tend not to have to build camps every night-- the studies done on moderns tend to be soldiers doing garrison duty in friendly territory rather than those in combat or hostile territory, for rather obvious reasons of access and safety. Modern soldiers also generally have recourse to modern heat-resistant tents or buildings, as well as sometimes air conditioning, as well as regular food and water, plus medical care should they become dehydrated or hyperthermic. These are all conditions that are quite different from ancient soldiers in the desert. That said, general recourse is unlikely to affect the determination of the ideal amounts of food, water and salt for a human, so it is the difference in activities that is the main bulwark. Thus my below calculations can only be understood as approximate, as we have no accurate data for the average number of calories burnt by an ancient soldier per day. We can simply guess that they would be more active and, as such, any

calculations are likely underestimates.

The major impactors upon human (and animal) health relate to food, water and salt. The last two, because they are so closely linked physiologically, shall be discussed together, though most modern works undervalue salt intake severely. Only Roth discusses water and salt, but even he underestimates just how important salt especially is in the desert by allotting only five pages to its discussion. In addition to being a preservative for meats, without salt, but with water, hyponatremia<sup>36</sup> can result; though we do not have any Roman sources which discuss this phenomenon, we have evidence from Arrian and Curtius that shows this during Alexander's campaigns. Alexander's parched troops die, as Arrian says, 'because of their non-stop drinking.'<sup>37</sup> Curtius, in 7.5.15, says '*Sed qui intemperantius hauserant, intercluso spiritu extincti sunt multoque maior horum numerus fuit, quam ullo amiserat proelio.*' This can be taken to mean that the men choked on the water, which is possible, or to mean something like the life essence in breath was closed in. Though a discussion of Greek medicine and physiological thought is well outside the scope of this work, it seems as though Curtius may in fact be describing a seizure.<sup>38</sup> This a symptom of advanced hyponatremia. Local sources of salt would no doubt have been available; if Herodotus' description of the main oasis route in Garamantean territory is accurate there were salt mounds present there,<sup>39</sup> but these supplies, as with all others, would not necessarily be accessible at any given time.

The condition can also result from heavy exertion, especially in hot environments, so it is clearly something we might expect in a desert. It is brought about by the blood essentially being diluted by too much water intake. This dilution leads to the blood going from an isotonic solution, which means that the amount of dissolved substances (solute) in the blood (solvent) is equal to that

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<sup>36</sup> Also referred to as 'water intoxication' or 'hyperhydration.' This can be suffered by any mammal.

<sup>37</sup> 'Πρός αὐτοῦ του ἀπαύστου πότου.' Arrian 6.25.6 (my translation).

<sup>38</sup> Seizures were also thought by Erasistrus to have been caused by massive inrush of blood into the veins; Praxagoras calls it the aorta. Longrigg, J., 'Seizure: Epilepsy in Ancient Greece-- the Vital Step,' *Seizure*, Volume 9, Issue 1, January 2000, pp. 12-21.

<sup>39</sup> Hdt. 4.181.2 ff.

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of inside the cells, to a hypotonic solution, meaning that there is an imbalance in the ratio of the amount of solute and solvent, with more solvent having been created thanks to the amount of water the person has drunk. This creates a diffusion gradient, which causes the cells to swell as the now-dilute solvent rushes into them. This swelling includes the brain, which can only swell so far before it becomes too large for the cranium and damage can occur; symptoms include fatigue, confusion, seizures, coma, and, in severe cases, death; we can perhaps see evidence of this (or, alternately, heatstroke) in Strabo 15.2.6 and the similar problems associated with sudden feasting after starvation, as described in Josephus (*BJ*, 5.13.4) and Plutarch (*Antony* 49). Mild cases of this ailment (which would likely not have been mentioned in the sources unless being suffered on a wide scale) can be treated by increasing salt in the diet, but more severe cases would not be treatable at the time. Avoidance was the best measure.

As is perhaps only logical, one major concern for any army in the desert is that the water sources would be poisoned or otherwise spoiled. According to both Strabo and Plutarch,<sup>40</sup> the Parthians would not take the chance of contamination of rivers by fighting near them; if this was in fact the case then this would explain why we find only one example of intentional contamination in Parthia; Arsaces is said to have endeavoured to fill and destroy at least some of the *qanat* system in order to deny water to Antiochus.<sup>41</sup> With regard to North Africa, however, the Alexandrians made the water saline for Caesar's forces in *Alexandrian War* 6-7, Appian states in his *Roman History* 2.7.44 that Curio's army fell afoul of poisoned water, and Pliny states that the Garamantes put sand into wells along the main road used by the Romans (*NH* 5.5) though this was circumvented under Vespasian through neighbouring Oea. One also finds the occasional reference to manipulation of rivers, usually by damming or intentional flooding, in order to prevent the enemy from gaining access; the Persians flooded the plains to create a marsh along the road the Romans were taking,

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<sup>40</sup> Plutarch, *Antony*, 3.47-48, Strabo 15.3.14,16.

<sup>41</sup> Polybius 10.28.5-6.

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requiring them to cross the region on pontoon bridges and rafts,<sup>42</sup> and Babylon is said to have had the Euphrates denied to them by both Alexander and Semiramis, though we do not hear of so dramatic an instance in the Roman period.<sup>43</sup> What is remarkable, however, is that there are not more examples of water-spoiling in the extant sources. This could be simply because the data did not survive or was for some reason not recorded, but given that there are examples from other areas (e.g., Greece),<sup>44</sup> I believe it may have more to do with just how precious water would be in the desert. If one were to successfully poison a river then one does deny it to the enemy but also to oneself, potentially rendering the area useless for an extended period of time and endangering the survival of one's own group.<sup>45</sup> This does not account for why we do see instances of poisoning or blocking water supplies in North Africa, however; one could possibly speculate that it was related to the history of intensive irrigation of the Eastern desert areas as well as Egypt (remembering that Alexandria is in the Delta, and that the sabotage would have affected only that section of the city already under Caesarian control). In the high desert of North Africa, most water sources are oases or seasonal rivers, rather than irrigation channels, canals or other anthropogenic structures. Thus, by this reasoning, there might not be a culturally-ingrained sacrosanctness of water sources. Also, the North Africans were predominantly nomadic, whereas the Eastern groups were a mix of settled and nomadic; being confined to one area of control would also potentially give a different view of spoiling one's territorial water sources. Without more data on ancient North African culture, however, we must leave this as speculation.

We do know that the ancients frequently drank wine in some form as their main beverage on campaign. In his *Western Way of War*, Hanson discusses Greek use of wine before battle. Though

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<sup>42</sup> Amm Marc 24.3.10.

<sup>43</sup> Frontinus 3.4-5.7.

<sup>44</sup> Frontinus 3.7.6.

<sup>45</sup> There are no data apart from the little mentioned above with regard to ancient nomadic belief about water. Some modern nomadic groups will regard water as common property to the group, and the modern Bedouin offer food and water to travellers as part of their hospitality, but these analogies are imperfect at best. Sheik-Mohamed, A., Velema J., 'Where Health Care Has No Access: The Nomadic Populations of Sub-Saharan Africa,' *Tropical Medicine and International Health*, Vol. 4 No. 10 Oct. 1999, pp. 695-707.

he does not examine it in the context of being a caloric supplement, he believes it to have been used primarily for anaesthetic purposes, with occasional overindulgences.<sup>46</sup> At any rate, the consumption of alcohol at any time would have two main physiological effects, not counting drunkenness.<sup>47</sup> As alcohol is both a diuretic and causes excess perspiration, the first would be dehydration, which would be exacerbated in the desert, though there are no examples from the ancient literature of attributing an increased dehydration to alcohol consumption. The second effect, however, would be to increase the caloric intake of the army. Modern studies show that there are about 7 kcal/g of wine, though as the Romans frequently mixed their wine with water and sometimes honey and/or juices, and consumption would likely vary on a daily basis even for the same soldier, it is impossible to give an accurate amount of just how much of the daily caloric intake was in liquid form. In order to at least get an idea of the maximum number of calories, we can use the following method. Roth suggests an average wine ration of approximately 135 ml/day, or about 160 g.<sup>48</sup> If he is correct, then, taking the modern studies at their mean, this would mean that the average Roman soldier obtained up to approximately 1120 kcal/day through wine. Whether this increase in caloric intake would adequately offset the water and salt loss through excess sweat and urination is unknown; the ancient sources do not discuss it.

The Romans, however, often used sour wine, and so looking at the effects of vinegar may also be instructive, though how close to vinegar the wine was allowed to become is unclear and likely highly variable. Pliny (*NH* 23.27) stated that vinegar was good for cooling the body, though it is unclear if he meant through use as an ointment or through imbibing; he moves onto extol its virtues for easing stomach problems when drunk by those suffering sunstroke so we can possibly interpolate that he meant both uses. He also believed vinegar useful against various bites and

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<sup>46</sup> Hanson, V.D., *The Western Way of War: Infantry Battle in Classical Greece*, Oxford: OUP, 1989, pp. 126-134.

<sup>47</sup> The effects of alcohol would also be more severe in the absence of food; this includes the electrolyte imbalance caused by alcohol's diuretic effect as well as the altered mentation.

<sup>48</sup> Roth, J.P., *The Logistics of the Roman Army at War (264 B.C.-A.D. 235)*, Brill, Leiden, 1999, p.40.

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stings, eye ailments, and respiratory problems. These are certainly all problems we see in or can extrapolate from the texts with regard to the desert, though the consumption of sour wine was not confined to that region. We also have no evidence of vinegar being used to treat any ailment apart from the combination of olive oil and vinegar discussed in Dio 53, which was used on the expedition to Arabia Felix as either an ointment or sunscreen.

With regard to modern data, wine vinegar has a much lower caloric value than wine, with modern balsamic red vinegar having an average caloric value of .16 kcal/g.<sup>49</sup> At the average 160g/day this equals about 25.6 kcal/day, not counting any additives such as honey. This is not a significant addition, but recent studies have shown that vinegar has two other uses that would have affected the Romans. The first is that vinegar is an appetite suppressant. This would help to explain why the soldiers would not have felt any caloric debt incurred by activity, though as discussed above not eating or drinking to satiety is found in modern soldiers as well without imbibing vinegar. The second, however, is far more relevant, and explains why vinegar acts as an appetite suppressant. Recent studies have shown that vinegar reduces the glycemic index of carbohydrates, such as breads and starchy foods, sometimes by as much as 30%.<sup>50</sup> What this means practically is that the breaking down and absorption of the calories from the carbohydrates would be slowed, giving the soldiers a slower but steadier source of energy, rather than a sudden rise in blood glucose level and then an equally sudden fall not long after. Thus, though not significantly increasing the caloric intake, vinegar could still have helped in the efficient use of whatever supplies the Romans did have.

A lack of wine, sour or otherwise, was however considered a serious enough change to

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<sup>49</sup> 'Vinegar' <http://thecaloriecounter.com/Foods/200/2048/Food.aspx> [online] Accessed 11/08/10. The average is based upon the nutrition information given on the bottles of several modern brands of balsamic vinegar.

<sup>50</sup> Ostman E, Granfeldt Y, Persson L, Björck I, 'Vinegar supplementation lowers glucose and insulin responses and increases satiety after a bread meal in healthy subjects.' *European Journal of Clinical Nutrition* Vol 59 (9) September 2005, pp. 983–8; Roberts S.B., 'High-glycemic index foods, hunger, and obesity: is there a connection?'. *Nutrition Reviews* Vol 58 (6): June 2000, pp 163–9.

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require acclimatisation. In the *Cyropaedia*,<sup>51</sup> when informing his men about a fifteen to twenty day march where there would be no food or wine available *en route*, tells them that, in order to avoid sickness from lack of wine, they must gradually begin to drink water every time they eat, and use water in their food preparations, with only a bit of wine after the meal. Though potentially decreasing the overall caloric intake, this would have increased the overall water intake, and prevented dehydration from alcohol. In contrast to this, the Numidians supposedly drank only water.<sup>52</sup> Appian does not say why this might be, but, given their climate this was probably based at least partially on the need for hydration. The Lusitanians, in a semi-desert region, are said to drink only water, but this may be Strabo showing them as being simple and/or 'un-Roman', as the rest of the section is devoted to their being warlike, dancing, being promiscuous, etc.<sup>53</sup> Cato is also said to only have drunk water unless extremely thirsty, in which case he would call for vinegar or a little wine for strength, though this is attributed to austerity, rather than any physiological considerations;<sup>54</sup> according to the *HA* the Egyptians drank only water, and Niger encourages his troops to do the same.<sup>55</sup>

Though the primary sources do give some examples of what might be adaptation to heat and aridity (or lack thereof), as noted above we do not have definite data about what exactly the increased physiological needs were and how they were addressed. Whilst I am comfortable stating that in the desert caloric, salt and water intake would have to be higher and that incidence of certain conditions caused by the desert environment or lack of adaptation to same certainly occurred,<sup>56</sup> I feel that one can obtain a reasonable estimate of the required increase in daily salt, water and caloric intakes in desert environments, then take that percentage and apply it onto Roth's numbers, but

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<sup>51</sup> 6.2.25-40, especially 27-30.

<sup>52</sup> Appian, *Punic War*, 11.2-3.

<sup>53</sup> Strabo 3.3.67-68.

<sup>54</sup> Plutarch, *Cato the Elder*, 1.

<sup>55</sup> *HA*, *Pesc. Niger*, 7.7-9. The history of beer drinking in Egypt argues against this, reinforcing the problems with the *HA*.

<sup>56</sup> e.g., the siege of Hatra, Scipio's army in Spain, *et cetera*. See chapters four and five.

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given the potential inaccuracies in those numbers, whether or not this would reflect the ancient reality is unknown. For example, according to Consolazio et al., humans in a desert require approximately 56 kcal of food per kg of body weight (55.5 kcal in hot sun, 56.4 kcal in hot shade), as compared with 36.6 kcal in cooler environments.<sup>57</sup> This means that caloric intake must be approximately 34% (or approximately one-third) higher than normal. If we take Roth at his estimate of approximately 3000 kcal/day per soldier, then, in the desert, it should need to be 4000 kcal/day per soldier. If, as both Roth and Engels<sup>58</sup> do, we take the average weight of a Roman at 55 kg, however, then the required caloric intake drops to 2830 kcal/day in a desert, and 2035 kcal/day in a cooler environment. In either case, the caloric requirements would be much higher, requiring more supplies. This, like all the numbers in this section, is a projected 'ideal' number for optimum performance by the soldiers. It would not have been met for a variety of reasons which are addressed in the analysis. These projected numbers do, however, give us an idea of how much higher supply needs would be in a desert.

One point determined in a 2006 work on Mineral Requirements for Active Duty Personnel is that, despite energy expenditures of anywhere from 4000 to 7000 calories, the average caloric intake of soldiers was 2400 calories.<sup>59</sup> Whilst modern data applied to ancient is, as discussed extensively above, not always applicable, and this paper focuses on training in a garrison, the idea that soldiers routinely under-eat is an interesting one. The sensation of hunger, most likely familiar to the ancients, as discussed above, is not one modern scholars have attempted to take into account.

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<sup>57</sup> Consolazio et al., 'Energy Requirements of Men in Extreme Heat,' *Journal of Nutrition*, Vol 73, 1961 pp. 126-134.

<sup>58</sup> Engels uses 120 lbs as his baseline, which is approximately 56.1 kg. Engels, D., *Alexander the Great and the Logistics of the Macedonian Army*, University of California Press, London, 1978. Erdkamp uses the slightly higher estimate of 60-65 kg. Erdkamp, P., *Hunger and the Sword: Warfare and Food Supply in Roman Republican Wars (264-30 BC)*, Amsterdam: Gieben, 1998. Height/weight ratio charts list the low-normal weight of a man between 5'4 and 5'5 as between 55 and 60 kg; I have chosen the 55 kg figure in order to determine a minimum optimum caloric intake. See Benn, R., 'Some Mathematical Properties of Weight-For-Height Indices Used as Measures of Adiposity,' *British Journal of Preventative Social Medicine*, Vol 25, 1971, pp. 42-50; Thomas, A, McKay, D, and Cutlip M., 'A Nomograph Method for Assessing Body Weight,' *American Journal of Clinical Nutrition*, Vol 29, March 1976, pp. 302-304.

<sup>59</sup> US Food and Nutrition Board, *Mineral Requirements for Military Personnel: Levels Needed for Cognitive and Physical Performance During Garrison Training*, NAP, Washington DC, 2006 pp. 15-17.

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Though entirely subjective, and thus not quantifiable, this could explain why soldiers seemed able to cope with these rations. The effect of vinegar as an appetite suppressant may also have played a role, though this is not explicitly stated in ancient literature.

Water and salt are even more important than food, as discussed above. Modern US military requirements suggest 3.8 litres (1 gallon) for every 33 km (20 mi) walked during the night, or about 1.2 litres per 10 km, and double that during the day.<sup>60</sup> This does not take into account carrying equipment. Another study from 1993 estimates that water loss in the desert can be up to 10 litres/day/person during high exertion, with a 10-20% increase on top of that during acclimatisation.<sup>61</sup> Therefore, the US military recommended in 2005,<sup>62</sup> admittedly with a baseline of a modern male soldier who is partially acclimatised to an environment where the temperature is at 40 degrees C, that someone consuming 3600 kcal/day should need a minimum of 12 litres/day of water, and someone consuming 2900 kcal/day should require between 9 and 10 litres/day. This does not necessarily mean that this is the amount that *will* be consumed, even if ample water is available, much as with food.<sup>63</sup> Schmidt-Nielsen showed that humans are often sated below the level of water which is lost, for reasons which are not understood. Animals do not have this same problem, with donkeys and camels replacing approximately the amount lost.<sup>64</sup> At cooler temperatures of 25 degrees C, 6 litres/day is needed for 3600 kcal/day and 5 litres/day is needed for 2900 kcal/day. As

<sup>60</sup> United States Army, 'Water Usage in Desert Operations,' *Army Study Guide*, [online] available from [http://www.armystudyguide.com/content/army\\_board\\_study\\_guide\\_topics/desert\\_operations/water-usage-in-desert-ope.shtml](http://www.armystudyguide.com/content/army_board_study_guide_topics/desert_operations/water-usage-in-desert-ope.shtml). Date of access 28/12/08.

<sup>61</sup> Gisolfi, C, 'Water Requirements During Exercise in the Heat,' in Marriott, B., (ed). *Nutritional Needs in Hot Environments: Applications for Military Personnel in Field Operations*, Committee on Military Nutrition Research, Institute of Medicine, 1993 pp. 87-96. Extra salt, in excess of that required by the desert conditions, would also be needed during acclimatisation. Nelson N., et al., Army Medical Research Lab, Ft Knox, 'Determination of Water and Salt Requirements For Desert Operations,' Defence Technical Information Centre, p.2, available from <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=AD652256&Location=U2&doc=GetTRDoc.pdf>. Date of access 28/12/08. This was also seen in the sources; in *Afr* 1.19, Labienus is very confident in his troops because they had been in Africa for three years and had acclimatised, and Julian considers troops with Constantius to have been at a disadvantage because they were not accustomed to the heat (*Oration I, 23B*).

<sup>62</sup> Institute of Medicine (U.S.). Panel on Dietary Reference Intakes for Electrolytes and Water, *DRI, Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate*, NAP, Washington DC, 2005, pp. 488, 489.

<sup>63</sup> Sidebotham's empirical evidence suggests that a modern human performing archaeological work in the Egyptian Eastern desert requires 6L/day for drinking, based upon consumption of his survey team. Sidebotham, S. 'Ptolemaic and Roman Water Resources and Their Management in the Eastern Desert of Egypt,' 87-116.

<sup>64</sup> Schmidt-Nielsen, K., *Desert Animals*, Oxford: Clarendon, 1964 pp. 62, 91.

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for salt, the 2005 study recommends just under 10000 mg/day for the 3600 kcal/day consumption in 40 degrees C, with 7000 mg/day for 2900 kcal/day under the same conditions. In 25 degrees C, 5000 mg/day and approximately 3500 mg/day are recommended for the respective diets. So, invading ancient soldiers in the desert would have required, by these figures, twice the amount of water and salt as usual.<sup>65</sup>

My use of modern numbers can certainly be accused of the same inaccuracies as Engels, who similarly uses modern military recommendations in his work on the Macedonian army. This is why I merely suggest that the ratios of caloric, water, and salt intakes required for soldiers in a desert to that of soldiers working in a more hospitable environment are a valid estimate of how much greater the amount of supplies would have had to be.<sup>66</sup> Though exact numbers cannot truly be given, what these data do strongly suggest is that the baggage trains for desert campaigns would have to be larger or heavier than those in more fertile areas, and/or that alternate arrangements would have to be made.<sup>67</sup> Because they also would not be able to find reliable forage, and may or may not have been able to count on indigenous cultures for either voluntary or involuntary support, secure and long ranging supply lines would also be of vital importance for a successful desert campaign.

It must be said that the requirements given above refer to what was needed for optimum performance of soldiers. This was not necessarily of great concern to generals; adequate functionality for battle, i.e., whatever was enough to allow the army to win, may have been regarded as acceptable. This does not necessarily mean that ancient soldiers were worked to death and simply replaced; there is no evidence for this in the sources, and it would be both detrimental to

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<sup>65</sup> Cyrus tells his troops to bring salted meats on their march as they are more appetising and satisfying. Xenophon, *Cyropaedia* 6.2.31. Classical hoplites likewise brought salty foods with them. Van Wees, H, *Greek Warfare: Myths and Realities*, London: Duckworth, 2004, p. 104. These would have been clear attempts to maintain an adequate salt intake.

<sup>66</sup> Deserts, of course, are not the only type of terrain where extra rations may have ideally been used; this is, however, outside the scope of this paper.

<sup>67</sup> See below for discussion of alternate approaches such as splitting the army, forward supply depots, forced marches, *et cetera*.

morale and ultimately more costly given the required time and money to train replacements. The greater recourse to grievous punishment of non- or under-performing soldiers by their officers can also account for the continued high levels of activity on short rations.

**2. Animals:** As with human adaptation, the Romans have left us very little extant with regard to how they addressed changes required by the animals in their midst, leaving us again to extrapolate as best we can through use of modern data. In addition to the incorporation of camels and camelry, the Roman forces had horses, mules and donkeys for mounts and pack animals, as well as potentially having cattle, sheep, and other food animals. As with the humans, in a desert, water and fodder sources would be problematic to obtain, though, as pack animals may well have been worked to death,<sup>68</sup> there would have been less concern for their continued well-being than would be the case for humans. Whilst camels can graze even on desert scrub and obtain or retain enough to survive, horses, mules and other non-native creatures would, like humans, require both water and digestible fodder.

Exactly how much more food, salt and water would be required would change from species to species. For donkeys, Adams suggests between three and five artabas of barley per month based upon papyrological data, or between 47.1 and 75 kg/month, likely supplemented with pasturage or green fodder.<sup>69</sup> We can attempt an estimate in the case of horses based upon an average ration for travelling horses as listed in the Persepolis Fortification Tablets, and comparing that to the Roman cavalry grain ration as given by Polybius.<sup>70</sup> The latter equals approximately 1.6 kg/day for a horse. The former is somewhat more problematic, based upon difficulties of transliteration and translation from the Elamite. The units of dry measure are called BARs, which roughly equals ten imperial quarts, or about 9.5 litres, and the QA, equalling about .95 litres.<sup>71</sup> Exactly what type of grain is

<sup>68</sup> Goldsworthy, A., 'Review: *The Logistics of the Roman Army at War 264BC-AD235*' *BMCR* 11/1/99 [online] <http://bmcr.brynmawr.edu/1999/1999-11-01.html> Accessed 3/9/10.

<sup>69</sup> Adams, C. *Land Transport in Roman Egypt*. Oxford, OUP, 2007, p85.

<sup>70</sup> 6.39. Adams points out that it may not, in fact, be possible to determine a 'normal' ration. Adams, C. *Land Transport in Roman Egypt*. Oxford, OUP, 2007, p84.

<sup>71</sup> Translation of units of measure is always open to question; for a good discussion of such issues see: Haldon, J.,

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being given is unclear, but for barley, at a specific gravity of .6 kg/litres, this works out to one BAR then equalling 5.7 kg and a QA equalling .57 kg/day.<sup>72</sup> For wheat or millet, the maximum specific gravity is .8 kg/litres for both; thus this would be 7.6 kg/day for a BAR and .76 kg/day for a QA.

The amount of grain given to these horses in the tablets varies. Unfortunately, all that is listed is duration of days rather than distance travelled. Still, in PF1781 and in PF1784, in the eighth and ninth month of the year respectively,<sup>73</sup> horses were given 1 BAR/day of unspecified grain, or about 5.7 kg/day of barley or 7.6 kg/day of wheat or millet. The rider in PF1784 was going to Susa, but whence is unclear. In PF1783, from the twelfth month,<sup>74</sup> horses got 5 QA/day, or 2.9 kg/day of barley or 3.8 kg/day of wheat or millet. Finally, in PF1785, in the second month,<sup>75</sup> horses got 3 QA, or 1.6 kg/day of barley or 2.3 kg/day of wheat or millet.

To compare to the Roman ration of 1.6 kg/day of usually barley, we can see that in PF1785, the rations are roughly equal between the Persians and Romans. Elsewhere, however, it is far higher, at 2.9 kg/day or even 5.7 kg/day in the eighth and ninth month. Looking back at the 1/3 fold increase required by humans in the desert, that would equal a requirement of 2.1 kg/day for optimal desert performance. The Persians clearly exceeded this most times of the year, though exactly why these differing rations were given is unclear. It could relate to climatic conditions, though the hottest part of the year for which we have record here is when the ration equals that of the standard Roman. It could also relate to harvest, i.e., that the eighth and ninth month represent a time in which grain stores are full, which would actually be the case. Or, it could reflect differences in terrain and/or distance, which cannot be determined from the tablets. Finally, it could simply be a

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'Feeding the Army: Food and Transport in Byzantium, ca 600-1100,' *Feast, Fast or Famine: Food and Drink in Byzantium*, Mayer W. and Trzcionka, S. (eds.), Australian Association for Byzantine Studies, Brisbane, 2005, pp. 85-100.

<sup>72</sup> In order to convert from the imperial liquid measure quart to the metric dry measure kilogram (kg), one has to first convert quarts to litres, then find the specific gravity of the substance which one is attempting to convert, which is given in kg/litres.

<sup>73</sup> The Persian year began at the vernal equinox, so this would be roughly mid-November and mid-December/January, respectively. Smith, A., Ph.D, *Pers Comm*, 23/03/09.

<sup>74</sup> Mid-February-mid March.

<sup>75</sup> Mid-April-mid-May.

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difference in ration given according to status, and excess was given to an entourage or others to reflect this. Thus, without more complete data we can only say that the desert-born Persians routinely equalled or exceeded the Romans with regard to their horses' rations.

In the absence of any other extant ancient data we must now turn to modern. A 1964 study showed that food and water consumption go together in many animals, humans included, but not, for example, camels. When the body begins to dehydrate, which fluids are most affected by this water loss are directly relevant to the animals' ability to adapt and survive. Animals such as camels and donkeys tend to lose this water from interstitial fluid; humans and sheep, however, tend to lose this water from plasma.<sup>76</sup> It seems reasonable that the difference in where the water dehydrates from is directly related to the ability to cope with the environment, and thus why camels and donkeys both are better able to do so.<sup>77</sup> A truism from medicine is that salt follows water; in herbivores like donkeys, however, there is very little salt loss through sweat. Therefore, whatever salt the animals take in tends to remain in their systems longer than in the case of humans.<sup>78</sup>

There is still the question of adaptation and acclimatisation to an assumed dearth of fodder in animals. Whilst one study showed a 'metabolic switch' which desert mammals use to reduce their metabolic rates,<sup>79</sup> this does not seem to be a feature of every mammal. In most cases, strategies used by animals to compensate for the environment are behavioural rather than physiological.<sup>80</sup>

In summation, what has been determined in this section represents the ideal ration of food, water and salt to obtain optimal performance from both men and beasts in the desert. I must stress,

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<sup>76</sup> Sheep regularly suffer loss of plasma volume in desert conditions which would kill a human. Schmidt-Nielsen, K., *Desert Animals*, Clarendon, Oxford, 1964, pp. 105-106.

<sup>77</sup> The camel's ability to retain water is higher than a donkey's; for example, donkey faeces has about three times as much water as camel. Schmidt-Nielsen, K., *Desert Animals*, Clarendon, Oxford, 1964 p 85. For a full discussion on camel physiology, see also Gauthier-Pilters, H., Dagg, A.I., *The Camel: Its Evolution, Ecology, Behaviour and Relationship to Man*, University of Chicago, 1981.

<sup>78</sup> Schmidt-Nielsen, K., *Desert Animals*, Clarendon, Oxford, 1964 p. 90.

<sup>79</sup> Merkt, J.R. and Taylor, C., "Metabolic Switch" for Desert Survival,' *PNAS* December 6, 1994 vol. 91 no. 25 pp. 12313-12316.

<sup>80</sup> This is especially the case in humans, who cannot adjust their excretory systems to retain water, nor 'downshift' into aestivation. Schmidt-Nielsen, K., *Desert Animals*, Clarendon, Oxford, 1964 pp. 11, 187-192. There is also no evidence that 'desert physiology' can exist in humans, though acclimatisation is of course possible. McCance, R.A., *et al.*, 'Have the Bedouin a Special "Desert" Physiology?' *Proc R Soc London B* 185, 1974, pp. 263-271.

however, that there is no reason to believe that this ideal was ever achieved. Modern data, though it can give us insight into how the mammalian body reacts under the stress of desert environments, and can even do so under wartime conditions, still do not tell us exactly how much food or water someone living millennia ago required, much less how much they were given on a day-to-day basis. What these numbers *can* do is give us an idea of the magnitude of the logistical stress increase on ancient armies when entering into a new environment. Once this magnitude becomes clear, we can begin to understand why so many sieges had associated famines and/or epidemics, and why planning ahead with regard to adequate food and water supplies was so vital, and how easily any campaign could end in disaster.

### **B. Tactical Logistics in the Desert:**

Having looked at the individual logistical needs, I shall now look at the next order of magnitude, that is tactical logistics. Though the modern studies of logistics tend to focus exclusively upon strategic needs, the importance of tactical logistics cannot be overlooked. There are two factors with regard to tactical supplies. The first is what should be done with baggage trains, including reserves, during battle, and the second is the maintenance of troops during the battle. Several ancient treatises<sup>81</sup> suggest that one should keep reserve personnel, horses and equipment far enough away from the battle to avoid the reserve forces being noticed and reserve animals being upset by the noise which could cause anything from a mild disruption to a stampede. This also allows the baggage train and reserve forces time enough to prepare and evacuate should the battle go poorly. Most likely, the baggage was kept at the forward tactical base under guard.<sup>82</sup> A good example of a badly placed baggage train is from Appian's *Mithridatic Wars*,<sup>83</sup> where Tigranes, overconfident because of his numeric superiority, was goaded into allowing his forces to pursue Lucullus near a hill, which meant that Tigranes' formation was disrupted. This allowed Lucullus to

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<sup>81</sup> Maurice 5.1-4, Onasander 22.1-2.

<sup>82</sup> e.g., Plutarch *Alexander* 32.5-7.

<sup>83</sup> Appian, *Mithridatic Wars*, 12.85.

assault the enemy baggage train, which was driven into their own cavalry and infantry, causing mass confusion and allowing for a Roman rout.

Supplies and their lack also impact on where one sets up a marching camp. Vegetius 3.7 gives a list of criteria for an ideal location; the most critical for our purposes here is the requirement of water sources. Gilliver states that water is the most critical factor in determining a location for a camp;<sup>84</sup> in the case of desert campaigns I would agree. We see several instances wherein being forced to camp in an area without water supplies was used as a deliberate tactic against an enemy. In North Africa, Caesar was in dire straits when forced to camp in an area without any water sources; this was a deliberate tactic intended to diminish or destroy Caesar's army with no losses.<sup>85</sup> There is no explicit statement saying that a particular area was chosen over another because there was water, though given the discussions of the aridity of the areas in which the Romans operated it seems a reasonable assumption.

Supplies are never more obviously essential than in a siege, for both the besiegers and the besieged. There are several examples,<sup>86</sup> including several in the desert where a lack of supplies meant that a siege had to be raised. Severus' victory in Persia, for example, could not be pressed by besieging Ktesiphon due in large part to this problem.<sup>87</sup> Normally, a besieging army would be able to supplement its supplies through foraging and pillaging, but in a desert environment that was not always possible and supply lines could only bring in so much so quickly.<sup>88</sup> The besieging army is also frequently struck by diseases,<sup>89</sup> which should require an increase in supplies unless a great

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<sup>84</sup> Gilliver, C.M., *The Art of War*, Tempus: Stroud, 1999, p 71.

<sup>85</sup> *Afr* 69, 79. Scipio Africanus did much the same to Hannibal just before Zama; by forcing Hannibal to make camp somewhere in which he was cut off from both imported and local supplies, he forced the Carthaginians to exhaust themselves before the battle in obtaining insufficient rations, something which must have played a role in the Carthaginian loss. Appian, *Punic Wars* 36-40.

<sup>86</sup> e.g., Heraklea in Polybius 1.18.10, Praaspa in Dio 49.263, Ktesiphon in the *HA*, *Severus* 16.2. See also chapter four.

<sup>87</sup> Dio 76.9.9.

<sup>88</sup> Masada was an exception to this; though in a desert environment it was the last area out of Roman control, thus allowing the Romans to bring in supplies through secure lines.

<sup>89</sup> Both from being in close, unsanitary quarters (e.g., cholera) and from diseases endemic to where they are invading (e.g., the Syracusan malarial swamps).

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many are lost to disease, and assuming that a lack of something is not the cause.<sup>90</sup> Heat and other environmental conditions can be just as devastating; for example, the siege at Hatra had to be lifted when the besieging Romans began dying due to the heat.<sup>91</sup>

Supplies for the besieged are always important. In a desert, however, because of the hostile conditions cities would additionally have had to have stockpiled foodstuffs because of the potential for disruption to their transport systems.<sup>92</sup> Additionally, desert cities were sited with water in mind; most if not all cities would have had a secure water source of some kind, be it springs, wells, or a river; frequently, access was maintained via irrigation tunnels if the water source was outside the walls.<sup>93</sup> These tunnels could, of course, be used to transport more than just water. Unless this access could be cut,<sup>94</sup> the city could hold out for sometime. Disease was, however, a common problem, and could be exacerbated by heat.<sup>95</sup>

There is not a lot of information available in the primary sources on tactical logistics in general, which prevents us from making much of a determination on how it would function in the desert. We can, I believe, safely assume that the most critical aspects would be ensuring that there was a sufficient supply of food and water in place during sieges, whatever side one was on, as well as ensuring the safety of the baggage train during battle. These concerns, though exacerbated by an inability to forage or pillage nearby siege camps and a potential continual food shortage as discussed above, would hold true for an army no matter where it was operating, desert or not.

### **C. Strategic Logistics in the Desert:**

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<sup>90</sup> e.g., scurvy caused by lack of vitamin C, as occurred in the campaign into Arabia Felix. Dio 53. 29. Also unfamiliar foods, as in App *Sp* 10.54, and hostile creatures, as in 20.42.2.

<sup>91</sup> Hdn 3.9.6.

<sup>92</sup> e.g., Julian *Oration I* 26D.

<sup>93</sup> Any city with Ain, Ein, or En ('fountain') in the name was built around a spring (e.g., En Gedi, En Boqeq). Some of both Petra's and Jerusalem's water supply came in through tunnels, as did Palmyra's and Rabbat Ammon's. Jerusalem: Dio 65.4.5; for all four: Semple, E.C., 'Domestic and Municipal Waterworks in Ancient Mediterranean Lands,' *Geographical Review*, Vol. 21, No. 3 (Jul., 1931), pp. 466-474. Ammianus says that Amida had a spring and later a tunnel cut to the Tigris (18.9.2, 19.5.4) and in 24.5.3 references an unnamed deserted city that had a spring connected by a tunnel to the Tigris.

<sup>94</sup> e.g., Scipio cutting semi-desert Numantia off from the Duero. Appian *Spanish Wars* 14.91.

<sup>95</sup> e.g., Amida. Amm. Marc. 19.4.1-8.

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Having looked at tactical logistics, I should like to now turn to the extant evidence for strategic logistics. Let us begin with specific examples of adaptation to desert conditions on the march. Sallust (*BJ* 75.2-8) describes Metellus' preparation for an 83 km journey through the North African desert. He strips the provisions to only a 10-day grain supply and water-carrying skins, plus wooden (i.e., lightweight/potential fuel sources) utensils, as well as arranging for the Numidians to supply him with water. Depending on what figure is used for marching speed, and assuming no major difficulties in terrain, which is unknown, this could have taken approximately three days,<sup>96</sup> or approximately four days.<sup>97</sup> In either case, a 10-day supply is a good surplus in case something unforeseen should occur; Antigonus took a 10-day supply on a march from Gaza into the Sirbonian Lake region of the Sinai, though Diodorus does not give us an exact itinerary.<sup>98</sup> This region, now called the Bardawil lagoon, is 85 km in length,<sup>99</sup> and though it is suspected that he encamped near his off-shore fleet at the western end of the region,<sup>100</sup> we can but approximate that this march was 140 km, which should have taken 4 or 5 days at the regular Roman marching speed.<sup>101</sup> In a similar environment in Iberia, Metellus' son stripped down his forces to light arms and armour and had them carry a 5 day supply of rations in order to attempt to take the city of the Langobritae from Sertorius in a two-day siege. Unlike his father's success, however, Metellus' mission failed when Sertorius managed to get supplies of water into and the civilian population evacuated out of the city, and assaulted Metellus' foragers.<sup>102</sup> There is, of course, the potential problem of transport in the sense of soldiers being unable carry water with them due to a lack of helmets or other suitable instruments; this happened to Antony on his trip back from Parthia,

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<sup>96</sup> The standard 30-32 km/day, as discussed more intensively elsewhere.

<sup>97</sup> This using the established 'maximum safe' speed for mounts, or about 20-25 km/day.

<sup>98</sup> 20.73.

<sup>99</sup> Stanley, J..D. 'Configuration of the Egypt-to-Canaan Coastal Margin and North Sinai Byway in the Bronze Age,' in *Egypt and the Levant*, E.C.M. van den Brink, T.E. Levy (eds.), London: Leicester University Press, 2002, pp. 98-117.

<sup>100</sup> 20.73 n5.

<sup>101</sup> No data are available on average Antigonid marching rates.

<sup>102</sup> Plutarch, *Sertorius*, 12.

wherein he and his men reached a river, meaning both supply and safety, as the Parthians would not fight at rivers.<sup>103</sup> Unfortunately, as Antony and his men were short on carriers, he had to be supplied with those as well from allies.<sup>104</sup> These examples underscore both the importance of planning ahead as well as the narrow margin for success in the desert.

With regard to actual movement along the roads in the desert we can look at the few examples given of the order of march. We have examples of the Romans marching in a hollow square when expecting a threat, as discussed more in Chapter Five, but despite the different environment they seemed not to change particularly. In fact, having looked through all of the primary sources on the matter, it was only in response to a believed enemy presence that there was a change. Josephus, when talking about Titus' march into Judea, calls his order 'καθὰ Ῥωμαίοις σύνηθες'<sup>105</sup> or in accordance with Roman methods. It is possible that our understanding of the usual Roman order of march as discussed in the modern literature has been skewed by the assumption that Josephus is correct, or that Josephus may have mistaken what was a typical Roman order of march in a desert for a typical order or march anywhere, but there is no extant text showing any differences. This implies that the Romans were not automatically changing their order of march due to being in a desert environment, but were in fact adapting to whether or not they felt that there was the possibility of attack.

Having now looked at the few alterations made to individual campaigns or incidents, let us now move to look at the overall logistical system. In general the Romans as well as those indigenous groups for which we have evidence, used very similar logistical methods in all areas and time periods. Though coastal and fluvial resupply was important in many instances, in order to focus my argument on desert-specific logistics I will be confining my analysis to land-based systems.

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<sup>103</sup> Cf Strabo 15.3.14,16. Fear of pollution by bodies of all-too-rare watercourses would be logical for a desert people.

<sup>104</sup> Plutarch, *Antony*, 3.47-48.

<sup>105</sup> *BJ* 5.50.

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Road systems pre-dated the Roman period in both the East and North Africa. The Persian royal roads extended throughout the East and were added to by the Seleukids, Palmyrenes, and others, whilst the Ptolemies were road-builders in Egypt, adding onto Pharaonic road systems.<sup>106</sup> The rest of North Africa is less clear but Herodotus (4.181 ff) and Pliny (NH 5.5) tell us of a road into Garamantes territory, and there may have been Trans-Saharan trade networks in operation for far longer than that. We also have information from survey expeditions; thus far only a few sites have been (or are being) excavated and published, however, so the data are far from complete.<sup>107</sup> These road systems had a number of factors in common. They were all lined with road stations and/or fort(let)s through which they could protect and control supplies, especially water, which seems to have required a permit of some kind.<sup>108</sup> I will discuss the function of these fortifications further in Chapter Five.

Keeping to logistics, what is clear is that what these road systems all hold in common is water. Along each are either artificial or natural water sources in the form of either cities, burghi or *hydreumata*, sometimes also food and, in the case of Herodotus' discussion of the Garamantes route, salt. As Cherry pointed out that water is the defining factor for the choice of sites,<sup>109</sup> it is only a slight extension of that idea to believe that these pre-existing, secured water sources along roads would mean that almost all large-scale Roman and enemy movement would take place on these roads. This is supported by the *Cyropaedia*, where Cyrus is advised that he and the enemy will both have to travel along the same roads,<sup>110</sup> suggesting that the Persians did not normally march off

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<sup>106</sup> Persia: Xen., *Cyropaedia* 1.5.36; Egypt: Partridge, R., *Transport in Ancient Egypt*, London: Rubicon Press, 1996, p.78.

<sup>107</sup> For extensive information on specific roads/systems, see Jackson, R. *At Empire's Edge: Exploring Rome's Egyptian Frontier*. London, Yale University Press, 2002., Parker, S. T. (ed) *The Roman Frontier in Central Jordan: Final Report on the Limes Arabicus Project 1980-1989*. Washington DC, Dumbarton Oaks, 2006., Sidebotham, S. et al., *The Red Land: The Illustrated Archaeology of Egypt's Eastern Desert*. Cairo, the American University in Cairo Press, 2008., Chevallier, R, *Roman Roads*, Field, N. H. (tr) Berkeley: University of California Press, 1976, Isidore of Charax's *Parthian Stations*, the maps of the *Notitia Dignitatum* and Antonine Itinerary, Strabo 16.2.27. Isaac gives a good discussion in *Limits of Empire*, Oxford: Clarendon, 1993, pp 163-186.

<sup>108</sup> Sidebotham, S. 'Ptolemaic and Roman Water Resources and Their Management in the Eastern Desert of Egypt,' 87-116.

<sup>109</sup> Cherry, D. *Frontier and Society in Roman North Africa*. Oxford, Clarendon Press, 1998, p37.

<sup>110</sup> 1.36.

roads. Strabo, when discussing Alexander's journey through the Gedrosian desert, pointed out the difficulties faced by infantry in walking through both level sand and dunes;<sup>111</sup> though Gedrosia is outside our spatial-temporal bounds, this would be a problem faced by desert-operating groups in North Africa especially. Pliny describes the problems the Romans had with the Garamantes filling the wells with sand along the road into their territory to prevent incursions.<sup>112</sup> Later, Ammianus was at pains to secure the roads before the enemy; the tactical considerations of roads will be discussed elsewhere but the point supports that both armies will need the roads for movement of troops and/or supplies.<sup>113</sup> There is in fact only one extant instance of Roman troop movement off main roads. Afrianus (Dio 37.55) is said to have left the main Mesopotamian route from the Parthian border to Syria, and suffered both from the harsh winter conditions and from a lack of supplies.<sup>114</sup> This implies that he would have expected supply depots along the route, as well, presumably, as shelter or some kind. Because of this and the difficulties of moving even infantry through sand as detailed in Strabo, and because of the dearth of extant narratives involving problems of moving through sand apart from during sandstorms, I believe that it is safe to presume that any major Roman movement in the desert was taking place on a road. I believe we can also surmise that the reason why we see *hydreumata* in North Africa more commonly than in the East is simply due to distance.

One of the more perplexing features of the Eastern Desert and Negev is the lack of extant milestones upon the roads. There are multiple suggested reasons for this, from the commonplace archaeological explanations of differential preservation or stones not as yet found to the cosmological. The latter, proposed by Gates, relates only to the Egyptian desert and cosmology; as the same dearth is present in the Negev, Scotland and Eastern Anatolia as well we can dismiss this

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<sup>111</sup> Strabo 15.2.6.

<sup>112</sup> *NH* 5.5.

<sup>113</sup> 18.6.10.

<sup>114</sup> Cf Demetrius in Diodorus 19.97.1 who entered Nabatean territory through trackless roads, heading toward Petra. He is said to have been observed, though any logistical difficulties en route are not stated; the Nabateans do remind him that he cannot besiege them long due to lack of supplies (19.97.5).

possibility.<sup>115</sup> The Eastern Desert and Negev both share a geological regime different from the Sahara/Western Desert and the Syrian desert. We can perhaps suppose this relates to the dearth; this geological regime is prone to flash floods, implying that the milestones could have either been washed away or the Romans, knowing of the floods, did not feel it worthwhile to make the effort. The lack of milestones in non-urban eastern Anatolia and Scotland argue against this as well, however.

Therefore, it seems that these roads were unmarked for another reason. Adams' suggestion of native cairns notwithstanding (and also not explaining the similar dearth elsewhere),<sup>116</sup> I would argue that, as will be discussed more in Chapter Five, the *limes* zones, especially the *limes Africae*, seem to have been designed for traffic control. The increase in forts in the Eastern Desert region around AD 300, especially the new port at Myos Hormos and associated road, does suggest that the Romans were reacting to a need for increased control of Red Sea trade. Whether this is a response to changes in external agents (e.g., a probable Parthian state developing in southern India, whence the Red Sea trade in many Asian goods came)<sup>117</sup> or a response to internal banditry is unclear (and these are not mutually exclusive, as will be discussed in Chapter Five). A lack of clearly marked roads, however, would mean that the merchants would be by and large reliant upon Roman (or Roman-controlled) guides or patrols to direct them upon the roads to get their caravans safely to the Nile region. This scenario would also have the added bonus of making it more difficult for any invading group to find their way, but I would argue that was a secondary consideration.

With regard to movement upon the roads, something which seems to have not been confined to the winter months, one must wonder both how the guides found their way as well as how the

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<sup>115</sup> Gates, J. E., 'Hidden Passage: Graeco-Roman Roads in Egypt's Eastern Desert', in Robertson, E., et al, *Space and Spatial Analysis in Archaeology*, Calgary, University of Calgary Press, pp. 315-322. Contra this: Isaac, B. *The Limits of Empire*, Oxford, Clarendon, 1993 p305.

<sup>116</sup> Adams, C. *Land Transport in Roman Egypt*. Oxford, OUP, 2007, p22.

<sup>117</sup> Abbas, S. 'India's Parthian Colony: On the Origin of the Pallava Empire of Dravidia,' *The Circle of Ancient Iranian Studies*. [online] Available from: [http://www.cais-soas.com/CAIS/History/ashkanian/parthian\\_colony.htm](http://www.cais-soas.com/CAIS/History/ashkanian/parthian_colony.htm) (Accessed 10/10/11).

humans and baggage animals coped. Most of the desert tracks were beaten earth or gravel, with large stones cleared away; this would prevent accidental steps into sandy areas. The guides could, as Adams suggests, have used cairns to mark their way (at least in Egypt), though given the potential for inclement weather the cairns could be flooded out or buried by sand. Additionally, there is the heat; however, celestial navigation was an option which was used by civilian caravans, according to Strabo,<sup>118</sup> and night travellers would also have had the advantage of cooler conditions. The Romans would occasionally march at night due to the aridity and extreme heat, amongst other reasons.<sup>119</sup> As it seems a reasonable precaution to make under extreme conditions, and it was a known practice from the Hellenistic precursors, though not, it appears, an indigenous practice, I would speculate that travel at night during the height of desert heat took place all throughout the Republican and Imperial Periods, even though the sources are curiously silent on the subject.

Perhaps the most obvious adaptation to the desert made by the Roman army was its incorporation of camels, for which we have extensive literary, epigraphic, and artistic evidence. Called *dromedarii* in Latin<sup>120</sup> and κάμηλιτοι in Greek, they were clearly an official military speciality emplaced in *cohortes equitatae* and *alae*.<sup>121</sup> Their strategic and tactical uses are poorly understood, though we are somewhat better served as far as logistics are concerned. They are used in both campaign conditions and as part of the logistical system of the established provinces. Strabo records the use of camels by Gallus in his campaigns against the Nabateans,<sup>122</sup> and that the Berenike-Koptos route was built by the army of Ptolemy Philadelphos for long-distance camel

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<sup>118</sup> 17.1.45.

<sup>119</sup> e.g., Pompey in northern Mesopotamia/Armenia and Scipio in the semi-desert plateau of Spain both marched at night due to the environment. Dio 37.3.5, Appian, *Spanish Wars*, 14.89. Strabo 15.2.6, when discussing the Gedrosian desert, says that most travel must take place at night due to the heat and aridity. Amm. Marc. 24.6.4 says that Julian sent Victor to begin a river crossing at night.

<sup>120</sup> Except at Bu Njem, where they are called *camellarii*, an obvious transliteration from the Greek. *OBN 3-5, 7-10, 42*. Marichal, R., *Les Ostraca De Bu Njem*, Grande Jamahira Arabe, Libyenne, Populaire et Socialiste Departement Des Antiquities Assraya Al Hamra, Tripoli, 1992, pp. 119-129, 156-157.

<sup>121</sup> e.g., the *cohors XX Palmyrenorum dromedarum* known from papyri at Dura-Europos, the *cohors I Augusta Praetoria Lusitanorum* known at Apollonopolis Magna by papyri, the *ala I Ulpia Dromedariorum Milliaria* known by inscriptions at Palmyra, *et cetera*.

<sup>122</sup> 16.4.24.

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caravans, though it is unclear if he had military or civilian transport in mind. Camel caravans on the Dura-Palmyra route had been under the protection of the Palmyrenes long before Roman encroachment into the region, the Persians used camels to carry reserve arrows, amongst other things,<sup>123</sup> and both Arab and North African nomads had used camels as beasts of burden for centuries. In short, there was a long history of logistical camel use by Near Eastern and North African societies as well as invaders.

Camels have significant logistical advantages over other beasts of burden.<sup>124</sup> Though mules and donkeys have comparable distance per day rates, and horses can be force-marched through the deserts as well, camels can not only handle the stress of heat, aridity and lack of supplies, but will also recover completely if the lack is no longer than four days; this is because their physiology of water retention is far more efficient as discussed above. Camels can also graze on any sort of desert scrub and obtain both water and calories, thus fewer supplies must be carried, their long eyelashes protect against blowing sand and dust, plus their dung can be used for fuel and females continue to produce milk when on the march.<sup>125</sup>

When on campaign armies also would supplement by foraging; these small parties were a frequent target of attack, as were supply lines was also well-known in antiquity. The former will be discussed in chapter five, but assaults on supply lines appear several times in literature.<sup>126</sup> The

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<sup>123</sup> Hdt. 1.80, *Cyropaedia* 7.1.49.

<sup>124</sup> The average safe distance for a camel to travel in a desert is 20 km/day in summer and 25 km/day in winter. Shaw, B.D. (quoting Gautier-Pilters), 'The Camel in Roman North Africa and the Sahara: History, Biology and Economy,' *BIFAN* 41, Ser. B. 4 (1979), reprinted in: *ibid.*, *Environment and Society in Roman North Africa*, Ashgate, Aldershot, 1995, p. 704. A horse could make this distance, but would require at least 38 litres (10 gallons) of water per day, whereas a camel could go without any, if absolutely necessary. A horse also would not be able to keep up the pace, especially if shorted food or water. Engels, D., *Alexander the Great and the Logistics of the Macedonian Army*, University of California Press, London, 1978, pp. 126-130. To give an example of ancient thought, both Pliny and Aristotle thought that the normal span for a camel was 4 days without water. Shaw, *ibid.*, p. 704, whilst Diodorus 19.37.6 states that camels could travel continuously for almost 1500 stades, or about 283 km; 14 or 15 days, keeping to Gautier-Pilters' averages.

<sup>125</sup> Gautier-Pilters, H and Dagg, A.I., *The Camel: Its Evolution, Ecology, Behavior, and Relationship to Man*. Chicago and London: Univ. of Chicago Press, 1981, pp59-77.

<sup>126</sup> Plu, *Lucullus* 11.1, Sallust, *BJ*, 81, Ps. Caesar *African Wars* 75, Polybius 5.51.9-11, Diodorus 21.16 and 20.108.6, App, *Punic Wars* 36-37, *Mithridatic Wars*, 12.80-81, 85, 15.99, *inter alia*. See also Chapter Five.

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baggage train of an army was likewise a target;<sup>127</sup> though Roth believes that the train was sent in small groups from supply base to supply base primarily in order to reduce its size, I believe this also would have had the additional effect of minimising any losses. In the case of desert warfare, where sudden climatic and terrain changes, not to mention hostile forces of various sizes and organisations, could spell disaster for the only supplies in the area, this compartmentalisation would seem to make sense from a logistical point of view, though there is no direct evidence in the sources for this.

Roth also expands on the differentiation between logistical base types as used throughout the Republic and into the Principate. He lists operational bases, which were storehouses for provisions in secure areas, tactical supply bases near the enemy and forward supply depots. His system, though developed with the entirety of the region of Roman operations in mind is borne up with regard to desert operations. Though this will be addressed in far greater detail in Chapters Four and Five, as the control of all such bases is a major determinant in both regular warfare and asymmetrical strategy, we can for the moment simply say that we see several instances of all of these categories in the desert. Both the Romans and North Africans used Capsa and Cirta as operational bases, with Cirta of course being used as part of the coastal supply route; Utica and Uzzita were both used by Cato and Scipio respectively for the same reasons.<sup>128</sup> Operational bases in the East would vary based upon where the enemy were, but Dura-Europos was clearly used as one based upon its position, with the chain of smaller forts extending into the desert from it and along the Euphrates acting as either tactical or supply bases depending on where the borders were at the time. Joppa was an operational base for Judean rebels and then later the Romans; it seems that almost any major garrison or garrisoned city on the major overland routes could be used as an operational base if it was in a secure area. Tactical bases would vary based upon the area of

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<sup>127</sup> See Chapter Five.

<sup>128</sup> Sallust *BJ* 21-26, 81. (Cirta); *Ibid* 87, 97 (Capsa); Ps.Caes. *African Wars* 41 (Uzzita); *Ibid* 36, 61 87 ff. (Utica).

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conflict, but because towns in the desert would invariably be based around a water source of some kind they too were limited. From Alexander onward, the practice of stocking forward supply depots was used in desert environments, usually performed by allied or surrendered governments and often guaranteed by hostage exchange.<sup>129</sup> Incoming troops could also find caches of supplies made by indigenous persons for their own use, such as in Ps. Caesar *African Wars* 67; Erdkamp points this out as a disadvantage to the system.<sup>130</sup> Julian's *Oration I*, 26D says that Constantius laid supplies of food and equipment in Syria during the winter after he had heard about a potential usurper to the throne. The *hydreumata* discussed above that were seen along the Egyptian and Trans-Saharan routes, as well as the road stations of Isidore of Charax and the Antonine Itinerary also acted at least as water supplies, if not depots for other items. These bases and depots, however, as Roth points out are utilised all throughout the Roman territory, and are not confined to the desert nor do they differ in any discernible way.

What can be seen from this analysis is that there were very few adaptations made to strategic logistics in the desert. In general, the Romans utilised the same general logistical operations as they used elsewhere. The major changes, i.e., the incorporation of camels and the occasional change to night marches, merely act as adjuncts or slight variations to the usual themes; these methods may also simply have been the most sensible.

## **Part V. Conclusions:**

One of the main challenges to our understanding on ancient logistics no matter the environment is the lack of coherent ancient data. The information we have is scattered and often contradictory; recall Polybius' statement at various points that Romans carried rations for 4 days, 10 days, 30 days, and finally 'a long time.'<sup>131</sup> Factoring in attempts to extrapolate logistical systems out

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<sup>129</sup> Arrian 2.4.2, 2.13.7; Curtius 3.1.23. Arrian 3.6.8 says that the viceroy of Syria was removed for failing in this supply collection.

<sup>130</sup> Erdkamp, P., *Hunger and the Sword: Warfare and Food Supply in Roman Republican Wars (264-30 BC)*, Amsterdam: Gieben, 1998, p. 24.

<sup>131</sup> 8.26.3, fragment 88, fragment 75, 11.26.6.

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of accounts which seem uninterested in those details we are frequently left to fill in the gaps with modern knowledge. Though certain aspects would not change appreciably, e.g., human physiology, there are so much data unavailable to us that much of our understanding must be considered speculative.

With all that in mind, let us briefly review what this section has shown. First of all, the desert did not seem to affect general intelligence gathering techniques at all. Spies and stratagems were tailored to each individual circumstance, and the same principles applied no matter the region. Geographic knowledge seems to have been poor at best, but this could be said of all regions distant from the Roman heartland. The variable nature of the desert landscape seems to have caused celestial navigation to be preferred during night-travel and would very likely have caused large-scale movement of personnel and/or materiel to be confined to roads. The main transport routes also frequently featured *hydreumata* and led to most major cities; given the importance of water in the desert it is a reasonable expectation that any group would not willingly divert from such supplies without a compelling reason.

Water again, as well as salt and food were critical for military success and yet we have very little data on how the Romans adapted when in the desert theatre. Because mammalian physiology would not have changed appreciably from modern, we know that the soldiers and their animals must have required acclimatisation to the heat, aridity, and solar intensity. They must have had higher caloric and hydration requirements, and they must have needed more salt in order to remain effective. There is virtually no ancient data extant on the subject, however, so we are left to use our understanding of the reasons why the mammalian body reacts as it does to the desert and to the potential conditions encountered there, including disease, and extrapolate from the extant narrative. Because of all of this uncertainty, any calculations must be considered inexact.

With regard to tactical and strategic logistics on the march, there is again very little

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difference from Roman practice in non-arid environments. The order of march did not change except in response to threat; there were a few instances of an increase in attention to supply needs under unusual circumstances, such as Metellus' 83 km march described above, but these are the exceptions rather than the rule. The only major difference in that the desert seems to confine the army to the road network(s) even more strictly than anywhere else due to the variability of the desert terrain and the need for supplies, water especially.

Chapter Four:

High Intensity Warfare: Pitched Battle and Siege

**Part I. Introduction:**

The most obvious aspect of warfare, regardless of environment, is the engagement between opposing armies. When environment is taken into account, however, there are significant differences to be found, especially with regard to equipment and climate. The same cannot be said of tactics, however; they seem to have been based more in reaction to any unique or unusual tactics used by their various enemies. They did, when possible, choose to fight on suitable terrain, but that would be the case for the army no matter where it was operating.

That being said, however, their combat operations were affected by the desert, as were their forces, something often only realised in the aftermath of battle. Because of this, data such as casualty figures relating to particular, environment-specific illness or wounds will also be examined. I will, however, focus upon the innovations (or lack thereof) made by the army in the desert.<sup>132</sup>

**Part II. Pitched Battle:**

In order to understand how the Romans fought in the East and North Africa, one first must determine the composition and organisation of their forces. Before the *Notitia Dignitatum*, generally assumed to be accurate for the fourth century, we are badly hampered in this due to spotty evidence. That said, Maxfield has noted fluctuations in Egypt between the Augustan period (3 *alae*, 9 infantry *cohortes*) to AD83 (3 *alae* and 7 *cohortes*) to AD 156/61 (4 *alae*, 12 *cohortes*) and AD 179 (4 *alae*, 9 *cohortes*).<sup>133</sup> The next data we have is from the *Notitia Dignitatum*, which lists 41 of

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<sup>132</sup> In order to focus strictly upon the topic, this work will only discuss tactics or adaptations specific to the desert or indigenous cultural groups, rather than a full discussion of pitched battle or siege. Such discussions are quite common in the modern scholarship. See, *inter alia*, Webster G., *The Roman Imperial Army of the first and second centuries A.D.*, London: Black, 1969, Watson, G.R., *The Roman Soldier*, London : Thames & Hudson, 1969, Peddie, J., *The Roman War Machine*, Stroud: Alan Sutton, 1994, Goldsworthy, A., *The Roman Army at War: 100 BC-AD 200*, Oxford ; New York : Clarendon Press, 1996, Gilliver, C. M., *The Roman Art of War*, Tempus: Stroud, 1999, Southern, P., *The Roman army : a Social and Institutional History*, Oxford; New York : Clarendon Press, 2007.

<sup>133</sup> Maxfield, V, 'The Eastern Desert Forts and the Army in Egypt During the Principate,' in Bailey, D. (ed)

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the 70 units in Egypt as being cavalry.<sup>134</sup> With regard to the rest of Africa, again we turn to the *Notitia Dignitatum*, which gives us approximately 10500 cavalry and 11500 infantry,<sup>135</sup> though unit size in the Late Empire is unclear.

Moving to Roman Arabia, Spiedel states that in the late second and early third century, the Arabia garrison totals about 10000.<sup>136</sup> Kennedy further points out that new cavalry units were brought in during the late third century, roughly the same time as Arabia was split in twain. The north part was still termed Arabia with the south renamed Palaestina Tertia.<sup>137</sup> Each half had its own army, with the southerly Palaestina Tertia under the *dux Palaestina*; his army was comprised of 60% cavalry to 40% infantry. Roman Syria is difficult to determine before the *Notitia Dignitatum*, though Pollard points out attestation of a Palmyrene archer unit at Dura that pre-dated the Roman takeover (and was thus incorporated), as well as the *cohors XX Palmyrenorum* (a milliary dromedary unit) and *legio II Parthica* by AD208, *legio I Parthica*, *legio III Parthica*, *cohors II Ulpia equitata*, *cohors II Ulpia Paphlagonum*, *cohors III Augusta Thracum* and *cohors Palaestinatorum*. Dedicants from vexillations comprised of members of *legiones IIII Scythica*, *III Cyrenaica* and *XVI Flavia Firma* have been found at Dura,<sup>138</sup> but the unit size of the vexillations is unclear. In the *Notitia Dignitatum*, Syria Coele has already been amalgamated into Eufkratensis Syria, under the *dux Syriae*. As this is the region containing most of the desert area, I am focusing upon this entry; Augusta Euphratensis is Commagene which is not desert so it is being omitted. The units listed are: *equites scutarii Illyriciani*, *equites promoti Illyriciani*, *two equites sagittarii indigenae*, *equites promoti indigenae* and *two equites sagittarii*. Serving both regions under the *dux Syriae* were: *ala prima nova Herculia*, *ala prima Iuthungorum*, *cohors prima Gotthorum*,

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*Archaeological Research in Egypt*, Ann Arbor, University of Michigan Press, 1996, pp. 9-19.

<sup>134</sup> Alston, R., *Soldier and Society in Roman Egypt*, London: Routledge, 1995, p147. Alston also suspects that cavalry may also have been mixed in with infantry units, though offers no support.

<sup>135</sup> Mattingly D. *Tripolitania*. London, BT Batsford Press, 1995, p 187.

<sup>136</sup> Kennedy, D. *The Roman Army in Jordan*, London, The Council for British Research in the Levant Press, 2000. p 47.

<sup>137</sup> Kennedy, D. *The Roman Army in Jordan*, London, The Council for British Research in the Levant Press, 2000. p 51.

<sup>138</sup> Pollard, N. *Soldiers, Cities and Civilians in Roman Syria*. Ann Arbor, University of Michigan, 2000, pp.120-129.

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*cohors prima Ulpia Dacorum, cohors tertia Valeria, and cohors prima victorum.*

For Mesopotamia we have mainly the *Notitia Dignitatum* again. Under the *dux Mesopotamiae* were: *equites scutarii Illyriciani, equites promoti Illyriciani, equites ducatores Illyriciani, equites felices Honoriani Illyriciani, equites promoti indigenae, equites promoti indigenae, equites sagittarii indigenae Arabanenses, equites scutarii indigenae Pafenses, equites sagittarii indigenae Thibithenses, equites sagittarii indigenae, legionis primae Parthicae Nisibenae, legionis secundae Parthicae, ala secunda nova Aegyptiorum, ala octava Flavia Francorum, ala quintadecima Flavia Carduenorum, cohors quinquagenaria Arabum, and cohors quartadecima Valeria Zabdenorum.*

What can we first conclude from all of these units? What is most striking is the preponderance of mounted units which increases over time. Tactically speaking, this means that, especially in the third and into the fourth century, it was felt that a highly mobile mounted force was needed. The nomadic tribes of both North Africa and the East were predominantly what we would term 'light cavalry'. Putting aside our uncertainty as to exactly how 'light' cavalry must be before it is termed so, what is important to note is that the Romans, so used to relying primarily upon their infantry forces (*ala* literally meaning a wing), was at a major disadvantage to a faster, more flexible enemy. While this was not unknown elsewhere (e.g., Viriathus used light cavalry against the Romans to great effect in Lusitania, Gallienus put together a cavalry army in the Alps against the Allamani)<sup>139</sup> it was a major feature of warfare in desert regions. The increased need for mobility may also be a response to the unrest of the late third and fourth centuries, in which the Empire was repeatedly beset by mobile groups on all of its borders (e.g., the Huns, the Allamani and various groups in the desert regions to be discussed in turn in chapter five).

In addition to the increased use of cavalry, we also see the innovation of camelry use in the Roman army. Evidence for the tactical use of camels by the Romans is uncertain. There is ample

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<sup>139</sup> Southern, P. and Dixon, K, *The Late Roman Army*. London, Routledge, 2000. p11.

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evidence for the existence of camelry units as part of *cohortes equitate*, *alae*, *turmae*, and/or *numeri* in papyri and the Dura sculptural friezes, but their exact use, apart from postal camels and bodyguards to the Arabian governor is unclear.<sup>140</sup> The incomplete nature of excavation and survey in desert environments does not allow for a great deal of speculation on those grounds apart from noting that there is a high degree of probability that camelry were present at the end points of various Egyptian communications routes.<sup>141</sup>

With regard to camelry in combat, we do have some information from literary sources. Appian's *Syrian Wars* 6.32 and Livy 37.40 both describe an Arabian contingent of camelry fighting with Antiochus against the Romans. We are told that they were archers who fought while mounted, and that they also had a long sword (*gladius* or μάχαιρα) for close quarters fighting. Livy also says that they were positioned in front of the cavalry. Adding to this Appian's listing this Arabian contingent with the light-armed forces, it strongly suggests that, at least in this battle, the camelry was being used as skirmishers. Because of the purported four cubit length of the sword from Livy, Dabrowa suggests that these were spears rather than swords. Whilst there is evidence for spear-bearing *dromedarii*, these are from artistic representation at Dura, so Palmyrene (or Palmyrene-influenced) forces. Those forces do show both sword and thrusting spear, and, as discussed below, are armed and armoured in a way which suggests an entirely different use than skirmish. These Arabian *dromedarii* are clearly intended to be light and fast and fighting preferably at distance, as

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<sup>140</sup> Libanius 109.3, OC 142 for post camels. *CIL III.93* reads:

M CAECILIO  
FVSCIANO CRE  
PeREIANO FiO  
RiANO LEG AVG  
PR Pr.ET M CAE  
CILIO RVFINO  
FILIO EIVS  
Eq SING  
EXERC ARAB  
ITEM DROM

<sup>141</sup> Sidebotham, S., et al., 'Survey of the Abu Sha'ar-Nile Road,' *AJA*, Vol. 95, No. 4 (Oct. 1991), pp. 571-622. cf. Sidebotham, S. et al., *The Red Land: The Illustrated Archaeology of Egypt's Eastern Desert*. Cairo, the American University in Cairo Press, 2008.

would be expected for archers, though if they got into a close quarters battle they would have a weapon to use, but it is a backup weapon in this context. To call it a thrusting spear seems unnecessary. I would instead suggest that Livy's figures were merely exaggerated, either intentionally or accidentally. Both *gladius* and μάχαιρα simply suggest a long straight knife which is shorter than a ξίφος but not curved like a *falcata*. This weapon would certainly be less likely to get in the way of a camelry archer, a long knife is a common tool of even the modern Bedouin,<sup>142</sup> and μάχαιρα is used of a long knife being utilised as a utensil as well as one used as a weapon. There is thus no reason to assume that a thrusting spear is meant.

Neither Livy nor Appian tell us about the armour used by this force. We thus have two options. Herodotus tells us that Arabian camelry fighting with the Persian army against the Greeks were armoured (and possibly armed) as their infantry archers; this means that they wore a long *zeira*, or a thick robe with a girdle.<sup>143</sup> This is in direct opposition to what can be seen at Dura-Europos, however, which has sculptural representation of a headless Palmyrene camelryman wearing a cuirass, what appear to be trousers, and either a knee-length boot or an ankle boot and greave. The rider has a quiver and what appears to be a small round shield; the top of the frieze is, however, lost.

Material remains from the Roman period at Dura agree with the artistic representation. Though it seems that camelry and cavalry equipment are indistinguishable-- indeed, James notes the similarity of equipment between Dura and sites at the west end of the Empire, suggesting a standardisation of equipment by the second century AD<sup>144</sup>-- the types of equipment seen on the friezes have been found. Many examples of the ankle boot or *calceus* have been found at Dura, as

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<sup>142</sup> I saw these knives when travelling in Jordan in 2005, and own a small one.

<sup>143</sup> Hdt. 7.69, 86.

<sup>144</sup> James, S., *Excavations at Dura Europos. Final report VII, Arms and Armour and Other Military Equipment*, British Museum, London, 2004, pp 251-254. If this is true, then perhaps we can see camelry armed and armoured elsewhere in the Empire in the same way as at Dura.

has a fragmentary copper greave.<sup>145</sup> Stephenson and Dixon reconstruct their *dromedarius* with ankle-high boots and only trousers over the rest of the leg;<sup>146</sup> I must disagree with this, however. The Dura frieze clearly shows that trousers were tucked into either a knee-high boot or that the figure is wearing greaves and an ankle-high boot. Given that greaves and ankle-high boots are found at Dura, and upon a camelrider's greater need for calf protection, as their mounts are taller than horses, thus the vulnerable area on a camel-rider's leg is lower than on a cavalryman, I believe the latter reconstruction to be more accurate.

Stephenson and Dixon have given the *dromedarius* a conical helmet, though the Ebenezer mural from Dura shows some cavalymen wearing what appears to be a cloth head covering, perhaps an arming cap. James believes that the conical helmet found at Dura in the collapsed undermining tunnel is Persian, not Roman/Dura-European. It should be noted that James does mention a decided lack of helmet finds, and, as discussed above, I find his explanation for their lack to be unconvincing. Because of these factors, I tend to support the mural representation, with perhaps one of the typical Roman helmets found on the site or a Palmyrene helm, as the incorporation of the name 'Palmyra' may refer to a style of armour and/or dress.

Why then, is there a difference in armour between the two represented groups? The answer is likely function. If we are correct in seeing the Arabian camelry contingents with both the Persians and Antiochus as functioning as light-armed skirmishers, then putting them in the heavier armour seen at Dura would be counter-productive. Dura *dromedarii* seemed to also have been armed with a thrusting spear and shield, in addition to a sword and bow. That suggests an expectation of both distance and close quarters fighting, and an expectation that these *dromedarii* would have to withstand a more sustained assault in one area, rather than rushing forward in a wave, firing a barrage of arrows and turning back. They seem to be armed and armoured for

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<sup>145</sup> James, S., *Excavations at Dura Europos. Final Report VII, Arms and Armour and Other Military Equipment*, British Museum, London, 2004, pp 59, 113.

<sup>146</sup> Stephenson, I and Dixon, K., *Roman Cavalry Equipment*, Tempus, Stroud, 2003, plate 10.

stronger defence and offence than the Arabian camelry. While I doubt seriously that camelry would ever be used as 'shock cavalry' for the reasons discussed at length in chapter one,<sup>147</sup> the increased armour does suggest to me that camelry are being put in a position where they would expect to be attacked. This could be because someone is attempting to disrupt lines of communication (e.g., the post camels discussed above) or because the camelry are operating in an area where they could be set upon by brigands. Whether this is because they are actively guarding something or simply patrolling an area is unclear.

The only study completely devoted to any ancient camelry force-- in this case, the *dromedarii*-- that I have been able to find is the article by Dabrowa discussed above which is slightly over 2 pages long.<sup>148</sup> This is a bare survey, and predates most of the work done by Sidebotham *et al* in Egypt as well as the publication of the Bu Njem ostraka, but there are some data to be mined.

To begin, Dabrowa notes quite aptly that there is very little extant data, but that we should potentially see *dromedarii* in many desert-based *cohortes equitatae*, even if we cannot prove it. This would seem a logical enough assumption. On more tenuous ground is his assumption that calling an *ala* the *ala Ulpia dromedariorum Palmyrenorum* means that the soldiers were necessarily all Palmyrene; if the *cohors XX Palmyrenorum* are anything to judge by, these men were all local Semites rather than Palmyrenes. It could simply mean that these *dromedarii* were armed and armoured in the Palmyrene manner, which he later describes, but this is a completely different kit from that of the Arabians fighting with the Persians and with Antiochus.

When discussing organisation and use, Dabrowa first poses the question of size, asking why the units were so small, despite so much of the Eastern and North African *limites* being on or near

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<sup>147</sup> e.g., the camel's vulnerable knees, lack of speed in comparison to horses, their strong herd instinct, and the reality that their scent is not necessarily off-putting enough to cavalry to make the horses break their training.

<sup>148</sup> Dabrowa, E., 'Dromedarii in the Roman Army: A Note,' *Roman Frontier Studies* Maxfield and Dobson (eds). University of Exeter Press, Exeter, 1989 pp 364-366.

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the desert. He admits a lack of evidence in North Africa and then relies upon a single quote from Vegetius which says that camels are ineffective on the battlefield to explain away the small number of *dromedarii*. Even ignoring the generally problematic nature of Vegetius, I find this argument unconvincing. Whilst I certainly do not contend that camelry was an effective replacement for traditional cavalry, or even a necessary or ideal contingent, small size does not necessarily denote ineffectiveness-- a short span of use might, but not small size. If anything, it argues for a highly specialised purpose, possibly being some type of 'elite squadron.' In Herodotus, Appian, and Livy, Arabian camelries were used as skirmishers; these would be a small group amongst other small national groups of light-armed peltasts, slingers, archers and others. I feel Dabrowa puts too much faith in Vegetius and in size, or at least does not offer enough evidence to support his claim.

When one examines the size of the camelry in regard to the rest of the mounted forces, the results are as follows. Mommsen's roster for the *cohors I Augusta Praetoria Lusitanorum* has 114 cavalry troops to 19 camelry, or about 17% of the mounted force, and 15-20 seems to have been a normal number of camelry in Egypt and North Africa. Heavier staffing (approximately 33-36 on the rosters) seems to have been the norm in the East, however, at least according to the papyrological evidence. At Dura-Europos, *PDur* 82 lists 34 *dromedarii* to 223 *equites* for both 27 and 28 March, ca. 223 AD, whilst *PDur* 89 lists 36 *dromedarii* to 233 *equites* for 27 and 28 May of 239 AD.<sup>149</sup> Thus, according to the papyri, *dromedarii* made up just over 15% of the mounted force at Dura. Therefore, despite there being a greater number of *dromedarii* stationed at Eastern bases, the percentages are very similar. Thus, we can therefore speculate as to the percentage of camelry in the different areas. The suppositions are as follows: that any *ala* or *cohors equitata* will be assumed to contain 15% camelry troops and that this percentage is stable throughout the desert regions and stayed constant though time. Therefore, in Africa, taking Mattingly's figures above,

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<sup>149</sup> Welles *et al* do have question marks near both of these figures, though they seem reasonably consistent with earlier troop strengths at Dura. Welles C.B., et al, *The Excavations at Dura-Europos: The Parchments and Papyri*, Yale University Press, New Haven, 1959, p. 285.

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camelry should make up about 7.5% of the overall force in the fifth century. For Egypt, between the Augustan period and AD179 camelry should have made up about 5% of the forces, increasing to 8.7% in the *Notitia Dignitatum*. For Arabia in the *Notitia Dignitatum* the camelry force should make up about 9%. For Pollard's figures in third century Syria the camelry percentage was 4.2%; from the *Notitia Dignitatum* it equals 10.4%. Finally, for Mesopotamia in the *Notitia Dignitatum* the percentage of camelry works out to 5.3%. This means that the camelry force was always small and likely had a specialised use, perhaps aiding or replacing light cavalry as scouts or in policing, along with their already-discussed logistical and communications uses.

This of course is all based upon paper strength. Examination of the material evidence, however, gives us a far different picture. Though exact numbers for horses are not listed, at Dal'janiya camel remains are the second-highest number of bones after sheep/goat. El-Lejjun, which had a minimum of 72 individual camels, had only a minimum number of 7 horses in the same strata. Qasr Bshr had a minimum of 2 horses to 6 camels, and Rujm Beni Yasser had 1 horse and 1 camel. At these eastern bases, on the basis of material remains alone, it seems as though there were more camels than horses.<sup>150</sup>

At the well-published site of Berenike, the excavators were more interested in looking at both camels and horses in the context of food sources than in a military context. That being said, from the Ptolemaic to Late Roman periods, camel bones vastly outnumber horses.<sup>151</sup> This could simply mean that horses were so valued that they were rarely eaten, or it could imply that there were more camels present.

The material and papyrological evidence would seem to be in direct conflict. Part of this conflict can be ameliorated by the reasonably safe assumption that the camel remains represent a

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<sup>150</sup> It is, of course, possible that horse remains simply have not been found.

<sup>151</sup> From 1995-1997, Sidebotham *et al* found 1 camel bone and no horse bones in the transitional phase between Ptolemaic and Early Roman periods; 180 camel bones to 14 horse bones in the Early Roman period, and 24 camel bones to 2 horse bones in the Late Roman period. Sidebotham, S. and Wendrich, W., *Berenike '95*, CNWS, Leiden, 1996, p. 339-347; Sidebotham, S. and Wendrich, W., *Berenike '96*, CNWS, Leiden, 1998, p. 364; Sidebotham, S. and Wendrich, W., *Berenike '97*, CNWS, Leiden, 1999, p. 346.

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long period of camelry use, and that the 72 camels at el-Lejjun represent two complete 'generations' of a camelry contingent (approximately 36 camels in the East, based upon the Dura example). As for why camel remains seem to vastly outnumber horse remains, we can only speculate without evidence.

Returning to Dabrowa, he goes on to list duties which he believes the *dromedarii* performed. They include caravan escort (obviously based upon the Palmyrene precedent) patrolling, scouting, communications, bodyguard duties for high-ranking officials, and other police functions. Whilst I do agree with this list in theory, he has only given evidence for bodyguards. Other documents, primary and secondary, do suggest these other functions, with the noted exception of caravan escort. Dabrowa simply assumes that at least the *cohors XX Palmyrenorum dromedarium* continued the Palmyrene practice of the military escorts for caravans. The incorporation of the Palmyrene ethnicity into the unit name (even though the troops do not appear to be Palmyrene) can be interpreted as not only reflecting the origin but function of the unit, and the *numerus* appellation seen in the Dura papyri can further be seen as expressing that this irregular unit had a speciality outside the norm (e.g., *frumentarii* were also called *numeri*). It could also be the case, however, that the unit name refers to their style of arms and armaments.

Apart from historical precedent, there is no direct evidence that states that any *dromedarii* were escorting caravans. They do escort people, as stated above, and given that at least two routes in Egypt (Abu Sha'ar-Qena, including *Mons Claudianus*, and Berenike-Qus) have camelry bases at their termini and even along the road (Abu Sha'ar-Qena), there may have been a military escort for State caravans, but civilian caravans are not explicitly mentioned anywhere as being guarded by the military. *P.Vindob G 40822*, for example, is a contract between two civilian merchants transporting goods from India. It states: '...διά του ὄρους μετά παραφυλακης καί ἀσφαλείας [εἰς τὰ]ς

ἐπί Κοπτοῦ...' but there is no indication that this security is being provided by the Roman military.<sup>152</sup> The possibility of camelry providing security as part of a police force will be discussed in chapter five.<sup>153</sup>

As to the organisation of the camelry forces themselves, there is not a great deal of clear evidence for how the *dromedarii/camellarii* fit into the greater Roman army. We have several instances, where an *ala* is given a *dromedarium* (or variant thereof) suffix. We do not have any evidence as to their exact numbers or use, however, simply where they were stationed. No *cohortes* are given that suffix,<sup>154</sup> but in both Dura papyri (*PDur 82*) and Bu Njem ostraka (*OBN3-OBN8*, *OBN10*), *dromedarii* are listed as part of *numeri*. This, unfortunately, is not particularly helpful as the term *numerus* is itself unclear. Whilst it can simply mean a (usually) non-Roman unit which is 'irregular,' e.g., not a *legio*, *cohors*, or *ala* but lower in rank than all three, it can also, especially in the plural, be used when referring to several types of units.<sup>155</sup> As if this were not enough, these *numeri* can also be completely dissimilar from each other, even if they are contemporary.<sup>156</sup> Southern suggests that each should only be discussed upon its own merits, rather than trying to determine a 'blanket' definition of the term.<sup>157</sup> Laudable an idea as this is, it does not help us understand the *dromedarii numeri*. We must therefore accept that a full understanding is beyond the extant concrete evidence.

In addition to the increase in cavalry generally and the incorporation of camelry, we also see a preponderance of indigenous archer units in the East; this may be related to the strong native

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<sup>152</sup> Casson, L., 'P.Vindob G 40822 and the Shipping of Goods From India,' *Bulletin of the American Society of Papyrologists*, Vol. 23, Issue: 3-4, 1986, pp. 73-79.

<sup>153</sup> Adams, C. *Land Transport in Roman Egypt*. Oxford, OUP, 2007, p214 points out that civilians were involved in both military and civilian supply transport.

<sup>154</sup> Though, if Dabrowa, Shahid and Isaac are correct and *dromedarii* are part of some *cohortes equitantes* and are just not mentioned, then there may be some other unknown reason why certain groups get the *dromedarium* suffix and some do not.

<sup>155</sup> e.g., Tac. *Agricola*, 18.2, *Hist* 1.6.2, both referring to more than one type of unit in an area.

<sup>156</sup> The function of *numeri* also change over time; by the second century they do much the same work as the *auxilia*. LeBohec, Y., *The Imperial Roman Army*, BT Batsford, London, 1994, p. 28.

<sup>157</sup> Southern, P. 'The Numeri of the Roman Imperial Army,' *Britannia*, Vol. 20, (1989), pp. 81-140.

archery tradition as well as supporting the increased need for mobility suggested by the preponderance of cavalry. With regard to Roman innovation, Livy 30.11 says that Massinissa learnt about the organisation of an army into *cohortes* from the Romans, whilst Sallust 2 explains that Jugurtha learnt his lessons in warfare from Scipio in the Numantine war. Herodian 3.4 says that the Mesopotamians learnt the creation of Roman-style arms and armaments from those Roman veterans who settled in the region. But perhaps most interesting is what the Romans learnt, according to Procopius I.1.11 and 15. He states:

'Apart from this, they were indifferent to the skill [of archery] such that they were drawing the bowstring to their own chest; accordingly, the missiles sent away were naturally dainty to those receiving them within.<sup>158</sup> Thus was, it seems (or it is seen) the archery of the past...they [now] draw the bowstring toward the forehead/face, nearly even to the right ear, therefore the missile, having been impelled with strength, so as to kill any who stand in the way; neither shield nor cuirass able to hold off its force.'

What is most notable about this statement is that the 'modern' archers' draw is completely different from the typical Mediterranean, which was to the chest. Drawing to the ear is a typically Near Eastern style of archery, as seen in Assyrian friezes from Khorsabad as well as images of Parthian horse archers.<sup>159</sup> The eastern method is not only more powerful, but also requires a different type of bow, which is shorter and thus easier to use whilst mounted. It may also be the case that the dryness of the environment caused the wooden Mediterranean bows to crack.<sup>160</sup>

These are the main differences in tactical use and organisation in the desert. With regard to tactical operations, as Mattingly points out, warfare in North Africa is mostly desert campaigning, sieges and guerrilla warfare rather than pitched battles.<sup>161</sup> This seems to be the case throughout our

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<sup>158</sup> i.e., the arrows were weak and did not penetrate.

<sup>159</sup> Khorsabad frieze image available at <http://www.superstock.com/stock-photos-images/2102-449>; original located in the Iraq National Museum. Parthian horse archer from Palazzo Madama in Turin: [http://sites.google.com/site/persanpersia/\\_/rsrc/1267594545447/Parthianhorseman.PalazzoMadamaTurinI-custom-size-255-279.jpg](http://sites.google.com/site/persanpersia/_/rsrc/1267594545447/Parthianhorseman.PalazzoMadamaTurinI-custom-size-255-279.jpg). Both accessed 28/9/10. See also Rostovzeff, M., 'The Parthian Shot,' *AJA*, Vol. 47, No. 2 (Apr. - Jun., 1943), pp. 174-187.

<sup>160</sup> Constant use under arid conditions is attributed to breakage of bowstrings by Dio 40.24.1. See also Miller, R. et al., 'Experimental Approaches to Ancient Near Eastern Archery,' *World Archaeology*, Vol. 18, No. 2, Weaponry and Warfare (Oct., 1986), pp. 178-195.

<sup>161</sup> Mattingly D. *Tripolitania*. London, BT Batsford Press, 1995, pp-69-70.

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period for most of the East as well, but there are a few points to discuss. To begin, I shall briefly summarise the 'typical' Roman battle order for the Empire. There were, as Gilliver points out, two possibilities: either legionary infantry was flanked by auxiliary infantry with auxiliary cavalry on the wings or the auxiliary infantry acted as the principle strike force with the legions held in reserve.<sup>162</sup> The Romans do not seem to have developed any standard tactics for coping with heat, dust, sand or aridity whilst in battle; though they would adapt somewhat to terrain, that is something they would do no matter what the environment. They seemed more to adapt to the differing styles of their enemies, with occasional incorporation or innovation.

That being said, there are a few obvious areas of investigation. The organisational innovations and changes to the overall region are discussed above, but there are a few noteworthy items that would affect pitched battles.

Terrain in any environment would be something to which the army would be required to adapt. In the desert, however, because of the difficulties posed by deep sand, rocks, and the variability of landmarks and water sources, areas for engagement would be quite limited and would have to be chosen quite carefully.<sup>163</sup> Perhaps more important than this, however, is the lack of advance information which seems to characterise many battles, especially the direct aftermaths. While this will be discussed more thoroughly in chapters three and five on pre-campaign planning and small force tactics respectively, driving a fleeing enemy into containment and/or into an area without sufficient water or food sources was common. This is not exclusive to Rome; for example in the Mercenary War, the Carthaginians drove a mercenary force into a box canyon where they starved. Examining satellite photos and maps of the area reveal that, at least in modern times, the walls of the canyon are quite steep; if this was the case in ancient times then the mercenaries would have been unlikely to have been able to scale the sides. Because the only major permanent water

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<sup>162</sup> Gilliver, C. *The Art of War*. Tempus, Stroud, 1999, p106.

<sup>163</sup> e.g., Sallust, *BJ*, 50, 57.3

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source in the area, a river, would have been behind the Carthaginians, even if they had been able to climb out then they would not have necessarily been any better off than if they had remained.

Additionally, the Romans would alter their tactics to exploit specific weaknesses in their desert-borne enemies' styles of warfare. The Numidians tended to assault and retreat in waves, which the Romans countered by not allowing them any respite in which to do so.<sup>164</sup> The 'Parthian shot,' however, in which the Parthians would feign flight then assault with mounted archers firing behind them, gave the Romans no end of grief. As most of these adaptations fall under the aegis of small force tactics, they will be discussed in Chapter five.

As can be seen from the above, the Romans did make certain alterations to their tactics based upon the desert environment and the particular enemies they faced, with the most obvious being the development and incorporation of camelry units into the army. That being said, apart from making certain that their terrain was suitable, in general they seemed to react to the tactics of those they faced, rather than developing anything new.<sup>165</sup>

### **Part III. Siege:**

The typical Roman siege, insofar as any operation can be termed 'typical,' begins with the city being surrounded with garrisons or siege camps to control the immediate territory, something often called setting up 'siege lines'. An circumvallation wall (sometimes two in parallel (e.g. Alesia, Cremna) would prevent the besieged from exiting the city; if there were two in parallel then the inner wall prevented egress and the outer prevented external access to the city. An embankment wall would then be placed wherever the terrain allowed for siege towers, allowing the Romans to 'hold the high ground', as it were, and this held siege artillery and battering rams.<sup>166</sup>

Because of the lack of available resources in the desert, cities tended to be built on or very

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<sup>164</sup> Appian, *Spanish Wars* 27, Sallust *BJ* 74.9.

<sup>165</sup> Part of this may have been a lack of training; for example, the Gauls at Amida were unsuited for anything apart from open-field battle. Amm Marc. 19.5.2.

<sup>166</sup> Campbell, D. *Siege Warfare in the Roman World 146 BC-AD378*, Oxford, Osprey, 2005, pp 50-56.

near water sources and major communications arteries. Therefore, major cities were frequently besieged multiple times, either going back and forth between Rome and another polity (e.g., Cirta and Amida) or being forced to fend off repeated assaults from one side or the other (e.g., Ktesiphon, Hatra). Thus the long history of siege warfare in Mesopotamia, as well as the desert conditions, led to the development of the double or multiple city wall, sally ports, and the other familiar features of such fortifications.

Looking more specifically at particular sites, the city of Hatra is unusual for several reasons. Not only was it a semi-autonomous kingdom, but it was also the site of three separate failed Roman sieges, one by Trajan and two by Severus. There were several unusual factors in these sieges. First of all, the city is situated in high desert, away from rivers, but it controls one of the major trade routes. This means that any besieging force will have to bring in supplies, and will not be able to supplement locally. The flat desert plain would also allow for wind-borne dust and sand to exacerbate thirst and irritate the mucous membranes, all of which are reported by the sources.<sup>167</sup> Dio also reports that Trajan's forces suffered from severe thunderstorms; this was a common problem in the desert.<sup>168</sup>

Later, in Dio 76, we are told more about Severus' two attempted sieges of Hatra. The first is given only a sentence; he lost many men, his siege engines were burnt, and he 'accomplished nothing' (ἐπέρρανε δ' οὐδέν).<sup>169</sup> His second attempt, however, is discussed in more detail. Owing to the dearth of local resources, Severus put together a large supply of food and built new siege engines. Unfortunately, he did not count on two things; first, assaults on his foragers, which will be discussed more in the chapter on asymmetrical warfare, and the Middle Eastern incendiary *par excellence*, naphtha. Also used against Lucullus in his failed siege of Tigranocerta,<sup>170</sup> this petroleum

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<sup>167</sup> See Hdn 3.9.6 for Hatra specifically; others will be discussed below.

<sup>168</sup> cf. Amm. Marc. 24.1.11.

<sup>169</sup> Dio 76.10.1.

<sup>170</sup> Dio 36.1B. Pliny, however, says it was *maltha*. NH II.CVIII.235. A mixture of bitumen, pitch and sulphur was used as an accelerant on firebrands at Jotapata. Josephus, BJ 3.20; see also below.

derivative was used to burn both flesh and wooden siege engines.

Pliny the Elder discusses both naphtha and a related substance, maltha, in his *Naturalis*

*Historia*. He says:

'In the Commogene city Samosata, is a marsh emitting flammable mud they call maltha. When it touches a solid, it adheres; after having been touched it follows those fleeing. Thus they defended the walls attacked by Lucullus; the soldiers were burnt by their own arms. Water increases the burning; experiments have taught that earth/soil extinguishes the fire.

'Naphtha is similar in nature, as is called a substance which flows like liquid bitumen near Babylon and in Astacen Parthia. It has a strong natural relationship (*cognatio*) to fire, and immediately leaps across to it from all directions, having been seen. Thus by Medea the rival/concubine (*paelex*) was made burnt, after having ascended to the altar to make sacrifice, her crown was seized by fire.'

(*NH* II.CVIII.235).

From these accounts, we can assume the naphtha and its related substances were used much in the same way as modern napalm, though the Romans do not appear to have used it directly against their enemies. Whether this is based upon a lack of access to it or an inability to develop or adapt a delivery system is unclear. There is too little information on the substance in Roman texts to be certain.

Naphtha and related substances were particularly efficient as they did not require any fuel to start it burning (i.e., those who used it as a weapon did not lose any of their fuel supplies in kindling a flaming arrow or other more traditional fire source), and also was very difficult for those struck by it to remove. Though it is difficult to determine exactly how hot naphtha would become-- the exact composition is unknown, and even now varies in its modern derivative of napalm-- the strong adherence to skin especially would create serious to severe burns. This is especially problematic in the ancient world, as burnt areas are prime breeding grounds for infection, something which was a problem for both besiegers and besieged even when incendiaries were not involved. It seems that the Romans were unable to counter this weapon.

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Herodian's discussion of Severus' sieges is somewhat different. For one, he makes no mention of the earlier siege; more important, however, is the cause to which he attributes the failure of the second attempt. When discussing Trajan's siege, Dio reports that flies would descend any time Trajan's troops would eat or drink; anyone who has spent time in a desert is familiar with this phenomenon. Herodian, however, attributes the defeat of the Romans to the use of insect life as a weapon.

'Having made a vessel (σκευή) of ceramic, they were filled with small flying things (πτηνῶν), stinging and poisonous,<sup>171</sup> thrown onto the Severan forces by the Hatrenes. These having fallen into the eyes and if onto a certain part of the body which was exposed, escaping their notice, going within and they were severely wounded.'<sup>172</sup>

Whittaker has stated that the term πτηνός must be some form of metaphor for arrows fired by a *ballista*. That is certainly possible, but I believe there is good reason to take Herodian at his word. First of all, the term θηρίον is associated with bees in Theocritus, and both it and ἰοβόλος are associated with poisonous stinging or biting animals. In addition, these clay pots may well have been beehives; ancient hives found in Israel would seem to fit the description.<sup>173</sup> Once hurled at the soldiers and broken, the bees would be released and swarm. That they would aim for the eyes or any unprotected surface also suggests angry bees; they are attracted by exhaled carbon dioxide which is why the face is a common target. Bees also range in size from 40 mm to 2 mm, so Herodian's assertion that the insects would not have been noticed right away is not impossible.<sup>174</sup> Alternately, these could have been biting sandflies, which would match Dio's description of the fly infestation; however, again, many sorts of flies are present in the desert.<sup>175</sup> The one factor which

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<sup>171</sup> I disagree with the Loeb's punctuation of the Greek, which has a comma between πτηνῶν and μικρῶν, as the two terms clearly go together.

<sup>172</sup> Hdn. 3.9.5.

<sup>173</sup> See Sanchez, M.J., 'Archaeologists Discover Beehives from Ancient Israel', *Christian Science Monitor*, [online] [http://www.csmonitor.com/Science/2010/0609/Archaeologists-discover-beehives-from-ancient-Israel?utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+feeds%2Fesm+%28Christian+Science+Monitor+%7C+All+Stories%29](http://www.csmonitor.com/Science/2010/0609/Archaeologists-discover-beehives-from-ancient-Israel?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+feeds%2Fesm+%28Christian+Science+Monitor+%7C+All+Stories%29). 09/06/10.

<sup>174</sup> Arizona-Sonoma Desert Museum, [http://www.desertmuseum.org/books/nhsd\\_bees.php](http://www.desertmuseum.org/books/nhsd_bees.php), [online] accessed 11/06/09.

<sup>175</sup> cf. Amm. Marc. 24.8.3, which points out that anywhere hot and dry is infested with flies and gnats.

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could be seen to suggest sandflies is the point made by Herodian about illness in the camp, as sandflies are carriers of leishmaniasis,<sup>176</sup> but there is no description given of the illness afflicting the soldiers which can be used to diagnose a particular disease and, as will be discussed below, illness during desert operations is common. A final possibility is that this term refers to scorpions, as they would be easier to place into a vessel than a flying insect.

Fire and other incendiaries that the Romans would have had to hand would have been of limited use apart from as an anti-personnel weapon. This is to do with the construction techniques of the region, as exemplified both by archaeology,<sup>177</sup> and Ps Caesar's *Alex* 1.1, wherein it is stated that the buildings have no timber and thus will not burn. As deserts are by definition timber-poor, most construction in the East and North Africa would be predominantly of stone and sometimes mudbrick construction. Mudbrick, experimental archaeology has shown, will become vitreous at high temperatures,<sup>178</sup> but even this amount of 'melting' would not cause major structural damage over a large enough area to be useful.<sup>179</sup> Apollodorus, when discussing the destruction of brick walls, suggests drilling a hole through the superstructure and inserting the flame within; this may be a reference to a common Near Eastern building technique. In order to give mudbrick structures flexibility in the case of earthquakes, timbers are inserted within the wall;<sup>180</sup> burning them could theoretically cause a weakened wall to collapse, or could at least give access to the inner surface of the wall, thus affording sappers cover and less material to have to undermine.<sup>181</sup>

As for other incendiaries, at Bezabde, wicker baskets full of pitch were set alight and thrown down upon the Persians to devastating effect,<sup>182</sup> in addition to the usual firebrands which would be used as at other places outside the desert; when the Romans attempted to retake Bezabde under

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<sup>176</sup> Centre for Disease Control, 'Leishmaniasis Fact Sheet,' [http://www.cdc.gov/ncidod/dpd/parasites/leishmania/factsht\\_leishmania.htm](http://www.cdc.gov/ncidod/dpd/parasites/leishmania/factsht_leishmania.htm), [online] Accessed 3/8/09.

<sup>177</sup> e.g., the fact that desert fortifications are drawn from local, inert materials such as mudbrick and stone.

<sup>178</sup> Alalakh/Tell Atchana Excavation, <http://www.alalakh.org/burnthehousewdown.asp> [online] accessed 03/08/09.

<sup>179</sup> The effects of naphtha upon mudbrick are unknown.

<sup>180</sup> These timbers could also act as shock absorbers against direct battering by a siege engine.

<sup>181</sup> Apollodorus 152.

<sup>182</sup> Amm. Marc. 20.7.10.

Constantius the Persians used iron urns for drawing lots that were filled with combustibles (*sitellasque fereras onustas ignibus*), clearly another example of improvisational use.<sup>183</sup> At Ktesiphon, the Romans were attacked with various types of flammable objects, though specifics are not given.<sup>184</sup> The other major incendiary, however, was boiling or burning oil. Josephus implies that he invented this use, but there is no evidence for this; his work is the earliest Classical reference to it, however. Oil was used at Jotapata and was poured or splashed directly from vessels onto Roman soldiers; it was likewise referenced by Apollodorus of Damascus in his treatise on siege weapons.<sup>185</sup> The term used in all of these is 'ἐλάα' which, though commonly translated as 'olive oil',<sup>186</sup> should most likely be understood here as meaning any sort of oil.

For all incendiaries, Apollodorus suggests building what is essentially a series of channels that would catch the liquids and carry them away from the equipment and personnel.<sup>187</sup> Simply having a source of water available to fight fires would, of course, be problematic in a desert, even without the resistance to quenching of naphtha and related substances. This is not only because of the scarcity of water in such areas but also because of the high rate of evaporation of free water. This would be ameliorated if the water were stored in closed tanks, of course, and, unlike for people or animals, saltwater would do as well as fresh, but other options that did not reduce available water supplies for the troops and animals would logically be desired.

What is interesting about these reports is that the Romans did not seem to use incendiaries of any kind when besieging, apart from after a wall had been penetrated, as discussed above, or in undermining which will be discussed below. This supports the statement about Alexandria being essentially inflammable, but raises the question of why the Romans did not attempt to use either naphtha or oil as an anti-personnel weapon. They were aware of at least maltha and naphtha,

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<sup>183</sup> Amm. Marc. 20.11.16.

<sup>184</sup> Amm. Marc. 24.6.2.

<sup>185</sup> Jos *BJ* 3.28-29, Apollodorus 183-185.

<sup>186</sup> As in the case of the Loeb translations of Josephus and Procopius.

<sup>187</sup> Apollodorus 174, 183-185.

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according to Pliny, but did not seem to use their artillery to send ceramic vessels filled with these substances against those upon the walls. The only explanation that seems possible is a lack of access to the substances, even when in the particular regions whence it came.

Even the traditional λιθοβόλοι would have their problems in the desert. At Jotapata, Josephus records that the Judeans used hanging sacks to push away the siege equipment.<sup>188</sup> This has antecedents in Assyrian warfare, which was heavily focused upon siege, as can be seen in the friezes of the siege of Lachish, amongst many other examples. More than this, however, is the problem of using local desert stones. At Jerusalem, they were white-- mature sandstones often are white or otherwise light-coloured-- and this allowed them to be easily seen in flight by the Judeans on the walls. In order to prevent this, the Romans ultimately blackened them to render them more effective.<sup>189</sup>

What is striking, however, is that the Romans do not seem to have changed their approaches overmuch from the 'typical' procedures discussed at the beginning of this section. They did not develop incendiaries for offensive use, merely creating a series of devices for defending the siege machinery. Though the concept of the Romans as being only able to copy and improve rather than innovate is an old, mostly-disproved bias, they do seem to have relied upon their traditional methods, perhaps deciding not to fix what was more or less unbroken.

#### **Part IV. Effects of Climate:**

Now that we have examined the adaptations (or lack thereof) of the army to the environment, let us now turn to the effects of the environment upon the soldiers themselves. Once the army arrived into a new environment they suffered a great deal from endemic diseases, dietary changes, unfamiliar flora and fauna, heat and aridity. This was especially the case during and in the immediate aftermath of engagement. The various diseases associated with close quarters and/or

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<sup>188</sup> Jos, *BJ*, 3.20.

<sup>189</sup> Jos, *BJ*, 5.273. White gypsum catapult stones have been found in Egypt. Sidebotham, S. et al., *The Red Land: The Illustrated Archaeology of Egypt's Eastern Desert*. Cairo, the American University in Cairo Press, 2008, p 56.

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with the presence of decomposing bodies (e.g., typhus, cholera, and related conditions) were not only present in desert sieges but frequently exacerbated by them. A generally lower carrying capacity of the region meant that the margin between surplus, shortage and famine was small under normal circumstances; with the added press of refugees and a strangulation of local intake, if not a full blockade, then a city would quickly succumb to starvation. In the desert, not only would water and its lack be felt sooner, but the heat would increase the metabolism of anyone in this situation.<sup>190</sup> They would need more food and water exactly when it was least available. The high stress on the metabolism, plus the lack of replenishment, means that the immune system would begin to be affected. Thus, those caught in these situations, both besiegers and besieged, would be more susceptible to any infection. Dust, which will be discussed more below, would also cause a higher mucous production, which would thus increase the likelihood and severity of upper respiratory infections.

Though the arid conditions would dry out bodies, this would not prevent decomposition, and the high porosity of sand would allow for disease-bearing fluids to reach any near-surface groundwater. Additionally, sheet and flash floods would have locally saturated the ground quite quickly, and any water that was not lost to evaporation could easily have become a breeding ground for mosquitoes and other insect life, as well as introducing any surface contaminants into the groundwater supply.

Apart from this are several instances of 'non-specific' illness, where we are frequently told that a large number of troops died or were incapacitated due to illness and/or the air or other climatological factors. This seems to reflect the Graeco-Roman inability to differentiate between hyperthermia caused by an immune response to illness (i.e., fever) and hyperthermia caused by physical exertion in a hot environment (i.e., heat exhaustion and/or heatstroke).

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<sup>190</sup> As would stress. The heat would increase due to overpopulation as well, though for temperatures over 38C the body would become a heat sink and environmental influence would stress the body more.

'Fever comes from these things-- whenever bile or phlegm are heated, all the rest of the body is heated from this, this is called fever. Both bile and phlegm is heated from within by either food and drink, from which it is nourished and grow, or from without, by toil and wounds, or from heat making them overly hot, and cold making them overly cold; they are also made feverish by seeing and hearing, but the least by these.'<sup>191</sup>

This confusion is unsurprising as heat exhaustion and fever associated with influenza or a like ailment have similar symptoms. Both feature headache and cognitive impairment that grows steadily worse as the hyperthermia worsens, both feature profuse sweating (diaphoresis), tachycardia, tachypnea, anorexia, dehydration, and can lead to coma and/or death, though the mechanism of action is an infection going systemic or to the central nervous system in the case of fever and severe hypertension leading to a cerebrovascular accident (CVA, or 'stroking out') in the case of heatstroke.

Galen gives a prime example of this problem in differentiation. In his discussion of fevers, he refers to two different treatment courses for fevers, one of which presupposes an illness, and the other of which suggests exertion in a hot environment.<sup>192</sup> Galen warns that a misdiagnosis would lead to the patient becoming worse. Also, as many of the treatments involve the provision of bathing, a particular diet, or both, the lack of resources that are a feature of the desert, especially when operating in hostile territory, would limit the already limited ability of the medical staff to treat hyperthermia of either type.

The level of devastation of the Roman forces due to a combination of famine and illness, whether an infection or exposure, seems to have been immense. Ammianus discusses the exhaustion of men due to heat in 24.6 and again in 25.1; the plague of Amida is made worse by the heat (19.4). Herodian says that more men were lost at Severus' second siege of Hatra than in battle, though Dio attributes the losses to a combination of naphtha, poor decision-making by Severus,

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<sup>191</sup> Hippocrates, Πέρι Νούσων 1.23.

<sup>192</sup> Galen, *De Methodo Medendi*, 10 *passim*. Ammianus also says that those in hot environments are afflicted with fevers. 19.4.

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poor-quality Syrian troops and recalcitrant European forces as discussed above. Antony also lost more men from climate than in a battle, almost half of his complement as Plutarch tells us.<sup>193</sup> But perhaps the most obvious case is in Procopius, where one-third of the Roman army suffers from incapacitating heat exhaustion during the Mesopotamian summer.<sup>194</sup> Though casualty estimates of ancient battles vary widely, one-third would certainly be considered a severe loss.

The effects of differing plant and animal life in desert regions were just as much a hazard as the microflora discussed above. Though one does think of deserts as being sparsely populated, they have a strongly varied ecology. Sandflies and other insects as vectors of infection and/or weapons have been discussed elsewhere, as have venomous reptiles. Mesopotamia was infested with lions, according to Ammianus 18.7.5, and Antony's troops also ran into poisonous herbs and unpotable water in the East, again based upon a lack of familiarity with the area.<sup>195</sup>

In several instances, the effect of enforced dietary changes, especially during a siege, were damaging to the Romans. As discussed in the earlier chapter on campaign preparations, scurvy occurred in the troops on Trajan's campaign to Arabia Felix, and likely would have occurred in other desert areas as well.<sup>196</sup>

Visibility problems due to dust and haze would have been a significant problem in any desert operations. The most obvious example of this being a problem for communications is in Asklepiodotus II.9, where he says that the horn-player he lists amongst his supernumeraries was

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<sup>193</sup> Plutarch, *Ant*, 50.1.

<sup>194</sup> Procopius, *History of the Wars*, 2.19. By comparison, smallpox kills approximately one-third of all those infected, so this can perhaps be best seen in the context of a plague. Whilst this story is beyond the temporal terms of the study, I believe that it is certainly applicable to earlier incidents as there was no comparable change or innovation gained or lost which would have had so great an effect.

<sup>195</sup> Plutarch, *Ant*, 45.5, 47.3. See also chapters three and five.

<sup>196</sup> This is supported by the oft-mentioned comment about African 'barbarians' who ate raw meat and undiluted milk. See Mattingly, D., (ed). *The Archaeology of the Fezzan, Vol 1: Synthesis*. The Department of Antiquities, Tripoli, 2003, pp. 76-79; Shaw, B.D., 'Fear and Loathing: the Nomad Menace and Roman Africa,' *Rulers, Nomads and Christians in Roman North Africa*, Ashgate, Aldershot, 1995, pp.25-46 for a full list of instances. Raw meat is one way to cure scurvy in the absence of citrus fruits. Rajakumar, K., MD, 'Infantile Scurvy: A Historical Perspective,' *Pediatrics*, Vol. 108(4), Oct 2001, pp. 76-81; Dutcher, R.A., 'Vitamine Studies: V. The Antiscorbutic Properties of Raw Beef,' *Journal of Biological Chemistry*, Vol XLII.2, 1920, pp. 301-311. The undiluted milk would also have a higher amount of protein, fat, and, if camel's milk, salt, than diluted counterparts. Thus, though the references to these practices are likely an expression of 'Otherness,' they may well be based in fact.

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there in case signals could not be seen due to dust.<sup>197</sup> To give an idea as to the visibility problems in sandstorms, the late February 2009 sandstorm in the UAE reported a 1 km visibility in Dubai, and .4 km in Abu Dhabi and Jebel Ali.<sup>198</sup> A mid-May sandstorm in 2001 brought visibility down to .5 km throughout most of Egypt.<sup>199</sup> The mid-March 2009 sandstorm in Saudi Arabia and Kuwait brought visibility down to zero and Shaanxi Province in China frequently sees sandstorms with visibilities of between .5 and .2 km.<sup>200</sup> Thus dust and sand can clearly be a severe problem for any sort of visual-based operation.

First of all, as discussed extensively elsewhere, there is frequently a great deal of sand and dust kicked up into the air and carried on the winds. This would have the effect of drying out the mucous membranes of the eyes, nose, mouth and throat, as well as being inhaled into the lungs. The dry membranes means that the voice would crack and/or become hoarse, limiting its range and the speaker's ability to utilise the voice at all. If sand got directly into the eyes, then the tearing caused in the eyes would impact the ability to see but would also cause mucous production to increase as the moisture would be carried into the nasolacrimal ducts into the nose, some of which would also become postnasal drip and find its way into the throat, further irritating the membranes.<sup>201</sup> Inhalation of sand or dust would cause the airways to become inflamed and reduce

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<sup>197</sup> See also, *inter alia*, Curtius 4.15.32, for a dust cloud at Gaugamela, 5.13.11, where Bessus' men were hidden in a dust cloud, 7.4.26 and 7.5.4 for problems with dust and haze in Bactria, Diodorus 17.61, where Darius conceals his troops in dust, 19.42, where Antigonus hid an assault on enemy baggage in dust, Polybius 5.58.1 where dust precipitated a charge, Ammianus 24.8.5-6, where Persians lying in wait are discovered due the dust they kick up, Ammianus 25.3.10, dust and heat hindered soldiers, Dio 40.23.4 where heat, thirst and dust cause the Romans problems in battle, Caesar *African Wars*. 52, where dust interrupted battle, Sallust 54, where dust gives away the advancing Iugurthine forces.

<sup>198</sup> Scott, K., 'Sandstorm Reduces Visibility as Strong Winds Buffet UAE,' *Gulf News* [online] <http://archive.gulfnews.com/nation/Environment/10290223.html> 28/02/09. Accessed 11/04/09.

<sup>199</sup> 'Heavy Sandstorm Engulfs Egypt,' *IOL: News for South Africa and the World* [online] [http://www.iol.co.za/index.php?set\\_id=1&click\\_id=68&art\\_id=qw989759820496B221](http://www.iol.co.za/index.php?set_id=1&click_id=68&art_id=qw989759820496B221) 13/05/01. Accessed 11/04/09.

<sup>200</sup> Associated Press, 'Blinding Sandstorm Hits Saudi Arabia, Disrupting Flights, Oil Exports,' *New York Daily News*, [online] [http://www.nydailynews.com/news/us\\_world/2009/03/10/2009-03-10\\_blinding\\_sandstorm\\_hits\\_saudi\\_arabia\\_dis-2.html](http://www.nydailynews.com/news/us_world/2009/03/10/2009-03-10_blinding_sandstorm_hits_saudi_arabia_dis-2.html) 10/03/09. Accessed 11/04/09. Lei, X. J. et al., 'Analysis of Climate Characteristics of Heavy and Severe Sandstorms in Shaanxi Province,' *Journal of Desert Research*, Vol 25, No 1, Jan. 2005 pp. 118-122.

<sup>201</sup> If this happened for a sustained period, then the excess mucous would also be a breeding ground for respiratory infections, much as with modern China.

the amount of oxygen available and the expansion of the lungs, thus reducing the ability of the speaker to project his voice.<sup>202</sup> The strong, sediment-filled winds would also interfere with sound transmission, both by the winds' own noise and the wind disrupting sound waves.

The hot and arid environment, so unfamiliar to incoming Westerners, had a profound effect upon the Romans. Literary sources discuss the great number of soldiers who were killed or suffered debilitating effects from temperature, thirst, dust, unfamiliar flora, fauna and microflora. In most of these instances, however, there seemed little that the Romans could do in regard to their tactical operations to ameliorate the problems save allowing troops to acclimatise as best they could.

#### **Part V. Conclusions:**

What seems clear from the evidence is that, though they would ensure that anywhere they fought a pitched battle would be suitable for their forces just as they would in other places, the Romans did not adapt to the desert environment. Instead, they would adapt to the tactics of the particular enemies they faced, which forced them to react, rather than act.

Everywhere in North Africa and the East we see a dramatic increase in cavalry after the third century AD, though this is not exclusive to the desert. We also see the incorporation of camelry and archers, two unit types that are desert-specific. The camelry units are very small, totalling between 5 and 10% of the total forces of a given area and 15-17% of a given cavalry unit. Their tactical use is unclear at best. The other major difference in the East is the use of naphtha and related incendiaries by the Eastern forces. The Romans developed defences against these, but either did not have access or did not desire to use them. At Hatra, too, what seem to have been vessels full of insects, possibly beehives, were used as missiles. The Romans themselves do not seem to have developed new offensive machinery, though Apollodorus does suggest additions and adaptations to existing engines in order to compensate for assaults from the walls. In short, though the

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<sup>202</sup> This could be either a chronic condition that grows progressively worse, or an acute condition brought on by a sudden, great intake of sand or dust, as in a storm.

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organisation and composition of the forces was becoming more tactically mobile, there were only the above adaptations made.

Chapter Five

Low Intensity: Guerrilla Warfare and Policing

**Part I. Introduction:**

Because of the dearth of resources available to those indigenous inhabitants of desert areas, a nomadic existence was required in order to avoid overwhelming the carrying capacity of any given area. Whilst this restriction did cause nucleation around certain resource-bearing areas, usually water sources, it also inhibited large-scale settlements in many areas. This lack in many instances prevented the traditional city-state or kingdom, and its associated large armies, instead producing small, mobile, scattered 'tribes' which participated in such small-scale military activity as raiding. In times of rebellion, these activities turned into full-fledged campaigns. There were several major campaigns of this sort which took place in each of the areas under consideration; the revolts of Jugurtha, Tacfarinas and Firmus in North Africa, Zenobia and Mavia in the East, along with frequent revolts in Judea. This is not the only type of 'small warfare' to be examined, however; functions of patrolling and other 'police' duties as performed by small groups will likewise be examined.

To begin, we must first define the English terms to be used in this study. Warfare conducted by small groups and/or through indirect methods against a larger or stronger force has had a number of different names attributed to it. These include 'rebellions', 'guerrilla warfare', 'small force warfare', 'insurgency', and 'asymmetric warfare'. These terms tend to be inconsistent in use, even over the same time period, something Blank's 2003 monograph decries. He refers mostly to discussions of asymmetrical threats in regard to modern American defence policy that have now classed everything from terrorism and insurgency to area-access-denial such as would be expected by a regular military defending itself from invasion.<sup>203</sup>

A further complication in both modern and ancient conception of asymmetrical strategies

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<sup>203</sup> Blank, S. 'Rethinking Asymmetrical Threats,' *Strategic Studies Institute Newsletter*, September 2003.

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and small force operations is that it is often difficult, if not impossible, to differentiate between what would now be termed organised crime (including piracy) and more politically motivated groups utilising asymmetrical strategies.<sup>204</sup> Often, in both the ancient and modern world, these groups are inter-related; with the somewhat unclear status and nature of Judean groups operating during Josephus' time.<sup>205</sup> In translations, any practitioner of small force operation(s) is frequently called 'bandit' or 'brigand', stressing the criminal and, in my view, diminishing their potential military skill. I shall thus explain in each instance whether I mean a guerrilla or a bandit.

Let us now discuss the Classical terms. In Latin, the usual term for small force practitioners or groups is '*latro/nes*'. The original meaning was that of a mercenary or other soldier for hire, suggesting a conflation of military and outlaw, and also expressing a lack of trust of foreign or hired troops.<sup>206</sup> The Greek term is ληστής, clearly related to *latro*,<sup>207</sup> but also related to λαστρις or one who is hired.<sup>208</sup> This is the only Greek term used in this context, and seems to be a blanket term.<sup>209</sup> Livy, however, gives a good example of the Latin terms in one section of his *ab Urbe Condita*. In book 29, he uses the term 'incursione' when saying that Laelius only had enough men to make what Moore translates as 'raids' into Africa.<sup>210</sup> The literal meaning of the term would be to run or rush in/upon; this does suggest a hit-and-run attack, a feature of small-force operations, and is supported by the context of the chapter (i.e., that Laelius cannot mount a full campaign because the bulk of his troops are still en route). *Latro* is not used in this passage.

In 29.6.2, however, Livy says '*latrociniiis magis quam iusto bello in Bruttiiis gerebantur res*', based upon the Brutti nature as well as their Punic alliance. The juxtaposition between '*latrociniiis*'

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<sup>204</sup> cf. MacMullen, R., *Enemies of Roman Order*, London: Routledge, 1992, pp. 255-269.

<sup>205</sup> Criminal organisations filling a power vacuum is common in failed states even today. Dodge, T., *Iraq's Future: The Aftermath of Regime Change*, London: Routledge, 2005, pp. 8-25.

<sup>206</sup> Lewis, C.T., Short, C., *A Latin Dictionary*, Oxford: Clarendon, 1846, p. 1054.

<sup>207</sup> And possibly a loanword into Hebrew, which calls 'bandits' *listim*.

<sup>208</sup> Liddell, H.G., Scott, R., *A Greek-English Lexicon* 8<sup>th</sup> Ed, Oxford: Clarendon, 1847, p. 891.

<sup>209</sup> Greek military terms on the whole tend to be less specific and far more flexible than the Latin, though why this should be the case is open to speculation.

<sup>210</sup> 29.4.3 '*iam haec agentibus nuntius tandem uenit Laelium non Scipionem, copiasque quantae ad incursiones agrorum satis sint transuectas; summae belli molem adhuc in Sicilia esse.*' Cf *excursione* in 29.6.3.

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and '*iusto bello*' is a telling one; it suggests that, at least for Livy, small force operations were *iniusti*, or having a connotation of inappropriateness and possibly illegality. This is how the term 'asymmetrical warfare' is sometimes used in the modern literature; as a type of warfare that the party being attacked considers 'wrong' or is unable to conceive of as being war.<sup>211</sup>

Finally, we can perhaps see the connotations to *latrocinia* in 29.31. This section details Masinissa's struggles to regain his kingdom from Syphax. The king was forced to retreat to Mt Bellus (location unknown) by Syphax after an undetailed pitched battle. Masinissa was joined by a few of the local families (*familiae aliquot*) and the mountain was not only able to support the small group but acted as a base from which they secured the surrounding area '*inde nocturnis primo ac furtivis incursionibus, deinde aperto latrocinio infesta omnia circa esse*'. This suggests that *incursiones* are on a smaller scale than *latrocinia*, and that both can be part of an asymmetrical strategy that is politically motivated, as Masinissa is attempting to defeat Syphax, who had usurped his kingdom. That being said, however, Masinissa finds Carthaginian lands more wealthy than Numidian and that *latrocinia* is safer there; this kills more Carthaginians than 'proper warfare' (*pluresque quam iusto saepe in bello Carthaginienses caderent...*) Again, the contrast between the two styles of warfare; Syphax, it is further said, '*... uix regium uidebatur latronem uagum in montibus consecrari*', again diminishing *latrocinia* in comparison.

It is only in Livy's Latin that such differentiation is clear. Why this is the case is unknown, but we can at least say from here that *latrocinia* can be understood roughly as asymmetrical strategy utilising small force tactics, and may carry a connotation of political motivations or at least anti-authority effects. The latter category allows us to integrate any of what we would now consider criminal activities (e.g., theft or piracy for personal, rather than political gain) into the term, and include peacetime policing duties into our examination of Roman use of and response to

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<sup>211</sup> Blank, *Ibid.*

asymmetrical strategies and small force operations.<sup>212</sup>

The terms for battles themselves in Latin show a difference in several works, though the differentiation is not always clear. The term *proelium* is always used of a pitched battle. Though its etymology is uncertain,<sup>213</sup> the inclusion of the 'oe' diphthong suggests age, as this is a rare survival from archaic Latin.<sup>214</sup> The other usual term for a conflict is *pugna*, a term which is far more flexible; in Ammianus the term can mean anything from a quarrel (14.6.25) to a murder (14.7.6) to battle generally (16.5.1). The same conflict can be called both, as in the case of an operation against the Alamanni which was begun when the *scutarii* rushed out against them (15.4.9,11) and an operation against a German *manus* who offered battle (16.2.12-13); both use first *pugna* then *proelium*. Earlier texts show the same flexibility, such as in Ps. Caesar's *African Wars* 12 and 19, where again a single battle is called first *pugna* and then *proelium*. Admittedly, the fact that Caesar's force was numerically inferior is stated, but the battle itself was not a small force operation; we can perhaps suggest that for Ammianus a battle which started as small force action and ended as a larger battle could be characterised in this way, but that does not seem to be the case for the earlier works.

In the description of a lone defence by a Roman officer against Tacfarinas' forces, *proelium* is used; again this was a case where Tacfarinas was using orthodox military tactics rather than small force operations.<sup>215</sup> Tacitus also uses *pugna* when discussing the type of a battle being waged between the Romans and Germans (*genere pugnae*), then says that the Germans '*coacta stabile ad proelium*'.<sup>216</sup> This suggests that a *proelium* is a type of *pugna*, which is another possible interpretation for the uses discussed above wherein the same conflict was called both (i.e., it was an unspecified 'fight' or *pugna* which at the end was determined to be a proper 'battle' or *proelium*).

<sup>212</sup> See Shaw, B.D., 'Bandits in the Roman Empire,' *Past & Present*, No. 105 (Nov., 1984), pp. 3-52 for detailed discussion.

<sup>213</sup> L& S 1456.

<sup>214</sup> Clackson, James PT, 'Latin,' in *The Ancient Languages of Europe*, Woodard, R. (ed), Cambridge: CUP, 2008, p77.

<sup>215</sup> Tac. *Ann* 3.20.

<sup>216</sup> Tac *Ann* 2.21

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Similarly, Livy says that there was a *proelium* just under the top of a mountain range, but that the Romans were unable to defeat the Carthaginian light-armed troops because of a Spanish *cohors* that were better suited to the type of fighting (*pugnae genere*).<sup>217</sup> Sallust, however, set the two terms in opposition when describing a conflict where Marius' forces were assaulted at dusk as '*pugna latrocinio magis quam proelio similis fieri*' due to the disordered nature of the Roman response.<sup>218</sup> Because of the qualifier on *pugna* we can perhaps see this again as an instance of a *proelium* being a type of *pugna*, as is a *pugna latrocinio*, but that is not certain. In 87, Sallust says that new recruits were engaged in '*proelia multa, ceterum levia*,' and then in the next sentence moves onto the discussion of those who learnt to enter battle without fear, '*sine metu pugnae adesse*'. It is possible that Sallust was simply looking to vary his terms for stylistic purposes, or that he personally felt the terms synonymous whereas the others did not, but that is unclear. Thus we can only say that, whilst *proelium* is reasonably stable in meaning, the understanding of *pugna* must rely upon qualifiers and context.

## **Part II. Small-Force Warfare:**

Though small force operations were encountered elsewhere in the Roman sphere, it is the type of conflict which appears to have been most common and most problematic for the Romans in both North Africa (including Egypt) and the East. I have decided to subdivide this section by these geographic regions on the basis of differences in climate and terrain; the North African desert is a vast expanse featuring ergs and dunefields whereas the Eastern areas are smaller, frequently feature more areas of semi-desert, and have more hills and other rock formations. There is also a greater similarity of culture and language groups through these subdivisions.

**A. North Africa:** There were three main campaigns which are well-attested that involved the Roman army having to cope with guerilla tactics; the revolts of Jugurtha, Tacfarinas and Firmus.

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<sup>217</sup> Livy 22.18.2-3.

<sup>218</sup> Sallust *BJ* 97.5.

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Each of these will be discussed extensively in turn. There are two poorly-attested conflicts as well; Cassius Dio 60.9.1-6 and Pliny NH 5.14-15 both briefly mention that the Mauri became restive 'again' and first Paulinus then Geta pursued them into the desert; Pliny reports they had to turn back, though Dio says they came to terms peacefully. We have no further extant accounts.

The other poorly-attested conflict was the Blemmyes, a nomadic group from south of Egypt who began raiding Roman Egypt in the third and fourth century AD. The Blemmyes are attested as living peacefully amongst Egyptian urban populations as a traders,<sup>219</sup> but during Zenobia's assault and brief conquest of Lower Egypt the Blemmyes conquered northward into Upper Egypt, though they were defeated subsequently in AD279/280. By AD298, however, they had retaken the region as Diocletian signed a treaty at that time.<sup>220</sup> Clearly, the Blemmyes were taking advantage of Rome's distractions.

Let us now turn to the three major North African incidences of guerrilla warfare.

**1. Jugurtha:** Though trained in both Numidian and Roman warfare, Jugurtha utilised several methods of small force operation over the course of the campaign against the Romans. This was evident from the first, as his initial strike (admittedly, against his brother) was a campaign of cross-border raiding in an attempt to provoke the other party into conflict; this was a tactic he would later repeat against the Romans in order to control the choice of time and place for the battle. This of course would give him a distinct tactical advantage. Jugurtha's strategy also included the use of hit-and-fade attacks against Aulus, as well as other indirect methods such as inducements to desert, (which the Romans themselves would also utilise) as well as feints and misinformation.

When Aulus was forced into surrender and a demeaning treaty after a night assault, however, a new Roman commander, Metellus was dispatched. Having realised that regular tactics would be

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<sup>219</sup> Sidebotham, S. et al., *The Red Land: The Illustrated Archaeology of Egypt's Eastern Desert*. Cairo, the American University in Cairo Press, 2008, p 368.

<sup>220</sup> Sidebotham, S. et al., *The Red Land: The Illustrated Archaeology of Egypt's Eastern Desert*. Cairo, the American University in Cairo Press, 2008, p 370.

ineffective,<sup>221</sup> he adapted to the small force tactics in part by inducement to desertion and/or assassination, but, perhaps more tellingly, by interspersing light armed troops amongst his army on the march, thus increasing its mobility and flexibility in case of an attack; this was a logical precaution against the hit-and-fade assaults as well as a counter to Jugurtha's far more mobile cavalry. Both parties attempt and protect against small force attacks on any vulnerable troops (e.g., fodder gatherers), but there is no detail given in the sources.

On a more strategic level, Metellus began a campaign to deprive Jugurtha of his support base, by which I mean not just the ability to obtain supplies but also his popular, financial and political support. Scorched Earth tactics were utilised for this effect, which terrorised the indigenous populace to the point of making recruitment and safe haven difficult to find. This also destroyed Jugurtha's ability to maintain his troops, and by the time of Marius' command, Jugurtha's financial and political capital were so poor that, after the loss of Capsa and its treasuries, Jugurtha was forced to promise Bocchus a third of his kingdom in order to get his support.<sup>222</sup> Previously, Jugurtha had been able to use persuasion alone, saying that the Romans were cruel oppressors who would not suffer another political entity to exist.<sup>223</sup> This was a master stroke which took away any guerrilla's main weapon; the ability to find supporters for his cause.<sup>224</sup>

The psychological toll of the inducements to betrayal caused Jugurtha to execute his main supporters and to suffer what would seem to be some sort of breakdown. As Sallust was concerned with matters of morality it is entirely possible that this breakdown was intended as a reflection of Jugurtha's mad lust for power driving him over the edge; as there is no other extant source we

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<sup>221</sup> Sallust, *BJ*, 54.

<sup>222</sup> Sallust *BJ* 97.

<sup>223</sup> Sallust *BJ* 81 *'igitur in locum ambobus placitum exercitus conveniunt. ibi fide data et accepta Jugurtha Bocchi animum oratione accendit: Romanos iniustos, profunda avaritia, communis omnium hostis esse; eandem illos causam belli cum Boccho habere, quam secum et cum aliis gentibus, lubidinem imperitandi, quis omnia regna advorsa sint; tum sese, paulo ante Carthaginensis, item regem Persen, post uti quisque opulentissimus videatur, ita Romanis hostem fore.'*

<sup>224</sup> cf. Callwell, C.E., *Small Wars: Their Principles and Practice*, 3<sup>rd</sup> Edition, Lincoln: University of Nebraska Press, 1996, *passim*.

cannot know for certain one way or the other. If we take Sallust at his word, however, we realise that there is potential support for Metellus' awareness of how to mitigate Jugurtha's main advantage. Jugurtha was said to move daily, feeling as though Metellus had constrained his movements completely. This sort of constraint, whether real or imagined, acts against the major advantage of a decentralised small force; their tactical mobility. Clearly, between this and the interspersing of light troops on the march, Metellus was well aware that the key to defeating a small force was to constrain its movements.

Marius' takeover of the Roman forces saw a continuation of adaptation to the small force tactics. He began by training his troops with hit-and-fade assaults but realised that such tactics will not allow him to regain and hold territory,<sup>225</sup> a common problem for small forces. Subsequently, he turned to more regular operations until, when on the march to winter quarters, the Romans are ambushed by the combined forces of Jugurtha and Bocchus. As discussed above, they have a battle described as *'pugna latrocinio magis quam proelio similis fieri.'* After the battle had been won by the Romans the next morning, Marius marches with the army in a hollow square so that it will be ready and able to defend itself from all sides. This is fortunate as it frustrates Jugurtha's attempt to attack on all four sides; the assault is driven off with waves of Latin and allied Italian cavalry under Sulla,<sup>226</sup> something quite similar to what the Numidians would do normally. This adaptation was effective and Sulla's assault on the forces under Bocchus at the Roman rear leads those enemy ranks to break and flee. Jugurtha, at the Roman front, was forced to withdraw.<sup>227</sup> Still, what the assaults did bring about was an increase in Marius' *fama*, which is another common weapon against small force tactics; in modern terms it would be called 'deterrence' or perhaps 'shock and awe'. Assuming Sallust is not exaggerating for rhetorical effect, because Marius was 'feared as something more than

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<sup>225</sup> Sallust *BJ* 87-88.

<sup>226</sup> Sallust *BJ* 95.

<sup>227</sup> Sallust *BJ* 100-101.

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human<sup>228</sup> however, it severely impacted Jugurtha's ability to gain followers. That perceived invincibility is no doubt why the victory at Capsa was so important; if Marius was seen to be vulnerable, especially as he was both the new commander and because of his rivalry with Metellus, then it might result in an upsurge in support for Jugurtha. This indirect method was yet another way of assaulting the support base, specifically popular and political support.

The above was the last major military battle of the conflict before Bocchus' men ambushed and delivered Jugurtha. It is notable, however, that Bocchus' envoys to Sulla are assaulted *Gaetulis latrionibus*.<sup>229</sup> The Gaetuli were Jugurtha's allies, though it is unclear from context whether we are meant to read this as a politically-motivated attack or merely brigandage. It does not seem that Jugurtha was forewarned of Bocchus' betrayal, however.

What we can see most clearly from this story, with the usual caveat of having only Sallust's word for the events, is that Metellus and Marius after him both realised that the keys to countering Jugurtha's small force operations were to constrain his movements, thus reducing his tactical mobility, to increase the Roman's tactical mobility and flexibility, and destroy Jugurtha's popular, political and financial support base. Ultimately, these succeeded.

**2. Tacfarinas:** Tacitus gives us very little information on Tacfarinas' motivations for and during his campaign against the Romans. Why this is the case is unclear; he may simply have not had access to data about the man, and was attempting to carry through on his stated belief about impartiality. At any rate, Tacitus does state that the war against Numidian Tacfarinas began after his desertion from the *auxilia*. When this desertion occurred is unclear but, according to Tacitus, the war began in AD 17, when Tacfarinas took a group of *latrones* and other 'undesirables' and formed them into a Roman-style force. Either because of this or subsequent to it, he was proclaimed as the leader of the Musulamii who were a desert-dwelling nomadic group.<sup>230</sup>

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<sup>228</sup> Sallust *BJ* 92.2 '*Numidae magis quam mortalem timere.*'

<sup>229</sup> Sallust *BJ* 103.3.

<sup>230</sup> Tac *Ann* 2.52.1-2. '*Eodem anno coeptum in Africa bellum, duce hostium Tacfarinate. is natione Numida, in castris*

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Tacfarinas' war had four main phases and is the best example of small force warfare in Numidia, despite Tacitus' brevity. The first phase, AD 17, saw Tacfarinas split his army into a Roman-style elite force who were kept encamped in an unnamed location, and incorporated or allied with the Mauritanians who conducted hit-and fade assaults. Due to or subsequent to this, the army was substantially swelled in number by the Cinithii, but perhaps more importantly this group was based in the southern part of Africa Proconsularis, giving Tacfarinas a foothold and support within Roman territory. This phase ended when Camillus brought a small army onto an unnamed area and provoked the larger Numidian force into a pitched battle. We are told that the Roman regular infantry was stationed in the centre, with auxiliary infantry and cavalry on the wings; he says nothing about the Numidian order of battle, however. If Tacfarinas was utilising Roman practices then we can perhaps speculate that he would have had his Roman-style elite force in centre, with the Mauritanian light cavalry on the wings, but there is no way to know for certain. As Tacitus discusses elsewhere and as is also common amongst non-Roman forces (to the point of possibly being a literary *topos*, something which must always be kept in mind), the Numidians seemed to lack the discipline of the Roman army, and the Romans won the battle.<sup>231</sup> Tacitus gives very little detail, however, so we cannot say more.

There may be a slight temporal confusion in Tacitus here, as Tacfarinas seems to have been defeated in AD17, but Tacitus refers to Tacfarinas' defeat as being 'last summer' when the Numidian appears again in AD20.<sup>232</sup> The term used is *priore aestate*, which is translated as 'the previous summer,' in the Loeb and Penguin translations, but *prior* can just mean a previous time, as *priores* is sometimes used as a term meaning 'ancestors'. At any rate, we do not know how or where Tacfarinas spent that time for certain. He is recorded as having retreated to the desert after defeats,

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*Romanis auxiliaria stipendia meritis, mox desertor; vagos primum et latrociniiis suetos ad praedam et raptus congregare, dein more militiae per vexilla et turmas componere, postremo non inconditae turbae sed Musulamiorum dux haberi.'*

<sup>231</sup> Tac Ann 2.52 *passim*.

<sup>232</sup> Tac Ann 3.20.1.

and as this is a logical enough action to take that I feel we can speculate with reasonable safety that he did this as a matter of course.<sup>233</sup> The Romans would have been hard-pressed to find him in an unfamiliar desert and without trusted allies; it was also Tacfarinas' home territory and a major recruiting area. At any rate, according to Tacitus in AD 20 raids attributed to Tacfarinas occurred; these hit-and-fade assaults, possibly to be interpreted as active probes of the Roman defences in Africa, were then followed by large-scale destruction and looting.<sup>234</sup> This emphasis on plunder could suggest a need for money to pay his soldiers; alternatively it could be read as a return to the small-force warfare of AD17. This was, however, followed up by a siege of a legion near the Pagyda river (of uncertain location). This highly unusual action for a small army did result in a victory for Tacfarinas, as the (undetailed) line of battle created in front of the camp failed. This proved so embarrassing for the Romans that decimation was used; this led to a very small force (Tacitus says five hundred) warding off a similar siege at the fort of Mala.

With that defeat, and with the Numidians rejecting (or despising) siege warfare, '*obsidia aspernantibus*,' Tacfarinas returns to hit-and-fade assaults. These were effective until his army became encumbered by plunder; this required a single base of operations near the coast. Thus Tacfarinas lost his main advantages; with a centralised area to protect he was unable to be as mobile as small force must be, and being near the coast the Roman supply lines would be shorter and Tacfarinas also had given up the desert as protection. Caesianus then went after Tacfarinas with cavalry, auxiliary infantry and '*velocissimos legionum*,' which suggests that they were developing something on the order of a flying column, if not something closer to Tacfarinas' original army. The Romans, using their now greater tactical mobility, defeated Tacfarinas somewhere in his area of control and drove the Numidians back to the desert.<sup>235</sup> It is unclear, however, if subsequent Roman commanders used a similar adaptation.

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<sup>233</sup> Tac Ann 3.21.

<sup>234</sup> Tac Ann 3.20.1-3.

<sup>235</sup> Tac Ann 3.21.

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A year later in AD21, Tacfarinas rose again. He had raised reinforcements in the desert (as he may well have done all along) and tried to demand land for himself and his army.<sup>236</sup> Whether he thought this would be effective or not is unclear. Tacfarinas may have simply wanted an end to the hostilities that would still allow him and his army to have a safe area that belonged to them. Alternatively, Tacitus reports later that Tacfarinas was portraying himself as a liberator of the Numidians and their allies (and possibly even all subject peoples) from the Romans, so it is possible that Tacfarinas was attempting a political gamble, believing that a rejection of his terms would give him a justification for a continuation of the war, almost an attempt at a politically legitimate mandate. Whatever Tacfarinas' motives, the effect of sending envoys was that Tiberius became enraged and sent Blaesus. Perhaps learning from Caesianus' success, Blaesus, after diminishing Tacfarinas' forces by offering an amnesty, divided his forces into three parts, two of which flanked Tacfarinas' area of operation and one of which set up garrisons to allow the Romans to always be able to constrain Tacfarinas' movements. At the onset of winter, he split his forces amongst a chain of garrisons, further constraining Tacfarinas. In amongst all this, forces '*solitudinem gnaros*', were formed into flying columns and harried Tacfarinas on all sides.<sup>237</sup>

The end of this phase of the war is curious. Blaesus captured Tacfarinas' brother and then withdrew before Tacfarinas' forces were completely crushed. Perhaps the brother was considered a hostage, but he is not referenced again by Tacitus, nor is there any indication of a treaty or other direct communications between the Numidian and the Romans. We are not even certain if it was Blaesus' idea to withdraw or if it came from Tiberius, as Tacitus only says that the Emperor treated the war as if it were over.<sup>238</sup> He even withdrew a legion from the area, leaving it under-defended.<sup>239</sup> There was deep unrest in Gaul at the same time, so Tiberius may have felt the troops were better

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<sup>236</sup> Tac Ann. 3.73.

<sup>237</sup> Tac Ann 3.74 *passim*. Knowledge of the desert 3.74.9. The use of *gnaros*, clearly from the Greek, suggests understanding or experience of the desert.

<sup>238</sup> Tac Ann 3.74.16.

<sup>239</sup> Tac Ann 4.29.3.

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used elsewhere, though it is impossible to say for certain. At any rate, one could argue that this is a clear example of what would now be considered asymmetrical strategy as described above; the Romans were so unaccustomed to this style of warfare that they did not realise that they were, in fact, still at war.

The final phase of the war against Tacfarinas took place in AD 24, though a year before Tacitus does record that a Roman was acquitted of selling grain to Tacfarinas, though when that sale was purported to have taken place is not stated.<sup>240</sup> The Numidian is said to have, by AD24, gained large numbers of Mauretanian auxiliaries; the Garamantes' king received Tacfarinas' plunder, presumably meaning that his court acted as a treasury and operational base for Tacfarinas' army, in addition to supplying troops. The poor and 'disreputable' also came to fight with Tacfarinas and it is here that we are told Tacfarinas sets himself up as a liberator, saying that other peoples were attacking the empire, which is why Africa was being evacuated-- this could support the reading that Tiberius' removal of a legion as being to deal with problems elsewhere-- and that if those who found freedom preferable to lying in slavery made a unified effort, '*si cuncti quibus libertas servitio potior incubuissent,*' Rome could be defeated.<sup>241</sup> In a way, this is a classic small force concept; if enough resistance cells coordinate then they can destroy a central or invading power; Tacfarinas' appeals to liberty only reinforce a desire to read him as an early 'guerrilla' of the type described above. Whether Tacfarinas himself actually believed this, however, is unclear, as Tacitus gives us very little to go on with regard to his motivations, and we have no other source for comparison. At any rate, after Tacfarinas attempted to utilise regular military tactics and besieged the town of Thubuscum, Dolabella gathered together an army and raised the siege due to a combination of Roman *fama* and because the Numidians are unused to fighting against an infantry charge. After this, Dolabella re-fortified strong points to constrain Tacfarinas' movements, executed his

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<sup>240</sup> Tac *Ann* 4.13.3.

<sup>241</sup> Tac *Ann* 4.24.1-2.

supporters, and organised four flying columns under Roman command and Mauretanian raiding parties. There is no detail given about whether this arrangement led to any particular successes or failures, though the constraint of movement and commensurate reduction in tactical mobility seems to have been the object, as was the case with Jugurtha. Tacitus does, however say that the Romans were frustrated by the enemy's refusal to fight (i.e., have a pitched battle). So, when Dolabella ultimately received word that Tacfarinas was encamped near the site of Auzea surrounded by woods, he sent light infantry and cavalry against them and attacked at dawn, allowing the troops to vent their frustrations. Tacfarinas was designated as a main target of this assault as well; after his bodyguards' deaths and his son's capture, Tacfarinas opted to die in battle.<sup>242</sup> As with Jugurtha, the death of the driving force behind the campaign seems to have pacified the region.

**3. Firmus:** The revolt of Firmus is described in Ammianus 29.5, though with less detail than might be ideal. He states that the local governor, Romanus, slandered Firmus to the Emperor over Firmus' murder of his half-brother in civil conflict following their father's death; the Jugurthine war began in much the same circumstances of internecine conflict. Fearing that the slander would lead to direct Roman interference (i.e., execution), Firmus rebelled from Roman authority. Whilst the circumstances of the entire war are unclear and open to debate,<sup>243</sup> what is clear according to the text is that the king was forced to move before he was ready. It appears that he was attempting to obtain support from neighbouring kingdoms but there is a lacuna in the text at that point so we cannot say more.<sup>244</sup> This would seem a reasonable assumption, however, as has been noted above political and popular support was vital for guerrilla forces.

Once Theodosius was on site in Africa, awaiting his troops, he began pondering how

*'...hostem caperet discursatorem et repentinum insidiisque potius clandestinis quam proeliorum*

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<sup>242</sup> Tac Ann 4.25.

<sup>243</sup> These include whether or not Firmus was exploited by Valentinian to catch out Romanus, and the extent to which Firmus' support of Donatism played a role in his actions and the Roman response. Whilst both of these questions are important, they are well outside the realm of this study.

<sup>244</sup> Amm 29.5.3.

*stabilitate confisum*.<sup>245</sup> He opted to assault the support base utilising scorched Earth tactics, as had many others before him; again attempting to deny Firmus a support base. Like Jugurtha, Firmus tried false envoys and other diplomatic tactics;<sup>246</sup> one does almost begin to wonder if Ammianus was drawing on the Jugurthine War for suppositions to fill in gaps in his data, but there is no way to know for certain.

According to Ammianus there were some small set-piece battles in this conflict which the Romans won handily, though Theodosius found himself confronted with the potential for small force tactics again once the rebels had taken control of the high ground around Audia. Much as had been done before, Theodosius opts to march in a hollow square to defend against an attack from any side; he is not able to penetrate far into the hills, however.<sup>247</sup> That being said, Firmus was able to hold off the Romans with light mobile troops for quite some time before his position was betrayed and he committed suicide to avoid capture.<sup>248</sup>

**Summary:** The response to North African small force operations was quite similar on the whole throughout the time period with which we are concerned. Generals found the best and often only successful methods of defeating a highly mobile force with popular support was to attack that support base, both of supplies and political and popular support, and physically constrain the movements of the North African forces. Once the mobility was reduced, the North Africans could be forced into either set piece battles or sieges, where the Romans could dominate. Marius found that *fama* was quite an effective weapon as well, using the Numidians' belief that he was something more than human against them. The Romans also acted directly against the leaders of the revolutionary army by targeting them specifically; though nobody is indispensable, once the commanders were dead the armies tended to fall apart, allowing the Romans to regain control.

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<sup>245</sup> Amm 29.5.7.

<sup>246</sup> Amm 29.5.8-11, 15, 19, 28.

<sup>247</sup> Amm 29.5.39, 44.

<sup>248</sup> Amm 29.5.54.

These tactics are all used against groups conducting small force operations well into the modern period.<sup>249</sup>

**B. The East:** Ammianus states that Mesopotamia is heavily garrisoned because the region is often restive,<sup>250</sup> this is supported by both the *Notitia Dignitatum* and by the number of archaeologically attested forts and fortlets that date from this period. Both prior and subsequent to Julian's campaigns, however, several places in the East saw small force warfare.

**1. Judea:** Several phases of the conquest of Judea (here including Peraea, Samaria, Gallilee, and Idumenea) featured the use of small force tactics. Judea was, according to Josephus, eyewitness and the main source for the Jewish War, a region which had devolved into warfare between various groups (ληστικῶ πολέμου).<sup>251</sup> Much of the province, however is semi-arid and thus outside the scope of this study. There was some small force activity in some areas in the desert, however; the Sicarii attacked En Gedi and local villages from their base at Masada, seeming to be supply and plunder raids.<sup>252</sup> They also increased their forces with recruits, suggesting that these raids might have been required to pay, support, and possibly train the new Sicarii. The scorched Earth techniques the Sicarii used would potentially destroy the supply and support bases of the Romans as well as any other groups in the area. This was not the only area of instability, as λησταί groups joined together into small forces all through the countryside, leading to hit and fade attacks on towns and outlying synagogues. Though engaged at Jerusalem, Vespasian decided to destroy the city of Gadara, whence came one of these λησταί groups, because it was too dangerous to allow to stand; the Gadarans fled but force-recruited into their army from a nearby village and attempted to engage the Romans in pitched battle, which failed.<sup>253</sup> Vespasian garrisoned local

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<sup>249</sup> Cf. Callwell, C.E., *Small Wars: Their Principles and Practice*, 3<sup>rd</sup> Edition, Lincoln: University of Nebraska Press, 1996.

<sup>250</sup> Amm Marc. 14.3.2.

<sup>251</sup> Jos BJ, 2.65

<sup>252</sup> Jos BJ, 4.398.

<sup>253</sup> Jos BJ, 4.399.441.

strong points and engaged in scorched Earth tactics into Idumeneia.<sup>254</sup>

Once Jerusalem had fallen to the Romans there were only two areas in revolt, both of which were too strong to be permitted to stand, Machabeus and Masada.<sup>255</sup> They were both eliminated through siege, and Josephus stated that Judea was then completely quiet.<sup>256</sup> There are problems with Josephus' account here in that, because the area was so unstable we do not know whether the λησται groups in Judea were rising in political revolt or if they were bandits taking advantage of instability for their own gain. Though the Roman response would have been much the same in either event, it is difficult if not impossible to characterise the actions of the λησται. Due to the seeming disconnectedness of these groups, apart from those jockeying for position in Jerusalem, I believe that it is best to characterise the Judean situation outside Jerusalem as endemic banditry. As such, it falls under the aegis of policing, which I shall discuss in a later section.

**2. Palmyra:** Under Zenobia, Palmyra acquired territory from Arabia Petraea through Pelusium and into Egypt. This route was the norm for invading armies, having been used since Pharaonic times.<sup>257</sup> The primary sources do not give specifics,<sup>258</sup> but the *Life of Aurelian* in the *HA* does refer to Syrian *latrones* delaying the Roman forces as they reconquered Egypt and moved toward Palmyra itself; this suggests small, mobile units attacking the Roman army on the march. These forces would be ideal to delay and diminish a regular army, as well as causing greatly increased psychological stress levels on the soldiers by not allowing them to feel safe at any time.<sup>259</sup>

Our historical sources for this revolt are suspect at best. The *Historiae Augustae* are anonymous and insecurely dated; Zosimus was from the sixth century and relied solely and

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<sup>254</sup> Jos *BJ*, 4.442.

<sup>255</sup> Jos *BJ*, 7.163-190, 7.252-406 respectively.

<sup>256</sup> Jos *BJ*, 7.407.

<sup>257</sup> Dio 3.39.57, Caesar *Alexandrian War* 26, Josephus *BJ* 4.659-663, Plutarch *Antony*, 3.3. Mavia later followed the same general route.

<sup>258</sup> The *HA* and Zosimus are the primary sources for Zenobia's campaign.

<sup>259</sup> It is essentially a variant on the panopticon; an army who is attacked often enough is soon always expecting to be attacked, believing that the enemy could be watching at all times. Jugurtha did the same to Metellus and Marius. Sallust *BJ*, 54-55.

uncritically upon his sources. There is thus very little that can be said about the conflict beyond these bare facts and that the Blemmyes conquered Upper Egypt as Zenobia took Lower.

**3. Mavia:** The late Roman campaign of Queen Mavia is mostly attested in later Ecclesiastical sources. Ostensibly due to a difference of opinion over the appointment of a bishop,<sup>260</sup> Mavia rebelled against Roman power and brought together a loose coalition of nomadic groups from the general vicinity of Palmyra and formed them into an army. Taking the same general route as Zenobia before her, Mavia's small raiding forces were able to wound the standing Roman army to the degree that Valens had to sign a peace treaty that heavily favoured the Arab queen. This is one of the best examples of how a weak and decentralised force can defeat a centralised force, yet because of the tendency to epitomise in later historians, we have little specific data. I would argue that Rome in 378 AD, though potentially stronger as a whole than Mavia, could not allocate sufficient resources to the area to make it an overwhelmingly stronger force.<sup>261</sup> That being said, the Roman forces were still centralised in the sense of being based out of particular garrisons, whereas Mavia's troops were at home in the desert. They had no fixed city or garrisons that we are aware of, so there presumably was no central location(s) against which Rome could strike and destroy, as they had done with Palmyra. We have no extant data about her command structure or specific battles, the late historians' tendency to epitomes again thwarting our efforts, but one is tempted to suggest that each of the tribes in her federation would have fought together under their usual military or raiding leader, though ultimately answering to her authority as far as where and when to strike the Roman army.

However her forces were arranged, we do know that they featured a strong cavalry component, as it was an elite cavalry unit she sent to aid Rome against the Goths later in 378. We

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<sup>260</sup> Mavia wanted an orthodox ascetic called Moses as her bishop and would accept no other, especially not an Arian. Socrates *Hist Ecclesiastical* 4.36, Sozomen 6.38, Rufinius 11. Modern and ancient sources make much of this as a religious difference, completely ignoring the fact that modern conceptions of 'separation between church and state' did not exist at the time.

<sup>261</sup> Rome was fighting wars on several fronts at the time, with the Goths presenting a threat to the Roman heartland far in excess of Mavia.

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know nothing else of her or her federation after this point. But the fact that she was able to force Valens to recognise her as a territorial queen and gave her client status both expresses the Roman weakness of the time and how well a small, weak force can exploit such distractions in order to defeat a larger force. It is possible that the Romans thought that they would in future simply invalidate the treaty as they had done with others (e.g., Jugurtha, Tacfarinas, the Lusitanian Viriathus, etc), but we have no evidence that such action was undertaken.

**Summary:** We have far less secure data from the desert regions of the East than we do for North Africa. We have only epitomes extant for both Zenobia and Mavia, meaning that we are left to speculate as to their tactics and goals. Banditry seems to have been endemic in Judea, both in the arid and semi-arid regions, which would fall under the aegis of police action.

**Part III. Policing:**

Small force operations were not confined to military campaigns; they were also used during the occupation and control of an area as somewhere between what in the modern era would be termed policing; that is enforcing the law and defending from banditry and raiding. These forces, which had parallels with the *Medjay* in Ptolemaic Egypt, patrolled their assigned catchment areas and, it is presumed, protected these areas against low-intensity threats.<sup>262</sup> Shaw points out that many military personnel stationed in the interior of the provinces are listed in the papyri and elsewhere as fulfilling police functions.<sup>263</sup>

Though this paper does not seek to engage to any great depth with the debates on the defence strategy, strategies, or lack thereof of the Roman state in the *limes*, what must be addressed to some degree is the debate about control of movement within the regions and across borders. As discussed in chapter three, the areas under consideration in this study contained several main

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<sup>262</sup> Herodian says that Numidia is garrisoned against raiders. 7.9.1; cf Amm Marc. 14.3.2 about Mesopotamia. Ptolemaic Egypt had a similar system which the Romans initially did not use. Bagnall, R. *Hellenistic and Roman Egypt: Sources and Approaches*, Aldershot: Ashgate, 2006, pp 67-86.

<sup>263</sup> Shaw, B.D., 'Bandits in the Roman Empire,' *Past & Present*, No. 105 (Nov., 1984), pp. 3-52. See also Alston, R., *Soldier and Society in Roman Egypt*, London: Routledge, 1995, pp. 81-86.

networks of roads, all of which had either cities, *hydreumata* or some type of road station along them. Those like Parker and Luttwak who champion the 'defence-in-depth' argument for Roman *limes* argue that the smaller forts that line the roads are just that; depth in the event that an external force invades. Following Whittaker, I do not contest that these small forts could act to delay and/or diminish an invading force if one should happen by. The siting of most of these, however, especially in the Eastern Desert roads and the Negev, are on low ground near water sources rather than very nearby high ground.<sup>264</sup> This idea that control of water means that traffic will be forced to move along constrained routes is supported by the siting of Gheria el-Garbia in Numidia. Goodchild points out that caravans could, potentially, pass unseen by the Roman garrison by going slightly to the north;<sup>265</sup> however, the Romans controlled the water source for that vicinity. If we assume that there was no other accessible water source nearby-- something which we of course can neither prove nor disprove, though Goodchild states that the forts in the region of Bu Njem are all oases, suggesting that there would have been no other permanent water features. Water is the key factor for desert survival, and whoever controls it will control the region.

The fact that there are forts on all of the known major roads also supports the notion that their main purpose was for traffic control; the fact that they also would be able to control the surrounding territory, and thus constrain the movement of any bandits or other small forces also supports their ability to secure against low-intensity threats. It is quite true that we see a boom in the construction of fortifications all through the Empire in the late third and fourth centuries, including the desert, just as it is true that this was the period when oasis-based nomads the Austuriani and Laguatans began raiding Tripolitania, the Blemmyes began a series of assaults on Upper Egypt and the Isaurians came in from the north. This was also when the proportion of

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<sup>264</sup> I excavated one season at Yotvata in the Negev, where the fort was on what is now the Arava highway and which is backed by a very large cliff; tactically speaking one could not have picked a worse position if one was expecting an overwhelming invasion force.

<sup>265</sup> Goodchild, R.G., 'Oasis Forts of Legio III Augusta on the Routes to the Fezzan,' *Papers of the British School at Rome*, Vol. 22, (1954), p67.

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cavalry to infantry rose markedly, as discussed in chapter four. All of these things together suggest that the Romans, having just come out of a period of internal strife, were trying to re-establish their power in a very unsubtle way whilst trying to cover inadequacies. For example, though Mattingly suggests that the increase in cavalry is to counter the threat of north African cavalry, I would argue that it also supports the reduction in unit numbers suggested by Alston and could relate to the boom in fortification-building seen throughout the regions under study starting from the late third and fourth centuries AD. A smaller number of cavalry than infantry are required to cover or hold the same area, especially if one sees them patrolling the roads. They can get to areas of trouble more quickly, and, as Mattingly correctly points out, they can defend themselves better against other North African cavalry troops. Alston also points out that the number of forts suggests both that the army was widely dispersed in the province and that the forts were used as a way of monumentalising Roman authority, something not apparently needed previously; both of these suggest an increasing reliance on the perception of the Romans as a threat-- a deterrent, to use the modern strategic term-- rather than relying upon literal strength of arms.

Kennedy<sup>266</sup> points out that much the same was occurring in the East in the late third and early fourth centuries, with Arabia also receiving an influx of cavalry forces in addition to the increased numbers of forts.<sup>267</sup> This again may well be for similar reasons; as stated above nomad forces in the East were frequently cavalry, plus Zenobia's fast-moving forces had recently caused major damage from Syria to Egypt, so they would have been very aware of the need for increasing mobility of their own forces. Increased monumentalising of their authority, whether a primary or secondary effect, would in theory act in concert with the Palmyrene defeat and destruction to help deter further unrest.

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<sup>266</sup> Kennedy, D. *The Roman Army in Jordan*, London, The Council for British Research in the Levant Press, 2000. pp 51-21.

<sup>267</sup> Cf. Parker, S. T. (ed) *The Roman Frontier in Central Jordan: Final Report on the Limes Arabicus Project 1980-1989*. Washington DC, Dumbarton Oaks, 2006, p 42; Kennedy, D. and Bewley, R. *Ancient Jordan from the Air*. London, the Council for British Research in the Levant, 2004, p 195.

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Thus the Roman military/police were responsible for traffic control and security against what were expected to be low-intensity threats. Let us now turn to the question of what kinds of soldiers make up these 'police' forces, both on the borders and within Roman control. One group which was always a small force and which would have some advantages in the desert was camelry. Camelry made up 15-17% of the mounted forces in the East, Egypt and North Africa; 5-10% of the total forces. Though we have discussed the advantages of camels over horses in chapter three, we can recall that stamina and increased ability to graze would be primary advantages here. A camel could carry its rider through the desert without needing roads, and could travel for longer stretches of time before having to turn back. We have little information on how or if they were actually used in practice, however. The closest thing to a camelry police force for which we have evidence is the Palmyrenes, who would provide protection for camel caravans along the Dura-Palmyra route. Whilst I refute Dabrowa's assertion that this practice continued under the Romans and was the duty of the *dromedarii* of the *cohors XX Palmyrenorum* based upon total lack of evidence, where one can perhaps interpret material remains as being somehow associated with desert route patrols would be in Egypt. The evidence is far from certain, but along the Abu Sha'ar-Qena route one both sees evidence for camels at both termini.<sup>268</sup> If they are correct, then it is possible to interpret these as not only 'rest stops' but also as something on the order of police stations, each of which are responsible for patrolling a particular area. Thus the roads (and surroundings) would be kept secure by the military/police forces but they would not be acting as escorts. Because these areas have only been surveyed, rather than excavated, however, everything must be considered speculative.

That camelry was used in police forces is somewhat more strongly suggested by papyri and ostraka. In Apollinopolis Magna, modern Edfu in Egypt, the *cohors I Augusta Praetoria Lusitanorum* had listed in a pridatum instances where members of their approximately 15 camelry

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<sup>268</sup> By 180 AD the *cohors I Augusta Praetoria Lusitanorum* was at either Qena or Koptos; camel dung was found in copious quantities at Abu Sha'ar.

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were *absunt in choram*. This could be interpreted as them being out on patrol. At Bu Njem, ostraka OBN5 lists one person being *ad stationem camellariorum*, but again the meaning is unclear.

Marichal believes that the term might refer to an *hydreuma* or analogous structure where camels were kept; it could also be an outlying structure from which patrols are conducted by camelry, though only one person being assigned there could be seen to argue against this interpretation.

Apart from camelry the other obvious candidate for patrolling is, of course, light cavalry. The high proportion of cavalry that has already been noted could easily account for their use in police duties.

Shaw states that the provinces seemed to be policed based upon whatever local support a governor could arrange, rather than any sort of organised force to draw upon. I believe he is correct, though I would argue the point that what a governor had was actually a variety of personnel available which he himself could organise, if given enough time in office and with sufficient motivation and resources. As the Roman system was specifically designed not to allow a governor to stay in one place long enough to organise such a thing (presumably in order to prevent said official from developing his own power base with which to attack the Emperor), the effect is the same.

#### **Part V. Conclusion:**

Asymmetrical strategies and small force tactics are, by dint of the current political situation, an area of warfare studies that is receiving a great deal of attention at the moment. What the current studies have shown is that our modern understanding and even definition of these concepts is fluid at best, meaning that our ability to understand them in an ancient setting is even more unstable. | Because of this, almost any attempt to translate Graeco-Roman terms must first be prefaced with a definition for the modern English so as not to confuse the reader..

The main focus of this chapter has, of course, been the instances of small force operations

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by both the Romans and their desert-based adversaries. We have noted that there is very little difference in adaptations between Roman practice in North Africa and in the East; much as Callwell advises the main successful strategies are assaults against the support base, including both political, popular, and physical support, physical constraint to reduce or destroy enemy mobility and flexibility, increasing one's own tactical mobility and flexibility, forcing set-piece battles and, if necessary, annihilation of leadership and/or the entire enemy force and their supporters. Tactics include scorched Earth, an increase in light-armed forces for battles and the development of flying columns; the latter in association with chains of garrisons were the usual methods of physical constraint.

These methods, however, were not confined to the desert. Agricola's campaign against the Britons in the mountainous terrain of Scotland and Wales also featured the use of mobile troops against the Ordovices when they would not fight in the plains (18), as well as the cultivation of terror (18), chains of forts (23), and flying columns (25). Though we cannot say for certain what the climatic conditions were during the time period, these regions could hardly be considered arid. None of the tactics used by either the Romans or their adversaries were desert-specific, though most did feature the use of hills (or, in the case of Theodosius, the fear of the hills) as sites for ambushes. We are told that Tacfarinas did flee into the desert, but that seems more because the desert was there and his home territory which he knew the Romans could not or would not penetrate rather than anything to do with it being a desert. Returning to the modern studies, Callwell, in his discussion of hill warfare, does not differentiate between arid, semiarid and non-arid; he simply states that the terrain is ideal for guerrilla warfare. Therefore, I believe the key factor was that the terrain was mountainous, rather than arid, in determining whether small force tactics would predominate; this would explain why the only major instances of small force operations in the Roman/Parthian conflict took place in mountainous Armenia.

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It is also the case that constraining movement in deserts is a double-edged sword; though there are fewer places it would be viable to maintain a settlement, many of those places are virtually impossible to find without advance knowledge of the region. Local small force groups do have a decided advantage in this area, especially given the frequent problems the Romans had in obtaining accurate intelligence.

Finally, once an area was under Roman control they used small contingents of their military forces for what would be considered 'police' activities in modern terms. These included patrolling and various other security operations, such as guarding areas in watchtowers or garrisons, controlling traffic across the *limes*, and also having powers of arrest and interrogation. In desert areas, the Romans may have used camelry for policing but the evidence is open to interpretation. As elsewhere, the Roman control of roads and their network of road stations, garrisons and cities under their control would have offered them control of the territory around the roads as well as the traffic upon them.

Chapter Six

Conclusions

**Part I. Introduction:**

This project began with the intent to examine if and how the Roman army adapted its preparation and fighting styles when operating in an arid or semi-arid environment. Those operations were further limited to those that took place between 108 BC and AD 400, and included operations in North Africa, Egypt, and the Roman East. Let us briefly revisit the main points of the earlier chapters.

**A. Logistics:** This section dealt with aspects of military operation such as intelligence gathering, specifically that of geographic and ethnographic data, and logistical support for provinces as a whole, armies on campaign and soldiers in battle. The methods of gathering data within a desert environment were very similar to those without. Geographic and ethnographic data on the whole were poor compared with a modern standard, but the shortfalls were less to do with the region being desert than the fact that they were remote from the Roman heartland. We are badly hampered by lack of data with regard to logistics after the Punic Wars in all regards; the best that can be said is that there seems to have been a system in operation which was slightly different from the Western counterparts. We have some evidence for logistical changes on some marches through areas known to be waterless, but these examples seem to be considered extraordinary, and if there were any standard changes we are not aware of them. The major difference in logistical terms for the desert regions is the incorporation of camelry. We have evidence that camels were used for communications and there is historical precedent for their use as beasts of burden, but our understanding of the specifics of their use is poor.

**B. Pitched battles and Sieges:** We see in both the East and North Africa a definite increase in the amount of cavalry in the Late Empire, though this is not a phenomenon confined to the

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desert. There is also the incorporation of camelry forces totalling between 5 and 10% of the total forces and 15-17% of individual mounted units, though their exact duties are unclear. Finally, indigenous archery units were incorporated. This all suggests an increased need for mobility.

There was very little wide scale change in either pitched battle or siege. There were some instances where terrain and dust caused problems for siege engines and other equipment, and thirst, hunger and disease (including heat-related and unfamiliar food and other animals) did cause problems. These, however, would also have been found in other environments. There was some change in practices based upon the fighting styles of the opposing forces but again there were no blanket changes.

**C. Small-force warfare and Policing:** The Romans did frequently run into small, decentralised forces in the East and North Africa, and did sometimes suffer heavy losses. But the Romans were able to adapt on both the strategic and tactical levels to defeat these forces, thus helping to refute the idea that the Romans were unable to contend with such tactics. On the tactical level, they would increase their mobility by incorporation of lighter-armed groups and cavalry, especially Numidian cavalry. They would also march in a formation that would allow them to be prepared for an assault upon any side.

On the strategic side, in the case of multiple groups operating at once (i.e., Judea) the Romans would allow them to fight each other, actively encouraging sedition and other in-fighting amongst the groups or amongst their leadership in order to diminish their forces. They also reduced the small forces' mobility by assaulting their political, public and practical support bases and constraining their movements throughout their own territory. Once the small forces could not act as traditional small forces anymore, they would be forced to meet the Romans in pitched battles and/or sieges, neither of which the small force groups were militarily strong enough to be able to withstand.

During peacetime, Roman forces would act as police. The forts along the roads are clearly

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built to control water sources rather than to watch for or defend against high intensity warfare; though they could certainly be used to diminish and delay such an enemy in the event it arose, this seems to have been a secondary effect.

Let us now begin to analyse the data acquired by the variables of space and time.

## **Part II. Changes to Roman Operations Over Space:**

As was stated in Chapter One, desert terrain is extremely variable. This is the case even between deserts of similar type, and even within the same desert. Despite this, however, there appears to have been little difference in adaptation. Part of this may relate to lack of specific information, or part may simply be parallel evolution, wherein similar solutions are found to similar problems independent of each other.

The groups living in both the North African desert and the East were militarily light and mobile troops. Though the surrounding terrain may have differed somewhat, due to the requirements of any widescale movement, i.e., being on a road with artificial or natural water sources present along the route and at termini meant that Roman and any other large scale movement was quite constrained in both places. The small carrying capacity and widely scattered resources of the regions meant that small groups would be the norm, and we know that many of the highly mobile groups would or could engage in pastoralism, meaning that they would be accustomed to desert routes not known to the Romans, i.e., 'off-roads' or trackless areas; Viriathus used these to great effect in Lusitania, however, so this is not confined to purely desert regions; in *Agricola* 37 the Britons fled from Agricola into the trackless wilderness in what is most certainly not a desert environment. Small force operations generally took place in hills or mountains and thus were no different from other Roman campaigns in mountainous regions that were not arid (e.g., Caledonia). When countering small force tactics, the Romans physically constrained the enemy movements by chains of garrisons and flying columns; again, this was no different from what was

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done in Armenia, Wales and Scotland, so it is a response to similar enemy tactics and similar hilly terrain, not the desert itself.

The major change in the Roman army which was predominantly desert-based was the incorporation of camelry. This is poorly understood in both regions, but we do know that the percentage of camelry troops in garrisons in both regions was roughly the same. Because we have so little extant evidence with regard to use, however, we cannot compare or contrast use.

Thus, as far as we can tell, there seems to have been very little difference between operations in North Africa and the East. Indeed, there are very few changes between what we see in the desert regions and outside them.

### **Part III. Changes to Roman Operations Over Time:**

Over time, the major changes to operation are reflective of the changes going on in the Republic and Empire. The establishment of Roman rule led to an army which was in charge of guarding the peace rather than actively expanding the Imperial holdings.

With regard to logistics, one mild criticism of Roth's work is that it stops at the Punic Wars and assumes that the particular system of operational, tactical and supply depots did not change after this point. What this study has underscored is the lack of data which would allow us to tell. As we have only a few instances of overall logistical failure in regions which had an established Roman presence (and those generally for reasons of plague, blight or other non-warfare problem) we can perhaps assume that the particular systems were in place and generally functional, but that is an argument from silence and must be treated as such.

Over the course of the study we can see that the style of warfare more or less followed the expanse of Roman territory. When in an expansionist phase, there were more pitched battles and sieges as well as small force operations when and where applicable; when Roman domination had been established, most conflict was utilising small force tactics until the *latron* in question became

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leader of a large enough group to attempt more orthodox warfare, e.g, Tacfarinas' attempts at siege. This is most likely to do with the problems noted by Sallust's Marius, in that small force operations, though effective, cannot be used to take and hold territory.

We have three major instances of 'revolt', or groups utilising asymmetrical strategies in roughly the same area in North Africa. What we see in the cases of the Jugurthine War and the campaigns of Tacfarinas is that the Roman response was essentially identical; physical constraint with garrisons and flying columns, and assaults to reduce popular, political and physical support. In the case of Theodosius' campaign against Firmus, he uses much the same tactics apart from chains of garrisons, though we are told that he sent Romanus to take charge of the frontier defences and that he reviewed the legions already in place. By this campaign it would seem that the garrisons and their zones of control had already been established. This is the only major change, though Ammianus' and Tacitus' descriptions do not give a great deal of detail and the former has several lacunae, so it is possible that some aspects are not extant.

We do not have such continuity in the East or Egypt with regard to military activity. Small force warfare seems to have been somewhat endemic, though it would most likely be categorised as traditional brigandage rather than something more political apart from the specific instances discussed in chapter five. Zones of control held by strong points constrained movement, just as in North Africa over the time period in question, and flying columns and/or the chains of forts along the roads were used to quell any increasing banditry.

#### **Part IV. Conclusions:**

This study asked what innovations or changes occurred when the Roman army entered the desert, and whether any changes that were seen were part of an overall institutional change based upon environment. The answer to the former is that we saw some incorporation of camelry and indigenous archer units, though the exact use of the former is unclear at best. We see a great

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increase in cavalry, but that is also seen elsewhere in the Empire wherever there is a need for greater tactical mobility and flexibility, so that is a response to an opponent rather than the desert. The same holds true for the constraint of guerrilla forces through flying columns and garrisons as well as denying them a support base-- similar actions were taken in Armenia, Wales and Scotland, all non-desert regions. The control of traffic is also apparent at Hadrian's Wall in the north of England, so it too has nothing to do with environment; in the desert however one would be further constrained with regard to the use of roads and guides. The increase in fort-building in the late third and fourth centuries was likewise paralleled elsewhere. The one thing that should be changed due to the desert conditions, i.e., increased supply requirements for humans and animals, is something that we have no evidence for and can only guess.

Thus the Romans did not seem to change ahead of time their overall approach when sending an army into the desert. This should not be all that surprising, however, when we recall two of the main points that Gilliver's work on Roman military treatises revealed were to reinforce the realisation that the Roman army was flexible and fluid by nature, and that the Roman commanders seemed to allow local conditions to dictate their operational specifics. As this study has pointed out in its introductory chapter, not only is one desert not like another but even one section of the same desert may be vastly different from another. The Romans would have quickly become aware of this fact, if it was not already presupposed; the modern conceit of 'seen one [region] seen them all' is based upon centuries of exploration and the ease of access to geographic and climatic information. The ancients would not have had such preconceptions. I therefore believe that no one set of regulations or standards were instituted by the Roman army heading into desert conditions because the commanders believed that to decide upon a course of action before they (or their intelligence gatherers) would be contrary and limiting to their best interests. Instead, they would make their decisions on the ground, based upon whatever information they had available at the time. Too

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much pre-planning could have caused a lack of flexibility for the army, which could be deadly when having to adapt quickly to new and unforeseen situations. The increased tactical flexibility noted in the East and North Africa reflects an increase in tactical flexibility generally by the army. Certain specifics may have been predominantly desert-based, such as camels, though at four garrison sites on the Danube (Vindonissa, Vermania, Abodiacum and Vindobona) camel bones have been found as well, though their use of camels is if anything more unclear than desert-based use.<sup>269</sup> Thus the results of this study support the argument that the Romans did not adapt to the East (or North Africa) due to climate, terrain, or anything else; any changes referenced in the texts were merely an expression of the tactical flexibility which allowed them to respond to individual situations as they arose. That flexibility was always inherent in the Roman system, and it increased over time no matter the region. The variable of space/arid-environment that this study introduced had, as far as we are able to tell from the extant evidence, only minor effects upon the Roman operations, and what changes were made both reflect standard Roman practice of letting circumstances dictate action and also are similar enough to actions taken outside the desert to be considered as variations upon a the theme of reaction to these circumstances. The mountains of North Africa were unsafe for Roman forces to enter for the same reason the Welsh hills were; because they were mountains and therefore perfect terrain for enemy small force operations. The fact that the North African hills were hot and dry was an added concern but it is comparable to the concerns of poor footing and visibility due to rain and fog in Britannia; both are simply another element present and will be adapted to as needed, just as one would adapt one's order of battle to the features of the battlefield.

Looking for an overall 'way of war' in the desert, or, indeed, any particular region, is, in my opinion,

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<sup>269</sup> Keller, C., *Geschichte der schweizerischen Haustierwelt*, Fraunfeld, 1919, p.42, Garbsch, J. and Kos, P., *Das Spatromische Kastell Vermania bei Isny I*, C.H. Beck'sche Verlagsbuchhandlung, Munchen, 1988, p 53, Werner, J., *Studien Zu Abodiacum-Epfach*, C.H. Beck'sche Verlagsbuchhandlung, Munchen, 1964, pp 218-223, Berger W. and Thenius E., 'Uber Romerzeitliche Kamelfunde im Stadtgebiet von Wien,' in Neuman, A., *Ausgrabungen und Funde im Wiener Stadtgebiet 1948/49*, Verlag fur Jugend Und Volk, Wien, 1951 pp. 20-22. There have also been four camel bones found in Roman Iberia in civil contexts; as this work is focusing upon the military, I have elected to exclude them. Muñiz, A.M. et al, 'Dromedaries in Antiquity: Iberia and Beyond,' *Antiquity*, Vol 69: 263, pp. 368-375.

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not applicable; the Romans simply would not have thought in this way. Though there is not enough data to address the logistic aspects of adaptation with any degree of confidence, tactically speaking, they adapted not to each region so much as to each battle. Thus I would argue that any similarities seen between operations in similar climates, types of terrain or environments are neither overall policy nor extensive pre-planning but parallel evolution, nothing more.

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