THE LOGISTICS OF THE ROMAN ARMY AT WAR (264 B.C. - A.D. 235)

JONATHAN P. ROTH

BRILL

THE LOGISTICS OF
THE ROMAN ARMY AT WAR
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COLUMBIA STUDIES
IN THE
CLASSICAL TRADITION

under the direction of

VOLUME XXIII

THE LOGISTICS OF
THE ROMAN ARMY AT WAR
(264 B.C. - A.D. 235)

BY

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This book is printed on acid -free paper.

To Susan,
the love of my life,
and to
Zoe, Desdemona and Othello

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PREFACE

Unless otherwise noted, English translations, are taken from the Loeb Classical Library, with occasional minor changes by the author. Translations of Vegetius are from N.P. Milner, *Vegetius: Epitome of Military Science*, Liverpool: Liverpool University Press, 1993. Secondary literature is cited by author's name and date of publication—for full title and reference see the bibliography.

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I would like to thank and acknowledge the German Archaeological Institute in Rome and the Westphalian State Roman Museum in Haltern for their kind permission to reproduce these photographs.

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ABBREVIATIONS

AE	=	*L'année épigraphique* (Paris, 1893–)
Ael. Arist. *Rom.*	=	Aelius Aristides, *To Rome*
Agg. Gen.	=	*Aggadat Genesis*
Amm. Marc.	=	Ammianus Marcellinus, *Roman History*
App.	=	Appian
BCiv.	=	*Civil Wars*
Gal.	=	*Celtic Wars*
Hann.	=	*Hannibalic Wars*
Hisp.	=	*Spanish Wars*
Ill.	=	*Illyrian Wars*
Mac.	=	*Macedonian Wars*
Mith.	=	*Mithridatic Wars*
Pro.	=	*Introduction*
Pun.	=	*Punic Wars*
Sic.	=	*Sicilian Wars*
Syr.	=	*Syrian Wars*
Apul.	=	Apuleius
Met.	=	*Metamorphosis*
Arr.	=	Arrian
Anab.	=	*Alexander's Campaigns*
Acies	=	*Order of Battle against the Alans*
Peripl. M. Eux.	=	*Voyage Around the Black Sea*
Tact.	=	*Essay on Tactics*
Ath.	=	Athenaeus, *The Learned Banquet*
Aul. Hirt. *BGall.*	=	Aulus Hirtius, *Gallic Wars* (Book 8)
BGU	=	*Berliner griechisch Urkunden (Ägyptische Urkunden aus den Museen zu Berlin. Grieschische Urkunden)* (Berlin, 1895–)
BM	=	*British Museum Papyrus*
Caes.	=	Caesar
BGal.	=	*Gallic War*
BCiv.	=	*Civil War*

[Caes.]	=	Pseudo-Caesar
BAfr.	=	*African War*
BAlex.	=	*Alexandrian War*
BHisp.	=	*Spanish War*
Cato *Agr.*	=	Cato, *On Agriculture*
Cic.	=	Cicero
Phil.	=	*Phillipic Orations*
Ad Fam.	=	*Letters To His Family*
Balb.	=	*For Balbus*
Font.	=	*For Fonteius*
Tusc.	=	*Tusculan Disputations*
[Cic.] *In Sall.*	=	Pseudo-Cicero, *Invective against Sallust*
CIL	=	Th. Mommsen, *et al.* (eds.), *Corpus Inscriptionum Latinarum* (Berlin, 1863–)
CISem.	=	E. Renan (ed.), *Corpus Inscriptionum Semiticarum* (Paris, 1881–)
Cinc. *De Re Mil.*	=	Cincius, *On Military Law*
Cod. Iust.	=	*Codex Iustinianus*
Cod. Theod.	=	*Codex Theodosianus*
Col. *RR*	=	Columella, *On Rural Matters*
CPL	=	R. Cavenaile (ed.), *Corpus Papyrorum Latinarum* (Wiesbaden, 1958)
Curt.	=	Q. Curtius Rufus, *Life of Alexander*
Dig.	=	*Digest*
Dioc. *EP*	=	Diocletian's *Price Edict*
Dio Cass.	=	Dio Cassius, *History of Rome*
Diod. Sic.	=	Diodorus Siculus, *Universal History*
Dion. Hal. *Ant. Rom.*	=	Dionysius of Halicarnassus, *Roman Antiquities*
Dos. *Hadr. Sent.*	=	Dositheus, *Sayings of Hadrian*
Eph. Epigr.	=	*Ephemeris Epigraphica, Corpus Inscriptionum Latinarum Supplementum* (Berlin, 1872–)
Epict.	=	Epictetus
Festus *apud Diac.*	=	Sex. Pompeius Festus epitomized by Paulus Diaconus, *On the Meaning of Words*, in W.M. Lindsay, *Glossaria Latina*, vol. 4, 93–467.

Fink	=	R.O. Fink, *Roman Military Records on Papyrus* [= American Philological Association, Monograph 26], Cleveland: Case Western University Press.
FIRA	=	S. Riccobono, *et al.* (eds.), *Fontes Iuris Romani AnteIustiniani* (Florence, 1940–3)
Front.	=	Frontinus
Aq.	=	*On Aqueducts*
Strat.	=	*Strategems*
Gaius *Inst.*	=	*Institutes*
Gal. (ed. Fichtner)	=	G. Fichtner, *Corpus Galenicum*, 1990.
Nat. Fac.	=	*On Natural Faculties*
Pres.	=	*On the Preservation of Health*
Gel. *NA*	=	Aulus Gellius, *Attic Nights*
HA	=	*Historia Augusta*
Alex. Sev.	=	*Life of Alexander Severus*
Aurel.	=	*Life of Aurelian*
Avid. Cass.	=	*Life of Avidius Cassius*
Claud.	=	*Life of Claudius II*
Gord.	=	*Life of Gordian*
Hadr.	=	*Life of Hadrian*
Pesc. Nig.	=	*Life of Pescennius Niger*
Sev.	=	*Life of Septimius Severus*
Tyr. Trig.	=	*Life of the Thirty Tyrants*
Hdt.	=	Herodotus, *History*
Herod.	=	Herodian, *History of the Empire after Marcus*
[Hyg.] *De mun. castr.*	=	Pseudo-Hyginus, *On the Building of Camps*
IGRR	=	R. Cagnat, *et al.* (eds.) *Inscriptiones Graecae ad Res Romanas Pertinentes* (Paris, 1906–27)
ILAfr.	=	R. Cagnat (ed.) *Inscriptiones Latinae Africae* (Paris, 1923)
ILS	=	H. Dessau (ed.), *Inscriptiones Latinae Selectae* (Berlin, 1892–1916)
Isid. *Etym.*	=	Isidore, *Etymology*
Jos.	=	Josephus
AJ	=	*Antiquities of the Jews*
BJ	=	*Jewish War*
Vit.	=	*Life*

Jul. Obseq. Prod. Lib.	=	Julius Obsequens, *On Prodigies*
Livy	=	*History of Rome*
Per.	=	*Epitomes*
Luc. *BCiv.*	=	Lucan, *The Civil War*
[Luc.] *Luc.*	=	Pseudo-Lucian, *Lucius The Ass*
Lyd. *Mag.*	=	John Lydus, *On Magistrates*
Mas. Doc. [Cotton & Geiger]	=	H. Cotton & J. Geiger (eds.), *Masada II: Papyri*, Jerusalem: Israel Exploration Society, 1989.
Matt.	=	Gospel of St. Matthew
[Maur.] *Strat.*	=	Pseudo-Maurice, *On Generalship*
MRR	=	T. Robert S. Broughton, *The Magistrates of the Roman Republic*, 2 vols., Cleveland: Case Western University Press, 1951.
Nep. *Eum.*	=	Cornelius Nepos, *Life of Eumenes*
Non.	=	Nonius Marcellus, *On the Meaning of Words*, in W.M. Lindsay (ed.), *De compendiosa doctrina*, 1903.
OGIS	=	W. Dittenberger (ed.), *Orientis Graeci Inscriptiones Selectae*, Leipzig.
Onas. *Strat.*	=	Onasander, *On Generalship*
Paus.	=	Pausanias, *Tour of Greece*
P. Amh.	=	B.P. Grenfell and A.S. Hunt (eds.), *Amherst Papyri*, 2 vols. (London, 1900−01)
P. Beatty Panop.	=	T.C. Skeat (ed.), *Papyri from Panopolis in the Chester Beatty Library* (Dublin, 1964).
P. Dur.	=	C.B. Welles, *et al.* (eds.) *The Excavations at Dura Europa, Final Report 5 pt. 1: The Parchments and Papyri*, 1959
P. Gen. Lat.	=	J. Nicole and C. Morel (eds.), *Archives militaires du 1er siècle (Texte inédit du Papyrus Latine Genève No. 1)* (Geneva, 1900)
P. Hamb.	=	P.M. Meyer (ed.), *Griechische Papyruskunden der Hamburger Staats- und Universitätsbibliothek* (Leipzig-Berlin, 1911−24)

P. Lond.	=	F.G. Kenyon and H.I. Bell (eds.), *Greek Papyri in the British Museum* (London, 1893–1917)
P. Oxy.	=	B.P. Grenfell, A.S. Hunt, *et al.*, (eds.), *The Oxyrhynchus Papyri* (London, 1898–)
Plaut.	=	Plautus
Mil. Glor.	=	*The Braggart Soldier*
Trun.	=	*Truculentus*
Plin. *HN*	=	Pliny the Elder, *Natural History*
Plin.	=	Pliny the Younger
Ep.	=	*Letters*
Pan.	=	*Panegyric*
Plut.	=	Plutarch
Aem. Paul.	=	*Life of Aemilius Paullus*
Alex.	=	*Life of Alexander*
Ant.	=	*Life of Marc Antony*
Apophth. (Scip. Min.)	=	*Sayings of the Great Romans (Scipio Minor)*
Brut.	=	*Life of Brutus*
Caes.	=	*Life of Caesar*
Cato Mai.	=	*Life of Cato the Elder*
Cato Min.	=	*Life of Cato the Younger*
Cic.	=	*Life of Cicero*
Cal.	=	*Life of Caligula*
Crass.	=	*Life of Crassus*
Fab. Max.	=	*Life of Fabius Maximus*
Luc.	=	*Life of Lucullus*
Mar.	=	*Life of Gaius Marius*
Marc.	=	*Life of Marcellus*
Mor.	=	*Moralia*
Pomp.	=	*Life of Pompey*
Sert.	=	*Life of Sertorius*
Sulla	=	*Life of Sulla*
Polyaenus, *Strat.*	=	*Stratagems*
Polyb.	=	Polybius
Porph. *ad Hor. Sat.*	=	Porphyrio, *On Horace's Satires*
PSI	=	*Papiri Greci i Latini, Pubblicazioni della Società Italiana,* (Rome, 1912–57)
Quad. *Ann.*	=	Quadrigarius, *Annals*
Quint. *Inst.*	=	Quintilian, *Institutes*
Res Gest. Divi Aug.	=	*Autobiography of Augustus Caesar*

RIB	=	R.G. Collingwood and R.P. Wright (eds.), *The Roman Inscriptions of Britain* (Oxford, 1965)
RMD II	=	Margaret M. Roxan, *Roman Military Diplomas, 1954–1977*, [= Institute of Archaeology Occasional Papers No. 2] (London, 1977)
Sall.	=	Sallust
Cat.	=	*Catilinarian Conspiracy*
Hist.	=	*History*
Iug.	=	*Jugurthine War*
SB	=	Fr. Preisigke, *et al.* (eds.) *Sammelbuch griechischer Urkunden aus Ägytpen* (Strassburg, Heidelberg, Wiesbaden, 1915–)
SEG	=	J.J.E. Hondius, *et al.* (edd.), *Supplementum Epigraphicum Graecum* (Leiden, 1923–1971)
Sen. *Phoen.*	=	Seneca, *Phoenician Women*
Serv. *de Aen.*	=	Servius *Commentary on the Aeneid*
Stat. *Silv.*	=	Statius *Silvae*
Strabo	=	*Geography*
Suet.	=	Suetonius
Aug.	=	*Life of Augustus*
Rel. Reif.	=	A. Reifferscheid (ed.) *Praeter Caesarum libros reliquae.*
Galb.	=	*Life of Galba*
Jul. Caes.	=	*Life of Julius Caesar*
Tib.	=	*Life of Tiberius*
Vesp.	=	*Life of Vespasian*
Vit.	=	*Life of Vitellius*
Tac.	=	Tacitus
Agr.	=	*Agicola*
Ger.	=	*On Germany*
Ann.	=	*Annals*
Hist.	=	*Histories*
Thuc.	=	*Thucydides*
TLL	=	*Thesaurus Linguae Latinae*
Val. Max.	=	Valerius Maximus
Varro		
Ling.	=	*On the Latin Language*
Rust.	=	*On Rural Matters*
Vell. Pat.	=	Velleius Paterculus

Veg.	=	Vegetius
Epit.	=	*Epitome of Military Science*
Mul.	=	*Veterinary Medicine*
Verg. *Aen.*	=	Virgil, *Aeneid*
WO	=	U. Wilcken, *Griechische Ostraka aus Aegypten und Nubien* (Leipzig-Berlin, 1899)
Xen. *Hell.*	=	Xenophon, *History of Greece*
Zon.	=	Zonaras

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INTRODUCTION

Strategy is to war what the plot is to the play; Logistics furnishes the stage management, accessories, and maintenance. The audience, thrilled by the action of the play and the art of the performers, overlooks all of the cleverly hidden details of stage management. . . .

George C. Thorpe[1]

Ancient historians use the term logistics to refer to a variety of different military functions.[2] For example, under the rubric of logistics, Jacques Harmand discusses the organization and the financing of the army, the train and baggage, as well as medical services.[3] John Paul Adams covers military roads, ports, fleets, and supply,[4] and Donald Engels concerns himself almost entirely with provisions.[5] Arthur Ferrill, in a general survey of ancient warfare, defines logistics simply as "organized supply."[6] Both François Berárd and Patrick Le Roux, in studies of the Roman army's supply system, refer to its

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[1] Thorpe (1917) 4.

[2] The classical Greek word *logistikê* (sc. *technê*), meant the art of calculation, and, in a military context, was used to refer to any aspect of strategic or tactical operations that was based on quantitative calculation, whether in connection to movement, equipment, organization, or fighting. It is first used in the tenth century by the Byzantine emperor Leo the Wise in the sense of the science of supplying an army. Eighteenth century writers employ the term *logistique* in the general sense of military quartering. Under the influence of the military theorist Henri de Jomini the word acquired a more narrow meaning, referring only to the organization necessary to keep an army moving. There is uncertainty as to the relation of the Greek to the French term. Jomini (1838) 37 derived *logistique* from the French *major-général des logis*, and this etymology is widely accepted, but Perjés (1975) 26, note 62, insists on a derivation from *logistikê*. The term gradually passed out of use in Europe, but continued to be employed in the United States (where Jomini's influence was stronger) and expanded its meaning to refer to all aspects of supplying an army and to moving the necessary materiel, in the required condition, to the correct place at the proper time. Thorpe (1917) 14–17; Hatton (1956) 173; Seibert (1986) 26; Falk (1986) xvii–xx.

[3] Harmand (1967) *passim*.

[4] Adams (1976) *passim*.

[5] Engels (1978) *passim*.

[6] Ferrill (1985) 38.

"*revitaillement*" or "provisioning" and both confine themselves to a discussion of the supply of food to the army. Yann Le Bohec, in his superb study of the imperial army, retains this usage.[7] Recent English and American studies of logistics, like that of John Shean on Hannibal's army in Italy, and Adrian Goldsworthy's survey of the Roman army at war, used the term "logistics" to refer to provisioning and army transport.[8] In recent German studies of Roman supply, Theodor Kissel and Marcus Junkelmann use "*Logistik*" to cover the supply of food, its transportation and administration, as well as medical and sanitation services.[9]

Some military historians, for example, Anton Labisch, deny that even the term logistics is applicable to ancient conditions as it suggests a modern supply system.[10] Although the Romans did not have a word which directly translates logistics, they certainly understood its practice in the field and, further, considered the provisioning of armies a matter of scientific study.[11] The Latin term closest to logistics, in the modern sense, is *res frumentaria*, although it appears only in Caesar and does not seem to be a technical expression.[12] *Copia, annonaria, frumentum*, and *commeatus* are all used in the sense of "military supplies," though in each case as a secondary meaning of the word.[13]

The Roman army took a vast array of materiel into the field: clothing, armor, edged weapons, missiles, tents, portable fortifications, cooking gear, medical supplies, writing materials, and much more. In a broad sense, logistics refers to the supply of all of these items to the army. Yet, approximately ninety percent of the weight of the supplies needed by an ancient army was made up of only three elements: food, fodder and firewood.[14] All military decisions from the basic strategic concept to the smallest tactical movements were affected by, and often determined by, the need to provide these supplies to the

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[7] Le Bohec (1994) 51–2.
[8] Shean (1996) 159ff.; Goldsworthy (1996) 291ff.
[9] Kissel (1995); Junkelmann (1997).
[10] Labisch (1976) 1 note 1; cf. Seibert (1986) 11 note 2; Kissel (1995) 5.
[11] Veg. *Epit.* 3.3 is a good example.
[12] Caes. *BGal.* 1.23, 39, 2.2, 7.3, 10; *BCiv.* 1.16, 54, 2.22, 3.9.
[13] Sall. *Iug.* 46.5; Caes. *BGal.* 1.49, 2.5, 3.2; *BCiv.* 3.49, 53, for the vocabulary of logistics in Caesar see Labisch (1975) 37–8.
[14] Van Creveld (1977) 24.

army.[15] The basic structure of logistics before the introduction of fire-arms was determined almost completely by provisioning. Although the questions of arms, weapons and equipment are important, they are decidedly secondary. In this study, the term logistics refers to the supply and transport of the Roman army's food, fodder and firewood.

As with so many human institutions, logistics is least observable when it works well, and usually only enters the historical record when it breaks down. Researching military supply should not merely investigate individual circumstances or questions of particular details, but "rather . . . should be a picture of the supply situation under normal . . . circumstances."[16] This study attempts to view the logistical system of the Roman army as a whole, taking all of its elements—including needs, resources, technology and administration—into con-sideration. The supply of equipment and ammunition, however, has not been discussed.

Understanding modern logistics involves plowing through moun-tains of statistics, but the examination of ancient logistics faces a paucity of evidence, and an almost complete lack of statistical data. For this reason, Goldsworthy does not think it possible to write a comprehensive study of the subject:

> The study of an army's logistics requires reliable statistics. In the case of the Roman army, these are not available.[17]

There is some truth in this. Reconstructing the Roman supply sys-tem involves collecting scattered evidence from many sources—liter-ary, documentary, and archaeological—and one must rely to a great extent on modeling and comparative data.[18] Such data cannot merely be strung together, rather each element must be analyzed critically, both for its veracity and its applicability.

The numerals transmitted in ancient sources are vital to the study of logistics, but their use is problematic. Estimated numbers of armies given by historians are often wrong and prone to exaggeration for polemical or rhetorical reasons. Numbers can also suffer from the natural distortion of manuscript transmission: those written out as

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[15] See Chapter Seven.
[16] Labisch (1975) 9.
[17] Goldsworthy (1996) 296.
[18] Foxhall & Forbes (1982) 65.

words are not necessarily more reliable than numerals, as copyists
replaced one with the other randomly. Jonathan Price takes a very
critical view of numbers, advising the historian to "doubt [figures]
unless they are absolutely provable."[19] Establishing "proof" for the
accuracy of ancient numbers, however, is almost always impossible,
except where physical objects are concerned. Numbers in any ancient
source should neither be accepted nor rejected categorically and the
best method for judging numbers is to look at their plausibility, and
coherence.[20] It is important to note the context of a number, the
purpose of a work, the author's method and sources.

  Although ancient weights and measures are often not consistent
or precise, sometimes one must translate these ancient amounts into
modern ones for the purpose of calculation. This results in the man-
ufacture of precise-looking numbers, although these figures are, in
fact, only rough estimates. Franz Stolle, for example, in transforming
ancient weights and measures to modern ones, brought his calculation
to the third decimal point. This apparent precision invited derision,
although Stolle himself emphasized that these numbers were merely
estimates.[21] Thus, although the seemingly precise figures given in this
study might appear similar to those in modern statistical studies, this
is merely the unavoidable result of quantification.[22] Sometimes, the
best one can do is "combine unsure estimates of the numbers of
men and animals with the equally unsure estimates of needs for var-
ious supplies."[23] There are, however, factors that have remained con-
stant with regard to military logistics from Roman into modern
times.[24] The judicious use of comparative evidence helps the ancient
military historian to address some of the problems posed by lack of
direct evidence.

  Edward Luttwak argued that there was a lack of writing on logis-
tics in antiquity because most ancient historians were aristocrats writ-
ing for other aristocrats.[25] The logistics of military operations is
frequently ignored even in modern military history,[26] so one should

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[19] Price (1988) 26.
[20] Brunt (1971) 27; Cohen (1979) 202.
[21] Stolle (1914).
[22] Watson (1969) 62; Foxhall & Forbes (1982) 42–3.
[23] Labisch (1975) 30.
[24] Peddie (1994) xi.
[25] Luttwak (1993) 5–6.
[26] Lynn (1993) 3–7.

not expect the importance of supply to be spelled out in ancient sources. Yet a quick look at the footnotes in the present study proves that ancient authors have preserved a tremendous amount of information on logistical matters. Of course, not all authors are to be taken as equally trustworthy. One must keep in mind when and where a work is being written, and the author's access to reliable information. One might consider the military expertise of an author as one way of validating his data: clearly a familiarity with military life and technical terminology is important in accurately describing war.[27] Being an experienced and competent soldier, however, does not necessarily make one a military expert. The skills that make a great commander do not automatically translate into an ability to discern and express the underlying nature, or purpose, behind military institutions and actions. For example, Marshal Ney was a better soldier and commander than Jomini, yet the latter was far more of a military expert in the historical sense. Expertise in military writing often requires less the experience of a soldier and more the vision of a historian.

It is true that all pre-modern armies used foraging, but recent studies have revealed the complexity of ancient logistics.[28] In the case of the Romans in particular, investigation has revealed a sophisticated logistical system. In his introduction to a new edition of Thorpe's *Pure Logistics* Stanley Falk writes:

> The Romans blended all these methods [of supply] efficiently into a far-reaching and flexible logistical system. Supported by carefully organizing supply and service forces and a net of well-engineered roads to speed movement and communication, they carried their own stores, drew on local resources and established fortified depots.[29]

As will be seen in the following chapters, the Romans indeed combined foraging, requisition and supply lines into the best organized logistical system the west would see for another 1500 years. While their skill at arranging supply, and using it as a strategic and tactical tool, is not the only reason for Roman military success, it is certainly one of the major factors in it.

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[27] Eisman (1977) 663–5.
[28] Adams (1976) *passim*, esp. 217–246; Seibert (1986) 26; Kissel (1995) *passim*, esp. 120–176.
[29] Falk (1986) xii.

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SUPPLY NEEDS AND RATIONS

Introduction

The Romans were well aware of the importance of good diet in maintaining an effective fighting force. Vegetius emphasizes the need for proper diet both in the army and in a besieged city,[1] citing the military proverb: "Whoever does not provide for provisions and other necessities, is conquered without fighting."[2] The study of military logistics begins with the needs of the individual soldier and of the army's animals. The first chapter discusses the nutritional requirements of the Roman soldier and his diet, as well as other logistical needs such as firewood and fodder.

Nutritional Requirements of the "Average" Roman Soldier

In the 1960s, the Recommended Daily Allowance (hereafter "RDA") for a 19-year old male soldier of the modern United States Army was calculated at 3,600 calories per day.[3] Engels used this figure as a basis for calculating the nutritional requirements of ancient soldiers.[4] This is, however, only a *recommended* daily allowance; it represents the amount of calories and nutritional elements the U.S. Army considered necessary not only to sustain a healthy soldier, but also to accommodate periods of extraordinary activity and to permit "other potential benefits."[5] The *minimum* daily requirement of a soldier is considerably lower and significantly altered by factors such as age, body size, activity and environment.[6] As will be shown below

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[1] Veg. *Epit.* 3.2, 4.7; Davies (1989) 199, 209–11.
[2] Veg. *Epit.* 3.26.
[3] U.S. Army (1961) 23.
[4] Engels (1978) 3.
[5] U.S. Army (1961) 23.
[6] Consolazio (1976) 232; Aymard (1979) 14; Foxhall & Forbes (1982) 44–47.

(p. 12), the Roman soldier's caloric needs were significantly below that of a mid-20th century American soldier (mainly because of size and age), and considerably below the modern American Army's recommended daily allowance.

Poor diet negatively impacts an army's combat capability. Of course, sufficient calories alone do not preclude malnutrition and diet-related diseases, humans require many nutrients for good health. The most important nutrient is protein, which provides eight amino acids essential to tissue growth, the creation of body fluids and the balancing of the nitrogen level in the body. The 20th century U.S. Army recommends approximately 70 grams of protein per day,[7] but, being smaller on average, the amount needed by the Roman soldier was slightly lower. The body also requires Vitamin C to prevent scurvy (Latin *scorbutus*): the U.S. government RDA is 60 milligrams/ day. Polybius reports that, due to poor diet and conditions, Hannibal's men suffered from scurvy (*limopsoros*). Limes, introduced into the British navy in the 18th century are the best known of the antiscorbutics, but a number of foods consumed by the Romans, vinegar for example, provided vitamin C.[8] In addition, small amounts of the amino acid lysine, provided by meat or legumes, is necessary when wheat is the main source of calories, as is the case with Roman diet. Human beings also require other nutritional necessities such as calcium, iron and iodine in small quantities.[9]

In order to maintain life, the minimum caloric intake need not be consistently maintained nor obtained through the daily consumption of food. Stored body fat can also be used to provide the soldier with energy. The rate of burning human body fat is constant and does not depend on age or size: one kilogram of body fat always provides approximately 1600 calories. If caloric intake is reduced only slightly below the minimum, stored body fat can be used for a considerable period. If calories drop too much, however, a soldier's physical and mental abilities will be substantially reduced over the course of as few as two or three days.[10]

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[7] U.S. Army (1961) 7; Engels (1978) 123 uses this figure. Note that Anderson (1984) 85 n. 79 says 54 g. of protein is sufficient for a 19–20 year old of average size and weight.
[8] Curtis (1926) 89.
[9] Aymard (1979) 9–12.
[10] U.S. Army (1961) 20, 29.

Height, Weight and Age of Roman Soldiers

A soldier's weight and height determine the amount of calories required. Adults in antiquity were certainly shorter than today: estimates for the average height of an adult male in ancient times range from 162 cm. (5'4") to 171 cm. (5'7").[11] Passages in both Apuleius and Tacitus suggest, however, that soldiers were taller than the average civilian male.[12] Every potential recruit was inspected before being enrolled, in a process known as the *probatio*.[13] The Roman army certainly had a minimum height requirement which exceeded the average height of the population as a whole. A story from a Talmudic Midrash, dating to the Roman period, makes this point:

> There is a case of a man who conscripted recruits. A man came to conscript someone's son. [The father] said: look at my son . . . how tall he is! His mother said: look at our son, how tall he is. The [recruiter] answered: in your eyes . . . he is tall. I do not know. Let us see whether he is tall. They measured [him] and he proved to be [too] small and was rejected.[14]

Roman records directly attest such measuring of recruits, although determining the exact height requirement is problematic. Vegetius gives the minimum standard, or *incomma*, as "6 [Roman] feet [178 cm.] or 5 feet 10 inches [ca. 173 cm.] among the auxiliary cavalry or the [soldiers] of the legionary first cohort."[15] Although both Fritz Wille and N.P. Milner see Vegetius's figures as an optimum and a minimum figure respectively, the expression *incommam . . . exactam* strongly suggests a regulation height.[16] Vegetius may mean that cavalrymen must be 6 feet and soldiers of the first cohort five foot ten. In any case, these are clearly height requirements for elite soldiers and not for the entire military. Praetorian Guardsmen probably had a higher minimum height than rank and file legionaries until the Septimius Severus started recruiting the latter into the imperial guard at the end of the second century.[17]

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[11] Angel (1968) 264; Angel (1971) 85; Foxhall & Forbes (1982); Bisel (1986) 23.
[12] Apul. *Met.* 9.39; Tac. *Hist.* 4.1; note that according to Polyb. 6.52.10 Italians were generally taller than Phoenicians or Libyans.
[13] Horsmann (1991) 111 and n. 20; Le Bohec (1994) 71–3.
[14] *Agg. Gen.* 40.4, cited in Isaac (1992) 303.
[15] Veg. *Epit.* 1.5; Watson (1969) 39; Silhanek (1972) 50–1, 113–4.
[16] Wille (1986) 33; Milner (1993) 6.
[17] Hdn. 5.4.8; Dio Cass. 75.2.4.

The height requirement for rank and file legionaries was certainly lower than that for elite units. Imperial regulations, though not entirely unambiguous, suggest that the minimum height for new recruits was five Roman feet, seven inches (165 cm., 5'5").[18] Such regulations may not always have been followed, but Roman military service was popular enough to induce the general enforcement of height requirements (note that the couple in the Midrashic anecdote wished their son to become a soldier). Certainty is impossible, but for the army as a whole a reasonable estimate of a soldier's average height is around 170 cm. (5'7").[19] Auxiliary soldiers may have had a lower height requirement (or no height requirement at all) but there is no evidence on this question. With some exceptions (such as obesity) the proportion of height to weight does not vary significantly in most populations, and, therefore, one can use modern height/weight tables to estimate the average weight of the Roman soldier. The U.S. Army's desirable weight tables indicate that a medium framed male 170 cm. (5'7") tall should weigh 65.7 kg. (145 lbs.).[20]

Age also influences caloric requirements—older individuals require fewer calories.[21] To estimate the average age of the Roman soldier, one must consider two factors: the average age of recruitment and the average length of service. In Republican times, the normal age for beginning military service (*aetas militaris*) seems to have been 17 years, although younger enlistment was possible.[22] According to Livy, during the Republic the normal maximum age for active duty was 35, although the consuls sometimes drafted soldiers past this age.[23] He cites an oath administered to draftees in 169 B.C. in which the new soldiers had to swear that they were under 46 years of age, but Livy notes that the army took soldiers up to age 50 in some circumstances.[24] The Republican constitution obligated an adult male with sufficient property to serve for at least ten year-long campaigns (*stipendia*), although not necessarily consecutively. During periods of

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[18] Dos. *Hadr. Sent.* 2; *Cod. Theod.* 7.13.3 with Pharr (1969) 170; Watson (1969) 37; Junkelmann (1997) 21.

[19] The skeleton of a Roman soldier found at Herculaneum, though of no statistical significance, was 174.5 cm. (5'9") in height. Bisel (1986) 20. Another found at Velsen in Holland was even taller: 190 cm. (6'3"), Junkelmann (1997) 19.

[20] U.S. Army (1961) 21, Table V.

[21] Foxhall & Forbes (1982) 47.

[22] Livy 25.5.8; Plut. *Cato Mai.* 1.6.

[23] Livy 22.11.9.

[24] Livy 40.26.7, 42.31.4, 43.7.11.

intense warfare, however, such as the Second Punic War, and in the increasingly professionalized armies of the Late Republic, legionaries probably served longer terms. Thus, the "average" Roman soldier of the Republic was likely to be in his late twenties, and was certainly no longer an adolescent.

A late Roman imperial rescript gives the minimum age for recruitment as 18 years, and given the conservatism of Roman military regulations, this date probably also applied under the Principate.[25] Epigraphical evidence attests recruits as young as 13 years old, but these examples probably reflect special circumstances, such as emergencies, neglect of duty or willful deception.[26] Indeed, one of Caracalla's imperial officials was demoted in 217 A.D. for allowing "immature lads" into the army.[27] A passage in Dio Cassius indicates that the maximum age for enlistment in Imperial times was the same as under the Republic: when men of "military age" did not enlist, Augustus disenfranchised every fifth man under 35.[28] The maximum figure of 35 years of age for enlistment is generally supported by the inscriptions: Forni's study of the military career of 500 Imperial legionaries shows that 75% joined between the ages of 18 and 23.[29] An Oxyrhynchus papyrus of the early first century records the ages of six men enlisting in an auxiliary cohort: the average age was 22 years.[30] The typical Imperial Army recruit was probably closer to 21 than 18 years old.

In the Early Empire, many soldiers served well into their forties and even beyond.[31] Augustus introduced a length of service of 16 years, which was soon raised to 20 years. Although there was a temporary reduction back to 16 years, introduced after the mutiny of 14 A.D., this was soon canceled.[32] On the contrary, the length of service for imperial soldiers rose to 25 years over the course of the first century.[33] This trend continued into the second and third centuries. Although the inscriptions on soldiers' tombs tend to round the

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[25] *Cod. Theod.* 7.13.1; Pharr (1969) 170; Le Bohec (1994) 75.
[26] Keppie (1984) 182.
[27] Dio Cass. 79.13.4.
[28] Dio Cass. 56.1.23.
[29] Davies (1989) 7; Forni (1953) 26–7.
[30] *P. Oxy.* 7.1022 (103 A.D.).
[31] Junkelmann (1997) 18–19.
[32] Tac. *Ann.* 1.78; Dio Cass. 54.25.6.
[33] Dio Cass. 55.1.23, 57.6; Kromayer-Veith (1928) 487–8; Domazewski (1967) 79; Webster (1986) 143.

years of service listed up or down, it appears that the average length of service rose to about 28 years by the reign of Caracalla (211–217)[34] It is clear that the average age of a soldier under the Empire was closer to 30 than to 20 years. The Imperial soldier tended to be older than his Republican counterpart.[35]

The significant point for nutritional needs is not the exact average age of Roman soldiers, but that they, unlike modern American soldiers, were generally not adolescents, since metabolism and caloric requirements decline significantly after the end of adolescence and remain constant until middle age. Engels uses the United States Army RDA of a 175.2 cm. (5'9") tall soldier of average weight, 16–19 years old is 3600 cal./day, but that of a 25-year old soldier of the same height and weight is only 3200 cal./day—a difference of 11%[36] Extrapolating from U.S. Army standards, a Roman soldier 30 years old, 170 cm. tall, of medium build and weighing 66 kg. would have had a RDA of approximately 3,000 calories per day.[37] Assuming that other needs would be reduced proportionally to calories, the average Roman soldier probably would need only about 60 grams of protein per day.

There is no reason to think that, in order to fight effectively, an ancient soldier required more nutrition than a modern one. Even in war an ancient soldier would have experienced long periods of inaction. It is true that troops sometimes made extraordinarily strenuous marches and the physical demands of hand-to-hand combat, even for short periods, were substantial. This last point was well understood by the ancients. Onasander advises feeding troops especially well just before battles in order to prepare them for such bursts of exertion:

> . . . soldiers who have eaten moderately, so as not to put too great a load into their stomachs, are more vigorous in battle, armies have often been overpowered for just this reason, their strength failing for lack of food.[38]

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[34] Le Bohec (1994) 63–4.
[35] Bisel (1986) 20 estimated the age of the Herculaneum soldier as 37.
[36] Engels (1978) 124; U.S. Army (1961) 25, Table VI.
[37] According to U.S. Army (1961) 20, the formula for calculating the adjustment of calories for body size is 0.95 (815 + 36.6W), where W equals weight in kilograms. Although it is not explicitly stated, this formula apparently applies to 25-year old men. For discussion of caloric need of ancient soldiers see Foxhall & Forbes (1982) 57; Van Creveld (1989) 46; Junkelmann (1997) 92.
[38] Onas. *Strat.* 12.1–2.

There are a number of cases in battle narratives in which soldiers are said to fight less effectively due to having skipped a meal before the battle.[39] Lack of water, was even more serious, and Appian attributes Hannibal's defeat at Zama partially to this factor.[40] Nevertheless, it was certainly possible for a soldier to live and fight on substantially less than the modern minimum daily requirement. Routine late medieval and early modern rations provided as little as 2500 calories a day to soldiers.[41]

The Romans, like most armies in history, drew their officer corps from the aristocracy.[42] Both in the Republic and under the Empire, the highest officers were drawn from the senatorial aristocracy, and others from the equestrian order (as it developed). There is no evidence of any height or weight requirements, but there was some societal disapproval of excessively fat officers. Cato the Elder ridiculed a fat equestrian:

> Where can such a body be of service to the state, when everything between its gullet and its groin it devoted to belly?[43]

Appian, in relating the demise of Gaius Vetilius, who as commander of the Roman forces defeated in Spain in 148 B.C., was taken prisoner, says that:

> the man who captured [Vetilius], not knowing who he was, but seeing that he was old and fat, and considering him worthless, killed him.[44]

The minimum age for entering the Senate was 25 years old, but youths of the senatorial class served in the military before this age. Tacitus notes that Domitius Corbulo's son-in-law Annius Vinicianus was "not yet of senatorial age" (*nondum senatoria aetate*), but was, nevertheless, the acting legate of the *V Macedonica* during the Armenian campaign of 61–63.[45]

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[39] Polyb. 11.24.6; Livy 21.54.8, 55.1; Tac. *Hist.* 3.22; App. *BCiv.* 4.16,118.
[40] App. *Pun.* 7,40.
[41] Prestwish (1967) 538; Perjés (1970) 13.
[42] Horsmann (1991) 49–53.
[43] Plut. *Cato Mai.* 9.5.
[44] App. *Hisp.* 11,63.
[45] Tac. *Ann.* 15.28.

Rationing

There are a handful of scattered references to the amounts of food issued to Roman soldiers, the best-known and studied being Polybius' figures for the Republican grain ration.[46] To go beyond these few pieces of data, and reconstruct the ration as a whole, one must rely on comparative evidence, as well as some educated guessing. Of course, the amounts of many items of the ration are conjectural. Nevertheless, it is worthwhile to set out the likely parameters for the amounts, in order to derive reasonable approximations.

   Many ancient states, such as the Greek city-states and the Carthaginian Republic, expected troops to buy their own provisions out of pocket or with a food allowance.[47] The Roman army, in contrast, issued regular rations of grain, and probably other items. From the third century B.C., there is evidence of a set day on which the grain ration was distributed. Livy notes that in the crisis year of 216 B.C. "neither pay nor grain was being furnished to the soldiers and the crews at the proper date."[48] Caesar also refers to a particular day on which the soldiers expect to receive their grain ration.[49] A scholiast to Horace notes that "some people (*nonnulli*)" derive the term *calo* (military servant) from the word *kalends*, "first of the month" "because on that day they receive their rations (*cibaria*)."[50] While such etymologies are suspect, this does suggest that it was common knowledge that the Roman soldier received regular rations. Writing in the mid-second century B.C., Polybius discusses the military grain ration for both Roman and allied troops in some detail. The cost of the Roman soldiers' rations was deducted from their pay, although the state paid for the allies' rations.[51] This pattern continued through the Republic and beyond. Two passages in his commentaries show that Julius Caesar issued rations on a regular basis.[52] Pay records from the late first century show a deduction of 80 *HS* per *stipendium* for food (*in victum*), almost certainly a standard figure throughout the

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[46] For discussions of the various elements of the Roman ration see Stolle (1914); Junkelmann (1997) 86–7, 103–181.
[47] Polyb. 1.68.5,9, 5.75.1, 6.49.8, 28.16.3; App. *Mith.* 10.69.
[48] Livy 23.21.2.
[49] Caes. *BGall.* 1.16.5, 6.33.4.
[50] Porph. *Hor. Sat.* 1.2.44.
[51] Polyb. 6.39.13–15.
[52] Caes. *BGall.* 1.16.5, 6.33.4.

Imperial period.[53] These uniform deductions for food strongly suggest the ration itself was regularized. There were several military advantages to this system: it ensured sufficient food and prevented over-eating and, particularly, over-drinking. The military danger of such over-indulgence was well-known to the ancients.[54] The Roman military ration did not represent the amount that a soldier needed or even actually received, but rather the amount to which he was entitled, according to his rank and status. Polybius notes that allied cavalry received twice the ration of allied infantry, and Roman citizen cavalrymen three times as much.[55] There is evidence, however, that on campaign all soldiers received the same rations, regardless of rank, the difference being made up afterward.[56] This makes sense, as it prevents waste and avoids transportation problems.

Davies argued that the diet of a Roman soldier in a peacetime garrison would have resembled that of the local population, because, generally, the surrounding area provided most of a garrison's food.[57] A study of animal remains in British and German military and civilian sites, however, shows that there was a distinct Roman military diet, and that it tended to influence surrounding diet, rather than vice versa.[58] In any case, it is clear that many foodstuffs, particularly wine, oil and relish, were shipped to military establishments, often from long distances.[59] On the other hand, problems of transportation and storage constrained the variety and quantity of foods available in wartime conditions, so that the diet of the soldier on campaign would have been more monotonous than in garrison. There does seem to have been a particular dietary regime associated with soldiers: the *Historia Augusta* praises Severus Alexander for eating "military food (*militaris cibus*)."[60]

Roman military law strictly controlled the collection of food by

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[53] *P. Gen. Lat.* I. (88–90 A.D.) [= Fink (1971) no. 68]; *Mas. Doc.* 722 (72 or 75 A.D.) [= Cotton & Geiger (1989) 46–7]. Speidel (1973) 141–7 argues that *P. Gen. Lat.* recto I refers to auxiliaries, not legionaries, but it is more likely a legionary pay record, see Watson (1969) 91; Cotton & Geiger (1989) 39ff.

[54] Polyb. 11.3.1, 14.4.9; App. *BCiv.* 2.10,64; Tac *Ann.* 4.48; *Hist.* 1.70.

[55] Polyb. 6.39.12–14, although it is possible that the higher rations were intended to feed grooms as well as the cavalryman himself.

[56] Veg. *Epit.* 3.3.

[57] Davies (1971) 136.

[58] King (1984) 187–217.

[59] Anderson (1992) 58–68; Blázquez (1992) 173–188; Junkelmann (1997) 168–71.

[60] *HA Sev. Alex.* 51.5.

individual soldiers, but Roman soldiers, like soldiers in all ages, doubt-
less did whatever they could to supplement their diet. For example,
Sallust relates an incident during the Numidian campaign of 107 B.C.,
in which an auxiliary soldier from a Ligurian cohort serving on a
water party, stopped to collect edible snails.[61] The army permitted
soldiers to supplement their rations with food purchased from sut-
lers or merchants, who followed the army on campaign. Under nor-
mal circumstances, the Romans strictly controlled the activity and
the provisioning of the sutlers; for example, at the siege of Carthage
in 146 B.C., Scipio Aemilianus ordered that food supplied by sutlers
had to be "soldierly and plain" (*stratiotikê kai psilê*).[62] As plain as the
Roman soldiers' food may have been, as military diets go, theirs was
a varied and healthy one.[63]

Allied and Auxiliary Rations

As with all aspects of the Roman military, most of our information
on diet and rationing applies to legionaries. Scholars sometimes use
the terms "legionary" and "Roman soldier" as if they were synony-
mous, and even when a distinction is made, have a tendency to
ignore the non-legionary forces.[64] Non-legionary troops, whether aux-
iliaries or allies, may not have been "Roman" in the ethnic or legal
sense, but they made up a substantial part of every Roman force
during most of the period under discussion. During the Republic,
Italian allies were required to provide troops to the Romans on
demand by treaty; as noted above, these received a set ration, the
cost of which was borne by the Roman state.[65] Italian allies made
up a significant proportion of all Roman armies, down to their acqui-
sition of Roman citizenship in 89 B.C. In addition to these allied
troops, the Romans recruited auxiliaries from states outside the Italian
confederation. These troops also received Roman rations.

Spanish troops who defected to the Romans from Hannibal's army
in 214 B.C. were awarded double rations (*duplicia cibaria*).[66] As the

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[61] Sall. *Iug.* 93.2.
[62] App. *Pun.* 17,116.
[63] Le Roux (1994) 404.
[64] E.g. Labisch (1975) 30, although he does discuss the provisioning of other
troops, especially with reference to foraging.
[65] Polyb. 6.39.13–15.
[66] Livy 24.47.11.

Roman empire grew, it drew on such auxiliary soldiers from an ever-wider area. By the Third Macedonian War (172–167 B.C.) soldiers were present from as far west as Numidia, and as far east as Lydia and Phrygia.[67] In the imperial period auxiliary and allied forces always accompanied Roman armies in large numbers. For example, out of approximately 60,000 combatants in Vespasian's army in Judaea, only some 20,000 were legionaries.[68] In the Flavian era many of the nominally independent "client" states were absorbed into the provincial structure of the empire and their armies integrated into the regular army.

Ancient sources sometimes remark on the different eating habits of various ethnic groups. For example, when the Macedonian king Perseus prepared provisions for his Gallic auxiliaries, they included not only the normal grain and wine, but also "animals (*pecudes*)."[69] This suggests that the Gauls were carnivorous. On the other hand, the Romans and Greeks also ate meat, so the allusion is uninformative. Appian notes that both German and Numidian warriors "liv[ed] on herbs [or grass] (*poa*)," and that the latter drank only water.[70] Caesar says that the British and German diet consisted of dairy products and meat.[71] It is difficult to ascertain the accuracy of such information and whether different ethnic groups retained their traditional eating habits when fighting for the Roman army.[72] The simplicity of a "barbarian" diet was certainly a literary *topos*, though primitive peoples certainly resort to non-traditional foods, when their normal food supply fails. These few references do not shed much light on the diet of barbarians as allies of the Romans. Given the contingencies of campaign logistics, it is unlikely that there was a significant difference in the food consumed during wartime by auxiliary, allied, and Roman troops. There is no information on the composition and quantity of food eaten by Roman military servants but a comparison with Greek practice would suggest that they ate essentially the same diet as soldiers.[73]

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[67] Livy 45.52.11.
[68] Jos. *BJ* 3.65–69.
[69] Livy 44.26.6.
[70] App. *Gal.* 1,3; *Pun.* 2,11, cf. Dio Cass. 27.92.2; Hdn. 6.6.2.
[71] Caes. *BGall.* 5.14, 6.22; cf. Tac. *Ger.* 23.
[72] Kromayer-Veith (1928) 528; Labisch (1975) 29.
[73] Anderson (1970) 48.

The Grain Ration (Frumentum)

Grain made up the greatest part of every Roman's diet, and this
was certainly true of the Roman soldier. Indeed, the Latin word for
grain "*frumentum*" and its Greek equivalent "*sitos*," were often used
to refer to food supplies or provisions in general.[74] Grain represented
approximately 60–75 percent of the Roman ration's weight, and an
equal percentage of the calories consumed.[75] Roman soldiers, like
Romans in general, normally ate only wheat, and avoided eating
barley.[76] As Pliny writes:

> Barley bread was much used in earlier days but has been condemned
> by experience, and barley is now mostly fed to animals.[77]

These "earlier times" were apparently before the third century B.C.,
as the use of barley as a punishment ration is attested as early as
the Second Punic War;[78] the practice continued through the Republic[79]
and into the Empire.[80] Such a sentence was imposed on an entire
unit for a fixed period of time. For example, a cohort which fled
during the siege of Promona in Dalmatia in 34 B.C. was decimated
and placed on barley rations for a summer.[81] Barley might also be
issued to troops in an emergency situation: when Pompey blockaded
Caesar's troops at Dyrrachium, the latter ate barley, as did Octavian's
men during the Dalmatian campaign of 34 B.C.[82]

It is possible to calculate the Roman military grain ration with a
fair degree of certainty. Polybius gives the military grain ration for
a Roman citizen infantryman in the mid-second century B.C. as 2/3

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[74] Sall. *Hist.* 1.77.17; Livy 40.35.4; Tac. *Hist.* 2.32; Front. *Strat.* 3.15.4; App. *Syr.*
4,21; *BCiv.* 1.9.76. *Frumentum* meant unmilled grain, usually threshed, the form in
which the Romans issued the grain ration (Livy 38.37.9, 44.8.1 (Labisch [1975])
31). When the sources refer to grain in the form of flour or meal, they explicitly
use the Latin *far* or *farina*, or the Greek *aleuron* (Front. *Strat.* 3.14.1, 4.1.6; Zon. 9.2);
for a detailed discussion of grain in the Roman soldier's diet see Junkelmann (1997)
103–136.
[75] Stolle (1914) 28; Foxhall & Forbes (1982) 57.
[76] Labisch (1975) 41; Knights, *et al.* (1983) 143; Davison (1989) 242; Junkelmann
(1997) 104.
[77] Plin. *HN* 18.15.94.
[78] Livy 24.18, 27.13.9; Plut. *Marc.* 24.6; Front. *Strat.* 4.1.25.
[79] Polyb. 6.38.4; Plut. *Ant.* 38.7; Polyaenus 8.24.1.
[80] Suet. *Aug.* 24.2.
[81] App. *Ill.* 5.26.
[82] Caes. *BCiv.* 3.47.6; Dio Cass. 49.38.4; Labisch (1975) 40–41.

of an Attic *medimnus* per month.[83] In the Greek system of volume measurement there are 48 *choenikes* in a *medimnus*—thus two-thirds of a *medimnus* would equal 32 *choenikes*. Thus Polybius is probably thinking of a ration of one *choenix* of grain a day: Herodotus considered the *choenix* to be the normal daily consumption rate for soldiers.[84] Polybius would not be using Greek measurements and so he must be translating a Roman measuring system. Since an Attic *choenix* (about 1.1 liter) equalled almost exactly two Roman *sextarii* (each about .54 liter, a total of 1.08 liter),[85] Polybius doubtless meant that the Roman infantryman received 64 *sextarii* (four *modii*) of grain a month.[86]

There is no reason to think that this notional ration of two *sextarii* per infantryman per day changed from the 3rd century B.C. to the 3rd century A.D. These two *sextarii* were certainly not literally issued every day to each individual soldier, but it would have made a useful bookkeeping device. The idea of a notional daily ration of two *sextarii* per day is given support by the organizational scheme introduced into the Roman army by Augustus.[87]

The legion's basic structure remained constant from the mid-Republican period through the entire Principate: ten squads, or *contubernia*, made up a century, six centuries a cohort and ten cohorts a legion.[88] Nevertheless, there was one very important distinction in the organization of the Republican and the Imperial legions: the former had no fixed total size, while the latter did. It is true that Polybius and Livy both give established sizes for the Republican

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[83] Polyb. 6.39.13.

[84] Hdt. 7.18 7.2; Foxhall & Forbes (1982) 51, 61; Figueira (1984) 90–1.

[85] Foxhall & Forbes (1982) 84.

[86] Walbank *ad* VI.39.13 claimed that two-thirds of an Attic *medimnus* equalled three *modii*, but Duncan-Jones (1976) 258 showed that it equaled four. Cato *Agr.* 56 gives the winter ration for slaves as five modii a month and according to Sall. *Hist.* 3.48.19 the Roman grain dole was five *modii* a month. Labisch (1975) 31–33 thought it unlikely a slave or plebeian would receive more grain than a soldier, and argued that soldiers also received five *modii* per month. The argument is unconvincing—Cato says a *vilicus* or bailiff should receive only three *modii* a month. Based on papyrological evidence Le Roux (1994) 408 argues that the Roman soldier in Egypt received a monthly food ration of four *modii*. Kissel (1995) 35 calculates that the Polybian figure equals a ration of 3 *modii* per month, based on an equivalence of 1 *medimnus* = 4.62 *modii*; Junkelmann (1997) 91 accepts the figure of four *modii*.

[87] See Roth (1994) 346–62 and the critiques in Kissel (1995b) 110 and Junkelmann (1997) 49, 91.

[88] Serv. *ad Aen.* 11.463. The basic organizational scheme is confirmed by the archaeological evidence, see von Petrikovits (1975) 38.

legion: a "standard" legion of 4,000 infantry and 200 cavalry and an "emergency" legion of 5,000 infantry and 300 cavalry. Livy admits, however, that his sources disagree as to the numbers of troops assigned to these units.[89] In fact, the size of the Republican legion reported in various descriptions of campaigns fluctuates from as low as 3,000 to as high as 6,000 infantry, and from 200 to 400 cavalry.[90]

Both Livy and Sallust report that the size of the Republican legion was set annually by decree of the Senate, according to the availability of manpower and the needs of the army and not only in response to emergencies.[91] There was, therefore, no regulation size for the republican legion, and its strength varied from year to year.[92] Since the Republican legions' subunits were fixed, but its total number was not, the number of troops in *contubernia*, centuries and cohorts fluctuated from year to year, and even from unit to unit.

The lack of a standard size for the Republican legion would have led to logistical problems. Although there must have been a minimal complement (otherwise the legion would not function tactically), no estimate of the necessary rations for an upcoming campaign could be made until the Senate set the actual size of each legion for that year. The total number of legionary soldiers would then have to be multiplied by the monthly ration of *4 modii* to calculate the amount of grain needed. During the Republic, all logistical calculations, whether done by the Senate, the commander or a private contractor, would have had to be made on the basis of the individual soldier, not the unit.

After his decisive victory at Actium in 31 B.C., Augustus transformed both the Roman state and the Roman military after the chaos of the Civil Wars.[93] The army issued regulations governing

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[89] Polyb. 3.107.11, 6.20.8–9; Livy 22.36.1. Other sources discuss a fixed size for Republican legions. In a minor work on word definitions, Suetonius assigns 5,600 men to the legion, almost certainly referring to a republican legion consisting of 5,200 infantry and 400 cavalry (Suet. *Rel.* Reif. 278). Fest. *apud* Diac. (ed. Lindsay) 453L (2nd cent. A.D.) reports the size of the legion "after Marius" as 6,200, and Serv. *Aen.* 7.274.1–2 (4th cent. A.D.), gives the legion's size as 6,000 infantry and 300 cavalry. Both Festus and Servius refer to Republican legions, see Roth (1994) 347–8.

[90] Livy 21.17.5, 23.34.12, 26.28.7, 28.28.2, 35.2.4, 40.18.5, 41.9.2, 21.1, 42.31.1, 43.12.5, 44.21.8–10; Caes. *BCiv.* 3.106.1; App. *Mith.* 12,84; Plut. *Luc.* 24.1; *Pomp.* 60.1; *Caes.* 32.1.

[91] Livy 23.34.12, 40.26.8–9; Sall. *Iug.* 84.2 with 86.4.

[92] As noted by Kubitschek (1924) 1196.

[93] Raaflaub (1987) 262.

everything from officer's duties to the pattern of hobnails in military
boots.[94] Such statutes, though none survive, certainly also governed
the size of Roman military units. As a result, the nominal size of the
Imperial legion has been the subject of a great deal of confusion
and dispute. Estimates of the Imperial legion's size vary significantly
and are often expressed as approximations.[95] There was, however, a
standard size for the Imperial legion: 4,800 exactly, divided into 60
centuries of 80 men each.[96] This nominal strength included all the
legion's infantry, cavalry and artillery, as well as specialists, such as
engineers, bandsmen, medical personnel and so forth.[97]

In the new imperial army created by Augustus, the size of the
smallest unit in the legion, the *contubernium* or squad, was set at eight
men. This unit's rations were, therefore, one *modius* of grain per day
(two *sextarii* times eight men in the *contubernium* = one *modius*). Indeed,
the size of each sub-unit ensures a whole number of *modii* of grain
in the daily ration: ten for the century, 60 for the cohort and 600

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[94] E.g. *Dig.* 49.16.12.2. Veg. *Epit.* 2.9–12 probably derives in whole or part from
such regulations. The height requirements in Veg. *Epit.* 1.5 are almost certainly
quoted from military regulations. Van Driel-Murray (1985) 54 shows that the num-
ber and even the pattern of hobnails is the same in *caligae* found in widely dis-
persed camps. Shoe rests show that such items were made locally, which proves
the existence of a standard pattern. *BGU* 7.1564 (Philadelphia, 138 A.D.) gives the
regulation pattern of a military tunic being woven in Egypt for the army in
Cappadocia. For an overview of the supply of equipment and weapons to the army,
see Kissel (1995) 177ff.

[95] Kromayer & Veith (1928) 542: "5,280"; Watson (1969) 13: "perhaps some
5,500 men"; Rossi (1971) 70: "about 6,000 . . . [plus] 120 horsemen"; Wilkes (1972)
5: "about 5,300 men"; Luttwak (1976) 14, fig. 10: "c. 6,000"; Webster (1985) 110
(by implication): 4,920 plus "H.Q. staff and other non-combatants"; Speidel (1992):
"some 6,000 men"; Le Bohec (1994) 24: "about 5,000"; Goldsworthy (1996) 38
"5,000–6,000"; Kissel (1995) 35 n. 10 "6,000 men" (less individuals seconded to
the civil administration and plus *calones, muliones* and slaves).

[96] As noted by Junkelmann (1997) 91 correctly pointed out, when originally sug-
gested in Roth (1994) 362, this model neglected to discuss the legion's *calones* in
this regard. The military slaves certainly were not carried on a unit's roster for pay,
and probably not for rations either. Many *calones* could have been fed out of the
soldiers' rations—the leftovers of an eight-man *contubernium* would have sufficed for
a slave, and the others fed out of the rations of officers and centurions.

[97] This figure does not include military slaves (as does Kissel's, see previous note),
and assumes that soldiers on administrative or other civil duties would have reduced
the legion's combat strength. For a full exposition of the evidence and arguments,
see Roth (1994) 346–362. Goldsworthy (1996) 21–2 claims that the Roman army's
unit organization was "messy and irregular." While it is certainly true that Roman
units, like any others, were frequently understrength, this does not mean that the
nominal organization differed from, say, legion to legion. Indeed, all indications are
of standardization, particularly in the early imperial period.

for the entire legion. Such precise correspondence can hardly be co-
incidental. The 4,800 man legion vastly simplified the calculation of
supplies, which now could be done on the unit, not the individual,
level. This applies only to common soldiers who received a single
ration. Centurions were entitled to multiple rations, and probably
for this reason, were carried on separately on the rolls.[98]

The problem of the size of the imperial legion is complicated
somewhat by the fact that, at some point subsequent to the Augustan
reform, the organization of the legion was altered by the introduc-
tion of a doubled first cohort. The army instituted the doubled first
cohort at some time in the first century,[99] but it is not known exactly
when or how long it remained in use.[100] Although the standard view
is that the first cohort was made up of five centuries, it is more
likely that, just as the other nine, it had a manipular organization
of six centuries, with the single distinction that these centuries were
double-sized.[101] When its six centuries were increased in size to 160,
there would have been 960 soldiers in the expanded first cohort, so
5,280 soldiers in the expanded legion. This organization follows the
pattern established by Augustus and allows for easy calcuation of
rations, as shown in the table below:

Table I: The Imperial Legion's Estimated Daily Grain Rations

Daily Ration	dry sextarii	modii
per soldier	2	1/8
per contubernium	16	1
per century	160	10
per cohort	960	60
per standard legion	9600	600

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[98] Fink (1971) 10.
[99] According to Saddington (1982) 174 and Kennedy (1983) 285 the doubled
first cohort appeared under Nero, Frere (1980) 57–9 and Davison (1989) 52–6 date
it to the time of Vespasian, and Birley (1966) 55 to that of Domitian.
[100] Breeze (1969) 50 argues it remained standard until the reorganization of the
army under Diocletian; Pitts & St. Joseph (1985) 167 and Davison (1989) 52–6
assert that it was quickly abandoned, and in use only from ca. 70 to 95.
[101] Roth (1994) 359–361. For the standard view see Birley (1966) 50; Le Bohec
(1989) 147; Speidel (1992) 9.

(cont.)

Daily Ration	dry sextarii	modii
per double first cohort	1920	120
per expanded legion	10560	660

Note that there are no fractions in any of these figures. There is little question that the number of soldiers in these units were set exactly for this reason.

As noted above, however, a large proportion of the Imperial army was made up of auxiliary troops. The auxiliaries were divided into two branches: the cavalry organized in *alae*, or wings, and the infantry units in *cohortes* or cohorts.[102] The organization and strength of auxiliary units has been the subject of a great deal of discussion among military historians. It is difficult to reconcile the contradictory and obscure references to the size of *alae* and cohorts in Pseudo-Hyginus, Vegetius, Josephus and Arrian, with the evidence of inscriptions, papyri and archaeological excavations.[103] Certainty is impossible, but the same relationship between the daily grain ration of *two sextarii* and the size of the various subunits of the legion probably also existed in the auxiliary units. If this relationship is obscured somewhat by ambiguities about the size of various auxiliary units, the logistical system itself can be used to eliminate some of these ambiguities. Indeed, the relationship between the ration and unit size may well be the key to reconstructing many elements of auxiliary organization.[104]

In antiquity grain was generally managed in units of volume: the Roman army measured its rations in terms of *sextarii* and *modii*. One must, however, translate such ancient measures into modern weights in order to calculate their nutritional value, as well as to discuss the grain's transportability. Thus modern military historians generally discuss ancient rations in terms of weight. Thus Labisch, Gentry, Le Roux and Junkelmann all estimate the grain ration at 1 kg. per day; Engels and Goldsworthy calculate the daily ration at 1.4 kg.[105] Kissel,

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[102] Cheesman (1914) 7–25; Kromayer-Veith (1928) 477; Saddington (1982) 49; Goldsworthy (1996) 22.

[103] Cheesman (1914) *passim*; Kromayer-Veith (1928) 497–8; Davies (1967) 110–1; Davison (1989) 166–7.

[104] See Appendix "Logistics and the Organization of Auxiliary Units," pp. 335–9.

[105] Labisch (1975) 32–3; Gentry (1976) 25; Engels (1978) 123; Le Roux (1994) 408; Goldsworthy (1996) 291; Junkelmann (1997) 91.

on the other hand, works out the daily ration of the Roman legionary as 700 grams per day.[106]

The weight of grain per unit of volume can vary considerably, as much as 20 percent in some cases. The calculations of Duncan-Jones and Rickman, based on figures given by Pliny in his *Natural History*, are set out in the following table:

Table II: Estimated Weight of Various Types of Wheat

	Pliny[107]		*Duncan-Jones*[108]		*Rickman*[109]	
Source of Wheat	Roman lbs. per *modius*	kilograms per liter	kilograms per *modius*	kilograms per liter	kilograms per *modius*	
Gaul & Chersonese	20	0.750	6.46	0.759	6.55
Alexandria & Sicily	20 5/6	0.781	6.73	0.791	6.82
Africa	21 3/4	0.815	7.02	0.825	7.12
Foxhall & Forbes sample		0.782	6.74		

Calculating the arithmetic mean of Duncan-Jones' and Rickman's estimates produces an "average wheat" weighing .786 kg. per liter, or 6.78 kg. per *modius*, very close to Foxhall & Forbe's figure. In this case, the two *sextarii* of wheat in the Roman soldier's daily ration would weigh approximately 850 grams (30 ounces, or just short of two pounds).

The Non-Grain Ration (Cibaria)

Although a diet of grain alone would have provided sufficient calories and carbohydrates for the Roman soldier, it would not have supplied enough protein, vitamins and other nutrients to have main-

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[106] Kissel (1995) 35.
[107] Plin. *NH* 18.12.67–8; Stolle (1914) 7–8; Kromayer-Veith (1928) 280; Foxhall & Forbes (1982) 42.
[108] Duncan-Jones (1974) 370 expresses weight in kg./liters and converts it at a rate of 8.62 liters per *modius*.
[109] Rickman (1980) xiii, expressed in kg./modius, converted as in note above.

tained his health.[110] The Roman military diet by no means lacked non-grain elements: meat, cheese, vegetables (especially legumes), oil, vinegar and salt contributed significantly to the nutritional value of rations.[111] It is true that grain was the only component of the Roman soldier's ration mentioned by Polybius, but Plutarch refers to others in the course of relating bad omens before M. Licinius Crassus's defeat at Carrhae in 53 B.C.:

> It happened that when the soldiers' rations were issued after they had crossed the [Euphrates] river, the lentils and salt were given out first; these foods are signs of mourning . . . and are set out as funerary offerings.[112]

Frontinus notes that the Roman army consumed "food of all kinds," and Appian says that living on only wheat, barley and game, without the addition of wine, salt and oil, was detrimental to the health of Roman soldiers fighting in Spain.[113] Interestingly enough, Dio Cassius puts a speech in the mouth of Queen Boudicca, in which she contrasts the variety of Roman military food unfavorably with the simplicity of British tribal diet:

> [The Romans] cannot bear up under hunger (and) thirst as we can . . . They require kneaded bread and wine and oil, and if any of these things fail them, they perish; for us, on the other hand, any grass or root serves as bread, the juice of any plant as oil, any water as wine.[114]

The comparison, and the view of British diet is rhetorical, but it shows that the variety of Roman military diet was common knowledge.

Like the term "*frumentum*," "*cibum*" or "*cibaria*" was sometimes used to refer to the soldiers' provisions as a whole—indeed this seems to be its primary meaning.[115] The *frumentum* and *cibaria*, however, that Caesar doubled as a reward to one of his units were both clearly part of the soldiers' regular issue. In this context, *frumentum* clearly meant the grain ration and *cibaria* a ration of food other than grain.[116]

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[110] Sippel (1987b) 51–3.
[111] Foxhall & Forbes (1982) 44.
[112] Plut. *Crass.* 19.5.
[113] Front. *Strat.* 2.5.14; App. *Hisp.* 9,54.
[114] Dio Cass. 62.5.5–6.
[115] Sall. *Iug.* 45.2, 91.3; Caes. *BGall.* 1.5.3, 3.18.6, 6.10.2; Livy 27.13.13, 34.12.6; Tac. *Ann.* 1.65; *Hist.* 2.88; Front. *Strat.* 2.1.1, 3.5.2; see Labisch (1975) 31; Junkelmann (1997) 86.
[116] Caes. *BCiv.* 3.53.5; Kromayer-Veith (1928) 331 view *frumentum* as "grain" and *cibaria* as "bread" but this assumes that food was distributed to the Roman soldier in prepared form, which was not the case. Peskitt (in the Loeb edition) translates

This is confirmed by ostraka from Pselkis in Egypt which form two parallel series, one for the grain ration, and a separate one, labelled the *cibaria*, which includes other food items, such as wine and vinegar, salt and lentils.[117] In the Pselkis ostraka the exact components of the *cibaria* appear to change, probably depending on the availability of various items.

The *cibaria* itself may well have been subdivided into various food classes. There is some evidence for such sub-categorization: the *Historia Augusta* refers to three elements in the camp diet (*cibus castrensis*): *laridum* or *lardum* (salt pork), *caseus* (cheese) and *posca* (sour wine and water).[118] The most obvious part of the soldier's diet, grain, is not mentioned, and, in this case, *cibus castrensis* may well be a military synonym for *cibaria*. The biography of Hadrian in the *Historia Augusta* is one of its most reliable portions and may have drawn on that emperor's military regulations and the author may be using technical terminology.[119] A rescript from the Late Roman period, dated to 360 A.D., gives the elements of a soldier's ration as biscuit or bread, salt pork (*laridum*) or mutton, wine or vinegar, oil and salt.[120] Indeed, there is a remarkable continuity in the categories of foodstuffs consumed by western armies from antiquity onward: (1) bread, (2) salted meat, (3) beans (or peas), (4) cheese (or butter), (5) salt and (6) beer, wine and later coffee.[121] This is not to say that these categories of rations were necessarily part of any tradition or continuity, but rather that they reflect parts of the western diet suitable for the conditions of campaigning.

For its part, Roman rations definitely included (1) *frumentum* (grain corresponding to the bread ration), and the *cibaria* was probably divided into six categories: (2) meat, especially salt-pork (*laridum*), (3) vegetables, especially lentils and beans (*faba*), (4) cheese (*caseus*), (5) salt (*sal*), and (6) sour wine (*acetum*). In addition, Roman rations included (7) olive oil (*oleum*), which reflects the importance of this foodstuff in ancient diet.

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cibaria as "bounties," but since the next item doubled is "*dona militaria*" this is an unlikely meaning. Labisch (1975) 35; cf. [Caes.] *BAfr.* 43.

[117] *SB* 6970 = Fink (1971) no. 78.18 (171 or 203 A.D.), lines 3–5, see Fink (1971) p. 311.

[118] *HA Hadr.* 10.2. *HA Tyr. Trig.* 18.6–9 gives the necessities of the army as "fodder, grain, wine and bacon" (*pabulum, frumentum, vinum, laridum*).

[119] *HA Hadr.* 10.8.

[120] *Cod. Theod.* 7.4.6 = *Cod. Just.* 2.37 (38); cf. *Cod. Theod.* 7.4.2, 4.25, 5.2.

[121] Curtis (1926) 89–92; Shannon (1965) 208; Goff (1969) 17 n. 66; Consolazio (1976) 242, Frazer (1983) 3; Anderson (1984) 83–5.

Meat

Many 19th and early 20th century scholars insisted that the Roman soldier did not eat meat as part of his normal diet. As early as 1914, Stolle challenged this idea;[122] but Haverfield's view was typical:

> ...the Roman army which conquered the world and kept it in subjection was ... mainly a vegetarian army.[123]

Veith, in his influential work on the Roman army, accepted the vegetarian theory, attributing reports of meat-eating in the Late Empire to barbarian elements in the army.[124] A ground-breaking study by Davies, however, proved that meat made up a significant part of the army's regular diet throughout the Imperial period.[125] Indeed, archaeologists have found large numbers of animal bones at almost all of the Imperial Roman military camps.[126] In addition, legal sources and inscriptions attest military occupations involved with the collection and preparation of meat, such as hunters and butchers, in the Imperial army.[127] Literary sources show that meat-eating goes back to the Republican period and was typical of military diet throughout the period under discussion. Plutarch indicates that the Romans considered meat a normal part of a soldier's meal: Cato the Elder (234–149 B.C.) was inclined to vegetarianism, but ate meat because it strengthened his body for military service.[128] Many other passages in literary sources refer to meat-eating among Roman soldiers: these will be discussed in the context of each individual type of meat. Horsfall has gone so far as to suggest that Roman investment in Epirus in the first century B.C. was driven by the profit gained in supplying meat to the Roman armies travelling on the Via Egnatia.[129]

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[122] Stolle (1914) 19–20.
[123] Haverfield (1922) 182.
[124] Kromayer-Veith (1928) 413, 589, citing Amm. Marc. 25.2; *Cod. Theod.* 7.4.6.
[125] Davies (1971) 126. Labisch (1975) 37–8 repeats the argument for the vegetarian legionary; Knights, *et al.* (1983) 250 argue that the chemical analysis of coprolites from an auxiliary fort at Bearsden, Scotland indicates a vegetarian diet, but the authors admit that their results are not conclusive; see Junkelmann (1997) 154–165.
[126] King (1984) 187–217; Davison (1989) 243.
[127] Hunters (*venatores: Dig.* 50.6.7.6, *CIL* 3.7449, *RIB* 1905 = *ILS* 3548, *AE* 1968.101); trackers (*vestigatores: SB* 9272); herdsmen (*pecuarii* and *custodes vivarii: CIL* 6.130 = *ILS* 2091, *CIL* 13.8174 = *ILS* 3265); and butchers (*lani: Dig.* 50.6.7.6), *curatores macelli: CIL* 8.18224; see Le Bohec (1994) 52.
[128] Plut. *Cato Mai.* 4.3; see McDonnell (1990) 47.
[129] Horsfall (1989) 60–2.

Beef

The bones of oxen (*boves*) are attested at Roman military sites in
greater numbers than any other animal.[130] It must be borne in mind
that most of our excavated military sites come from Britain and the
northern frontier, and that peacetime military diet there differed from
that of the Mediterranean.[131] In addition, of course, campaign diet
would have differed from garrison diet.

   The term *pecus*, like the English cattle, can refer to a number of
different herd animals, but is most often used of beef cattle. Polybius
mentions a strategem of Scipio Africanus during his campaign against
Andobalus in Spain (206 B.C.), in which the army's cattle were dri-
ven ahead of the force to tempt the Spanish to seize them and pro-
voke a battle.[132] Sallust notes that surrender terms negotiated in 112
B.C. demanded that Jugurtha turn over cattle to the Roman army.[133]
The army also obtained cattle as booty. These were sometimes sold
for profit (Sallust notes that the undisciplined Roman army in Spain
traded stolen cattle for luxuries),[134] but the army probably consumed
at least some of such beef. Marius ordered cattle captured on the
way to Capsa in 107 B.C. and distributed it equally among the cen-
turies, almost certainly as food.[135] Cato the Younger drove cattle
along with his army when operating in Libya, certainly in order to
provide his men with their meat and Lucullus obtained cattle from
the Spanish to make up the lack of provisions.[136]

   During Caesar's conquest of Gaul the Romans captured large
numbers of beasts,[137] and cattle were part of his army's stores dur-
ing the Civil Wars.[138] Caesar specifically mentions the large supply
of beef his army at Dyrrachium enjoyed.[139] Appian wrote that in
preparation for the siege of Mutina (44 B.C.), Decimus Brutus "slaugh-
tered and salted all the cattle he could find in anticipation of a long

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[130] King (1987) 189; Junkelmann (1997) 158.
[131] King (1987) 198–201.
[132] Polyb. 11.32.2–3. The same trick was used by the Spanish against Julius
Caesar, when he was praetor in 60 B.C. and by the Caledonians against Septimius
Severus in 208 (Dio Cass. 37.52.5; 77.13.2).
[133] Sall. *Iug.* 29.6.
[134] Sall. *Iug.* 44.5.
[135] Sall. *Iug.* 90.2, 91.1.
[136] Plut. *Cato Min.* 56.3; App. *Hisp.* 9,54.
[137] Caes. *BGall.* 5.21.6, 6.3.2, 6.1.
[138] Caes. *BCiv.* 1.48.
[139] Caes. *BCiv.* 3.47.6; see Horsfall (1989) 61.

siege."[140] The use of beef as food by the army on campaign con-
tinued in the Imperial period. When the Quadi negotiated a sur-
render to Marcus Aurelius in 170, they turned cattle, as well as
horses, over to the army.[141] During Septimius Severus's Parthian
campaign of 197, his army "drove off the cattle they came across
for provisions."[142] Finally, during Maximinus Thrax's invasion of
Germany in 234–5, he turned over captured flocks to his troops.[143]

The average ox weighs about 800 lbs. (363 kg.), and provides
some 180–225 kg. (400–500 lbs.) of beef (*bubula caro*).[144] It could be
eaten in a beef-broth, cooked on a spit or gridiron, or stewed.[145]

Pork

Pig (*sus* or *porcus*) bones are found at almost all Roman military sites,
though in smaller numbers than beef, and there are fewer references
to pigs as food in the literary sources.[146] Polybius notes that north-
ern Italy was the main source of pork used to feed armies serving
overseas:

> [T]he number of swine slaughtered in Italy . . . to feed the army is
> very large, almost the whole of them supplied by this plain [the Po
> valley].[147]

The *Historia Augusta* says that pork was part of the standard camp-
fare (*cibus castrensis*).[148] While these are the only explicit reference to
pork in the Roman soldiers' campaign diet, they both indicate that
it was an important part of it.

The Roman military ate pork in a number of forms: cooked,
roasted or boiled, made into sausages (*farcimina*), ham (*perna*) or
bacon (*lardum/laridum*).[149] In addition to its value as meat, the fat
from pork can be used in making biscuit.[150] Smoked or salted pork

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[140] App. *BCiv.* 3.8,49.
[141] Dio Cass. 72.11.2.
[142] Hdn. 3.9.103.
[143] Hdn. 7.2.4.
[144] U.S. Army (1935) 10; Goldsworthy (1996) 292.
[145] Junkelmann (1997) 161.
[146] King (1984) 189; Junkelmann (1997) 158. For pork as part of the annona at
Rome, see Herz (1988) 162–9, 284–90.
[147] Polyb. 2.15.2–3; see also 6.31.12; Strabo 5.1.12.
[148] *HA Hadr.* 10.2.
[149] Junkelmann (1997) 163; cf. Schlippschuh (1987) 24.
[150] Frazer (1983) 4.

was particularly important on campaign. Indeed, from the quarter-master's, if not the soldier's, point of view, salt pork has always been a favorite food for campaigning because it is cheap and long-lasting.

In modern times, an average adult pig weighs between 45–150 kg. (100 and 330 lbs.) and about 75% of its weight produces edible meat.[151] Ancient pigs, however, were probably slightly smaller than modern ones, say between 40 and 70 kg. (90–150 lbs.).[152] A third-century papyrus from Oxyrhynchus records the collection of forty pigs, each weighing 50 Roman pounds (16.3 kg./36 lbs.) for an imperial visit, but Egyptian pigs tend to be quite small.[153]

Mutton and Other Meats

Of the main domesticated animals consumed in antiquity, the bones of sheep (*oves*) are the least commonly found at Roman military sites.[154] Nevertheless, modern armies sometimes substituted mutton for beef, as the U.S. Army did in the Southwest during the Mexican War,[155] and the use of sheep as campaign food is occasionally attested. According to Frontinus the consul Aulus Hirtius floated sheep carcasses down the Scultena river to the besieged troops (and civilians) at Mutina in 43 B.C.[156] After the defeat of the Peraeans in 67, during the Jewish War, the Romans seized sheep, certainly for the army's consumption.[157]

A sheep weighs from 66 to 100 lbs. (27–45 kg.), and upon slaughtering, about 45% of its weight is discarded as waste.[158] It could be cooked in many of the same ways as beef or pork. The Romans were particularly fond of lambs (*agni*) and kids (*haedi*).[159] Referring to the siege of Jerusalem in 70, the Talmud describes Romans eating kids: although this story has apocryphal elements, it may go back to a reliable source.[160]

In an emergency, soldiers might eat "all sorts of animals," as Fron-

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[151] Goldsworthy (1996) 292.
[152] Junkelmann (1997) 163.
[153] Van Minnen & Sosin (1996) 171–81.
[154] King (1987) 189.
[155] Frazer (1983) 52.
[156] Front. *Strat.* 3.14.4.
[157] Jos. *BJ* 4.436.
[158] Goldsworthy (1996) 292.
[159] Junkelmann (1997) 163.
[160] Midrash *Lamentations Rabba* 4.12. Price (1992) 201, generally critical of the Talmud's historicity, accepts the gist of this story.

tinus notes.[161] Lucullus's army in Spain ate boiled venison and rabbit, but only out of need.[162] Under extreme conditions, ancient armies turned when necessary to their pack-animals and horses (in that order) for emergency sustenance.[163]

Sacrificial Meat

The sacrifice of cattle and other animals (*hostia*) was a relatively frequent event in the army and a significant source of fresh meat.[164] It was a Roman custom to perform a "*lustratio*" or purification of the army before battle, and each soldier partook of what had been sacrificed to the gods.[165] Part of the *lustratio*, a sacrifice, called the *suovetaurilia*, involved the ritual killing of oxen, sheep and pigs.[166] Such a sacrifice is illustrated on several panels of Trajan's column.[167] Just before the battle of Philippi, the Caesarean army, short of supplies, used wheat meal for the *lustratio*, but the army of Brutus and Cassius "distributed great numbers of cattle for sacrifice among their cohorts."[168]

Sacrifices also occurred on other occasions. Josephus notes that after the capture of Jerusalem in 70, Titus had "an immense number of oxen sacrificed" and "distributed them to his soldiers for a banquet."[169] A papyrus from Dura-Europus, dated ca. 223–227, contains a calendar of sacrifices performed by the military unit stationed there. In the preserved portion, the period of January 3rd to September 23rd, there were 24 days in which cows or oxen, sometimes both, were sacrificed, and presumably consumed by the soldiers.[170]

Meat Ration

Given these many references, one can scarcely deny that meat was clearly a part of the Roman military diet. On the other hand, one

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[161] Front. *Strat.* 4.5.18. Fish, shell-fish, and fish-sauce (*liquamen* or *garum*) were important parts of Roman diet, both civilian and garrison, but there is no evidence for their use on campaign, see Junkelmann (1997) 166–171.
[162] App. *Hisp.* 9,54.
[163] App. *Pun.* 2,11; Tac. *Hist.* 4.60; for bones of slaughtered pack animals and horses found in Roman military sites, see Junkelmann (1997) 157.
[164] Watson (1969) 131; Davies (1971) 140; Rüpke (1990) 144ff.
[165] Plut. *Aem. Paul.* 36.3.
[166] Scholz (1973) 3–28; Rüpke (1990) 144–6.
[167] Scenes VIII, LIII Lepper & Frere (1988) Plates X, XXXVIII.
[168] Plut. *Brut.* 39.1.
[169] Jos. *BJ* 7.16.
[170] *P. Dur.* 54 [= Fink (1971) no. 117].

should bear in mind that meat was never the major portion of any
ancient Mediterranean diet. Modern American and European meat
intake is very high from a historical perspective—even in France
animal proteins contributed only 25% of protein intake until 1880–
1890.[171] The proportion of meat in the Roman soldier's diet may
have been low by modern American or European standards, but he
was no vegetarian.

Eating meat sparingly was characteristic of the plain diet worthy
of a military man.[172] There were complaints from Roman soldiers
when they were forced by circumstances to eat a diet of only—or
primarily—meat.[173] Both Appian and Frontinus note that strict mil-
itary commanders, as part of their disciplining of the army in Spain,
insisted their soldiers eat only "plain boiled or roasted meats."
Presumably their troops had previously been preparing meat in a
fancy and unsoldierly fashion.[174]

The exact amount of the Roman army's meat ration under the
Republic or Principate is not attested, so information from the late
period must be used, albeit with caution.[175] A Late Roman papyrus
from Egypt gives a figure for a soldier's meat ration of either one
or one-half *libra* of meat per day, depending on its interpretation.[176]
Although a pound of meat a day is normal in modern military
rations, it is an excessive amount in a grain-based diet, such as that
of the Romans. A more likely ration is one-half a Roman pound of
meat (163 grams) per day. It is possible that the correct figure is
one pound but that this represents a ration intended to feed not
only a soldier, but his family, as was the custom in the Late Empire.[177]
For the period under discussion, this study will assume a meat ration
of 1/2 pound of meat a day.

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[171] Aymard (1979) 2.
[172] *HA Sev. Alex.* 19.7.
[173] Tac. *Ann.* 14.24.
[174] App. *Hisp.* 14,85; Front *Strat.* 4.1.2.
[175] *Cod. Theod.* 14.4.10.3: The emperor Aurelian (270–275) added five Roman
pounds of pork per month, about 50 grams per day, to the *annona* or grain dole.
This small amount was certainly a supplement and not a ration.
[176] *CPL* 199 (398 A.D.).
[177] Zuckerman (1988) 280; Goldsworthy (1996) 291 takes this to be an individ-
ual soldier's ration.

Vegetables

The vegetable (*holus, legumen*) is a humble food, seldom attested in the historical sources, and then only incidentally and anecdotally.[178] For example, Plutarch reports that when Samnite ambassadors sought out Cato the Elder to offer him gold, they found him cooking turnips; he turned them away, saying that someone who enjoyed a simple meal had no need of gold.[179] Similarly, the *Historia Augusta*, noting the simplicity of Septimius Severus's diet says he was "fond of his homeland's beans (*legumina patrii*)," presumably those of North Africa.[180]

Legumes or pulses such as beans (*fabae*), lentils (*lentes*) and peas (*pisa*) were a major source of protein for the poor in Roman times,[181] and there is good evidence that vegetables were a regular part of the military diet.[182] Indeed, there is reason to think that beans were a particularly military food: analysis of plant remains from the legionary camp at Neuss (Novaesium) show 53.1% were from legumes, while the corresponding figure from the civilian settlement at Xanten (Vetera) was 15%.[183] Plutarch explicitly attests that lentils (by which he probably meant all sorts of vegetables, including beans) were issued as part of the soldier's ration.[184] Two pieces of evidence from the second-century Egypt mention vegetables: an ostrakon and a receipt on a papyrus.[185]

Herbs, such as garlic, also made up part of the military diet. Suetonius tells the following story about Vespasian, who prided himself on being a soldier-emperor:

> To let slip no opportunity of improving military discipline, when a young man reeking of perfumes came to thank him for a commission [as a prefect] which had been given him, Vespasian drew back his head in disgust, adding the stern reprimand: "I would rather you had smelled of garlic."[186]

In emergencies, Roman diet included less palatable plants. Roman legionaries besieged in the camp in Vetera during the revolt of Civilis

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[178] Aymard (1979) 2.
[179] Plut. *Cato Mai.* 2.2.
[180] *HA Sev. Alex.* 19.7.
[181] Heichelheim (1938) 130; White (1970) 189–90.
[182] Davies (1971) 132–4; Junkelmann (1997) 137–141.
[183] Junkelmann (1997) 137.
[184] Plut. *Crass.* 19.5.
[185] *WO* 1013 (Heraclea, 193); *PSI* 683.33 (Arsinoite nome, 199).
[186] Suet. *Vesp.* 8.

(69–70) were reduced to eating shrubs, roots and grasses.[187] Italians defeated by Pompey in 89 B.C. subsisted on acorns during their retreat over the Apennines.[188]

Like grain, vegetables were probably issued to Roman soldiers by volume. A *sextarius* of beans (ca. .54 liter) would have weighed around 110–130 grams,[189] but this seems an excessive amount, based on comparative evidence. In two modern grain-based diets, that of Iran and Crete, the average daily vegetable consumption rate ranges from 30 to 70 grams per day.[190] During the Mexican and Civil Wars, the standard daily issue for United States (and Confederate) soldiers was 2/3 a gill of beans or peas, .18 liters (40–50 grams),[191] the equivalent of one third a *sextarius* of vegetables per day per man. It is difficult to estimate the nutritive content of vegetables, which varies considerably according to type, but this amount of lentils would provide approximately 190 calories and 1.5 gram of protein per man per day.[192]

Cheese

The Romans consumed cheese (*caseus*) made from cow's, sheep's and goat's milk.[193] Though otherwise unattested in literary or documentary sources as a food for soldiers, the *Historia Augusta* lists cheese as part of the *cibus castrensis* along with salt pork and sour wine.[194] Cheese-squeezers are present at various military sites, suggesting that the troops manufactured their own.[195] Due to its light-weight and ease of transport, it is quite likely that cheese made up an important part of campaign diet, despite the paucity of references to its use.

Presumably cheese, like meat, would have been issued by weight. Stolle's figure of one *uncia* a day (27 grams) corresponds to a cheese ration issued to 18th century British soldiers, 1 1/7 ounce, in lieu of butter.[196]

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[187] Tac. *Hist.* 4.60.
[188] App. *BCiv.* 1.6,50.
[189] Prestwish (1967) 538.
[190] Flores (1976) 85; Foxhall & Forbes (1982) 90.
[191] Goff (1969) 17 n. 66; Frazer (1983) 3. There are four gills to a pint.
[192] Aymard (1979) 2.
[193] Varro *Rust.* 2.11.3–4; Plin. *HN* 11.237–242.
[194] *HA Hadr.* 10.2.
[195] Davies (1971) 127–8; Junkelmann (1997) 153.
[196] Stolle (1914) 23; Curtis (1926) 90.

Olive Oil

Olive oil (*oleum*) was a characteristic element of Mediterranean diet both in cooking and as a condiment.[197] Ample literary evidence exists for the use of olive oil by the Roman army.[198] Appian notes that it was part of the normal ration in the second century B.C.[199] Plutarch says Crassus issued oil to his troops on his Parthian campaign (54–53 B.C.) as a regular part of the ration.[200] Caesar collected oil, along with other staples, on a foraging expedition.[201] During Aelius Gallus's expedition to Arabia, the Romans were reduced to eating butter instead of olive oil, which was considered a hardship.[202] A speech which Dio Cassius puts in the mouth of Boudicca, the British queen, lists olive oil, along with bread and wine, as characteristic of the Roman soldier's diet.[203] There is now documentary evidence for the use of olive oil by the Roman military. A recently published papyrus from Masada, apparently an account from a military hospital (*valetudinarium*), lists "eating oil" (*olei cib(arii)*) intended for sick soldiers.[204]

Olive oil was measured both by the *congius*[205] and by the pound (*libra*).[206] Le Roux, basing his calculations on a 6th-century document, estimates the daily Roman oil ration as 7 centiliters, about 2 1/2 ounces, per day.[207] A papyrus from the reign of Diocletian, however, gives the monthly ration of olive oil as four *librae* per soldier,[208] about 1 1/2 ounces (4.4 centiliters) per day.[209] The latter calculation is used in this study, but Le Roux's higher estimate is certainly a possibility.

Water and Wine

The most basic need of troops in the field is not food, but liquid.[210] A human being can survive for even several weeks with no food,

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[197] Brothwell (1969) 153–7; Blázquez & Remesal Rodríguez (1983); Toussant-Samat (1993) 205–211.

[198] Blázquez (1992) 173–188; Kissel (1995) 215–220; Junkelmann (1997) 150–151.

[199] App. *Hisp.* 9,54.

[200] Plut. *Crass.* 19.5.

[201] [Caes.] *BAfr.* 67.2.

[202] Strabo 16.4.24; cf. Plin. *HN* 11.239; Junkelmann (1997) 151.

[203] Dio Cass. 62.2.5.

[204] *Mas. Doc.* 723:7–8, 10 [= Cotton & Geiger (1989) 59].

[205] Livy 25.2.8.

[206] Plut. *Caes.* 55.1.

[207] Le Roux (1994) 409.

[208] *P. Beatty Panop.* 2.245–9.

[209] Remesal-Rodríguez (1986) 76–7.

[210] U.S. Army (1961) 5.

but without liquids death will follow in a matter of days. The liquid
requirement of the soldier was satisfied in a variety of ways. The
most basic, though certainly not the most popular with the soldier,
was water itself. Appian emphasizes the barbarian nature of the
Numidians by saying that they drank only water. Though he thought
it strange, Appian saw this Numidian habit as a positive military
quality.[211]

The Romans were well aware of the primary importance of water
to an army's survival.[212] Polybius notes that the legions and allied
units of the Republican army took turns in the van, so that "all may
equally share the advantage of a fresh water supply (*hudreia*)."[213]
Ensuring a secure water supply was one of the jobs of the *metatores*,
the soldiers whose job it was to locate a site for, and measure
out, the army's daily camp.[214] Sulla's memoirs, cited by Plutarch,
notes the importance of a local spring to a campsite.[215] Caesar meas-
ured his marches and set up his camps in order to assure an ade-
quate water supply.[216]

Contaminated water could be almost as dangerous to an army as
the complete lack of it. Vegetius knew the health hazards involved
in a stagnant water source,[217] and Appian claims that during the siege
of Carthage (149–146 B.C.) stagnant water was the cause of disease
in the Roman army, certainly a plausible result.[218] Dio Cassius refers
to the "poor quality" of the water used by Titus's troops at the siege
of Jerusalem in 70 and Trajan's at the siege of Hatra in 117.[219]
Nevertheless, one should not overestimate the ancients' understand-
ing of the health hazards of water: Dio Cassius also believed that
drinking very cold water injured soldiers during the Pompey's Colchian
campaign of 65 B.C.[220]

Sources seldom mention a water ration, except when there is a
shortage, or in other special circumstances. Dio Cassius only men-

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[211] App. *Pun.* 2,11.
[212] Dio Cass. 75 (76) 2.1–2; Polyaenus *Strat.* 2.30.3; Veg. *Epit.* 3.2; see Anderson
(1970) 61; Junkelmann (1997) 172–5.
[213] Polyb. 6.39.9.
[214] Front. *Strat.* 2.7.12; Le Bohec (1992) 52.
[215] Plut. *Sulla* 16.1.
[216] Caes. *BGall.* 4.11.4; *BCiv.* 3.66.6; [Caes.] *BAfr.* 76.2.
[217] Veg. *Epit.* 3.2.
[218] App. *Pun.* 14,98.
[219] Dio Cass. 65.4.5, 68.3.1.
[220] Dio Cass. 37.3.6.

tions the drinking water carried on ships in order to note that it
was used to put out fires during the Battle of Actium in 31 B.C.[221]
The distribution of water must have been controlled in some way,
but whatever it was, soldiers on the march would have required at
least two liters per day in order to operate effectively.[222]

The Romans used other, more palatable liquids, as well. From
the Republican period, soldiers drank sour wine or vinegar and vin-
tage wine in addition to water.[223] Wine is not only a source of the
liquid necessary for the body, but also nutrition: a liter of wine,
with a 12% alcohol content, provides approximately 700 calories.[224]
Both wine and vinegar are antiscorbutic: for this reason the 19th
century U.S. Army issued the latter to soldiers in the Southwest to
help prevent scurvy.[225] Plutarch says this about the habits of Cato
the Elder, who served as an officer during the Second Punic War
(218–202 B.C.):

> Water was what he drank on his campaigns, except that once in a
> while, in a raging thirst, he would call for vinegar, or when his strength
> was failing, would add a little wine.[226]

Cato's affectations notwithstanding, wine was certainly an important
part of the Roman military ration. Indeed, Dio Cassius contrasts the
simple Britons' use of water alone as a drink with the Romans
reliance on wine.[227] Livy indicates that the army's supply of vintage
wine (*vinum*) during the war against Antiochus III (192–189 B.C.)
was large enough to require several cargo-ships to carry it. He adds
that when these ships were delayed, the Teans provided (under duress)
5,000 casks (*vasa*) of wine.[228]

By the mid-Republic, sour wine or vinegar (Latin *acetum*, Greek
oxos) had become a regular part of the soldier's ration.[229] When
Appian lists the provisions that Lucullus's army lacked in Spain

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[221] Dio Cass. 50.34.3.
[222] Atkinson & Morgan (1987) 101; Engels (1978) 125. This is in addition to the
two liters a day consumed through food and absorbed by breathing: U.S. Army
(1961) 6.
[223] Junkelmann (1997) 176–180.
[224] Aymard (1979) 10.
[225] Frazer (1983) 5.
[226] Plut. *Cato Mai.* 1.7.
[227] Dio Cass. 62.5.6.
[228] Livy 37.27.2; 37.28.2–3.
[229] Junkelmann (1997) 177.

(153 B.C.) vintage wine (*oinos*) leads the list, but sour wine (*oxos*) is also mentioned.[230] According to the Gospels, generally an excellent source for such minor details, Roman soldiers offered sour wine, *oxos* (*acetum* in the Vulgate translation) on a sponge to Jesus on the cross.[231] John offers the interesting detail that "hyssop," an aromatic flower, was added to the sour wine, apparently for flavoring.[232] The *Historia Augusta*'s biography of Hadrian says that sour wine (*acetum*) was part of normal "camp fare" (*cibus castrensis*).[233]

The Romans often drank sour wine mixed with water, a drink they called *posca*, a word derived either from the Latin *potor* (to drink) or from the Greek *epoxos* (very sharp).[234] As early as the time of Plautus (second century B.C.), *posca* was a drink of the Roman lower classes,[235] and this association continued into the Principate.[236] As with other foodstuffs of the common people, *posca* probably also featured in Roman military diet, although it has never been directly attested.

During the Republic, it was considered a sign of indiscipline for soldiers to drink wine of high quality. Sallust notes that imported vintage wine was banned by stricter military generals,[237] and Frontinus says that Cato the Elder "was content with the same wine (*vinum*)" as his "rowers" (*remiges*).[238] This attitude seems to have been relaxed over the course of the Principate: Pescennius Niger (193–4) was considered a martinet for allowing only sour wine to be issued to his soldiers, although this might represent Severan propaganda.[239] Two anecdotes in the *Historia Augusta's* biography of this would-be emperor refer to the army's preference for vintage wine (*vinum*). When troops in Egypt requested wine, Niger directed them to the abundant waters of the Nile, and when troops defeated by the Arabs said they could not fight without a wine ration, he chided them because the enemy

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[230] App. *Hisp.* 9.54.
[231] Mark 15:36; Matthew 27:48; Luke 23:36.
[232] John 19:30; Kromayer-Veith (1928) 528; Davies (1971) 124; Labisch (1975) 40 n. 70.
[233] *HA Hadr.* 10.2.
[234] Walde (1939) 345–6; Junkelmann (1997) 176.
[235] Plaut. *Mil. Glor.* 3.2.837; *Trunc.* 2.7.610.
[236] Suet. *Vit.* 12.
[237] Sall. *Iug.* 44.5; see Stolle (1914) 23–4.
[238] Front. *Strat.* 4.3.1; cf. Val. Max. 4.3.11; Plin. *HN* 3.15; Livy 37.33.2.
[239] *HA Pesc. Nig.* 10.3; as suggested by Everett Wheeler.

who had defeated them drank only water.[240] Dio Cassius soberly relates an anecdote about a soldier's prank related to wine, the point of which the historian fails to understand. During an audience with the emperor Caracalla, in 216, two soldiers pretended to litigate over a skin of vintage wine: when the emperor awarded half to each, they cut the skin in two with their swords.[241] Vegetius emphasizes the importance of both vintage and sour wine to military supply,[242] and both frequently are mentioned by the *Historia Augusta* as part of the soldier's ration.[243]

Drunkenness is always a problem when alcohol plays a part of the military diet, particularly when discipline was lax.[244] Barbarian troops, both fighting on their own or as auxiliaries, seem to have been particularly prone to this problem. When the Romans pillaged the Carthaginian camp after Metaurus in 207 B.C., they found most of the Gauls guarding it drunk and asleep in their beds.[245] Tacitus complains of the indiscipline of Thracian auxiliaries during Poppaeus Sabinus's campaign in Thrace in 26 A.D.: they would "leave their posts for some wild feast (*lascivia epularum*) or lay tumbled in drunken slumber." These alcoholic auxiliaries were slaughtered in a rebel attack, which only the arrival of legionaries drove off.[246] The problem of overindulgence in drink was not confined to barbarians. Drunkenness among regular Roman troops was normally strictly controlled, but such discipline did occasionally break down. Plutarch describes an incident in Spain in 97 B.C., in which a drunken Roman garrison neglected to post a proper guard and was massacred by local Celtiberians.[247] Drinking also contributed to a mutiny of soldiers of the XVII Urban Cohort stationed at Ostia in 69 A.D.[248]

A late-4th century receipt suggests that the wine ration equaled either *one sextarius* (0.54 liters) or one-half a *sextarius* (0.27 liters) of

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[240] *HA Pesc. Nig.* 7.7–8.
[241] Dio Cass. 79.1.3.
[242] Veg. *Epit.* 3.3.
[243] *HA Hadr.* 10.2; *Pesc. Nig.* 10.3; *Gord.* 28.2; *Claud.* 14.3; *Avid. Cass.* 5.2; *Tyr. Trig.* 18.6–9.
[244] Livy 31.41.10.
[245] Polyb. 11.3.1.
[246] Tac. *Ann.* 4.48; other examples: Polyb. 14.4.9; Livy 41.2.3, 4.4; App. *BCiv.* 2.10,64; Dio Cass. 67.5.6.
[247] Plut. *Sert.* 3.4.
[248] Tac. *Hist.* 1.70.

wine per day to soldiers.[249] If the amount of meat ration mentioned on the 4th century document is taken to be one-half a pound per day, then the figure of one-half a *sextarius* (0.27 liters) per day per man is probably correct. This would mean that each *contubernium* would receive four *sextarii* of wine a day. Le Roux suggests that the Roman ration of sour wine was 15 centiliters per day, about half of that postulated here for vintage wine.[250] This is reasonable, as sour wine or vinegar is stronger than vintage wine. This study assumes the daily Roman wine ration to be 1/2 *sextarius* per day. This amount would weigh approximately one-half a Roman *libra* (160 grams).[251]

Romans seldom drank either vintage or sour wine "straight," almost always adding water to it.[252] This was not necessarily done by the individual soldier: the mixing may have been done at some higher level.[253] Adding water, obtained locally, would have effectively doubled the volume of liquid ration given to the soldiers at a very low cost.

Auxiliaries from ethnic groups such as the Spanish, Gauls and Germans were accustomed to drinking beer rather than sour wine. There is some indication, however, that on campaign, such troops conformed to Roman practice. Germans in Caesar's army are said by Appian to have drunk wine, indeed to excess, although the circumstance is the pillaging of Gomphi in 48 B.C. and may not reflect normal practice.[254] Roman soldiers certainly drank beer particularly along the northern frontier.[255] There is no evidence, however, it was ever issued as a regular part of the campaign ration.

Salt

Human salt and water requirements are closely linked: the body needs extra sodium chloride to retain water, and it is for this rea-

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[249] Zuckerman (1988) 280. Polyaenus 8.16.2 says that when disciplining his army, Scipio ordered his troops not to keep silver beakers measuring more than two *coty-lae*, the equivalent of one *sextarius*; App. *Hisp.* 14,85 notes that Scipio allowed his soldiers to keep only a single drinking cup, but does not give its dimensions. If these two reports stem back to a single event, it suggests that the *sextarius*-sized drinking cup represented a single ration of wine. Little weight can be placed on these strands of evidence, however. See Stolle (1914) 24.

[250] Le Roux (1994) 404. According to Frazer (1983) 3, 19th century U.S. soldiers received 7.5 centiliters (.32 gill) of vinegar per day, but this was in addition to a ration of coffee or tea.

[251] Stolle (1914) 28.

[252] Junkelmann (1997) 179.

[253] As suggested by Susan Heidenreich.

[254] App. *BCiv.* 2.10,64; Tac. *Agr.* 23.

[255] *AE* 1928.183 cf. *ILS* 2238; Davies (1981) 133; Junkelmann (1997) 180.

son that modern armies issued salt tablets to soldiers during periods
of extreme heat stress. It is difficult to set an exact requirement
for salt, but a daily intake of 5 grams appears to be sufficient.[256]
While the ancients did not have a scientific understanding of the
body's need for salt, in antiquity salt was used in order to preserve
meat, to make provisions more palatable, and for medicinal pur-
poses.[257] An ostrakon from Egypt shows that salt was used by the
army in the baking of bread.[258]

Salt was also a very important part of the soldier's diet: the Romans
considered it a genuine hardship to be without it for any length of
time.[259] Vegetius puts salt together with grain and vinegar (*acetum*) as
one of the absolute necessities for provisioning an army.[260] Appian
lists it second among the necessary provisions Lucullus's army lacked
in Spain in 153 B.C., and claims that meat eaten without salt gave
the Roman soldiers dysentary.[261] The most striking illustration of the
importance of salt in antiquity, and its potential strategic importance,
is an episode in 35 B.C. during Octavian's Pannonian Wars. The
Salassi, a Gallic tribe who inhabited the Alpine pass of Val d'Aosta,
imported all their salt. They were forced to surrender by Octavian's
general Vetus, who blocked their supply of this vital mineral.[262] The
Roman army certainly included salt in its ration. Caesar lists salt
among the items that, when abundant, made a site particularly
suitable for a camp.[263] Plutarch notes an incident during Crassus's
disastrous invasion of Parthia in 54 B.C. in which the salt ration
was issued first to the troops—a bad omen since salt was part of
the ritual funeral meal.[264]

U.S. soldiers in the Mexican War recieved .16 gill of salt per
day, the equivalent of 3.8 centiliters.[265] For the Roman ration, this
would correspond to about four *cochleareae* or spoonfulls per soldier
per day.[266]

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[256] U.S. Army (1961) 11.
[257] Plin. *HN* 31.41.86–87; see Davies (1971) 124; Labisch (1975) 39–40.
[258] Adams (1995) 124 note 30.
[259] Front. *Strat.* 3.14.3; Junkelmann (1997) 149.
[260] Veg. *Epit.* 3.3.
[261] App. *Hisp.* 9,54.
[262] App. *Ill.* 4,17.
[263] Caes. *BCiv.* 2.37.5.
[264] Plut. *Crass.* 19.5.
[265] Frazer (1983) 3.
[266] Cf. Cato. *Agr.* 57 where the ration for slaves is 1 *modius* of salt per year, ca.
one *cochlearia* per day.

Fruit

The Romans, like many modern people, saw fruits as a sort of "health food." In his forced retirement, Seneca lived on an "extremely simple diet (*persimplex victus*) of field fruits."[267] Fruits (*poma*), with their high nutritional and sugar content, could be dried and stored, and would seem to be ideal food for an army.[268] Vegetius recommends bringing all the fruit in the vicinity, together with other crops, inside a city if a siege is impending.[269] Nevertheless, fruit is seldom attested as part of ancient (or indeed modern) military diet, although it is occasionally found at military sites.[270] Polybius does say that Philip V obtained a supply of figs for his army during the Second Macedonian War with Rome (200–196 B.C.), but this was when "his army was starving."[271] Athenaeus adds the detail that the figs were contributed by Magnesia because they had no grain available.[272] This was clearly an emergency measure and does not reflect normal practice.

The Roman military almost certainly did not include fruit as part of its regular rations. The traditional Roman military oath, the *sacramentum*, mentioned a fruit (*pomum papulum*) as one item that the soldier was allowed to seize personally and not turn over to the commander.[273] This suggests that fruit was not issued by the military, but rather was obtained by the soldier on an individual basis.

Fruits were probably one of the items sold by sutlers to soldiers to supplement the army's rations. They could also have been picked by soldiers. This is probably the source of the remains of wild berries were found in the fort at Welzheim.[274] In order to illustrate the extraordinary discipline of the army of Marcus Aemilius Scaurus, Frontinus relates that a "tree laden with fruit" (*pomifera arbor*) at the foot of the Romans' camp still bore its fruit when the army left it.[275]

Reconstruction of Roman Rations

The amounts set out in the present study are compared with those of Stolle.[276] The average weight of the reconstructed rations would

[267] Tac. *Ann.* 15.45.
[268] White (1970) 228; Columella *RR* 12.14.29.
[269] Veg. *Epit.* 4.7.
[270] Junkelmann (1997) 142.
[271] Polyb. 16.24.5.
[272] Ath. 3.78.100.
[273] Cin. *De Re Mil.* 5, quoted in Gell. *NA* 16.4.2; Davies (1971) 132; cf. Hdn. 8.5.3.
[274] Davison (1989) 243.
[275] Front. *Strat.* 4.3.13.
[276] Stolle (1914) 28. Calorie and protein figures for wine are from Aymard (1979)

be about 1.3 kg. (under 3 lbs.), breaking down to 850 grams of grain and about 460 grams of other foods. If biscuit was carried,[277] the weight is reduced to under 1.2 kg. (slightly over 2 1/2 lbs.). This reconstruction is based on the assumption that distribution on the individual level was given in a whole or half unit of a normal Roman measure.

Table III: Reconstruction of Roman Daily Military Ration

Item	Stolle ration in grams	Roth ration in grams	Roth ration in Roman measures	Calories in Roth rations	Protein in Roth rations
Grain	815	850	2 *sextarii*	1,950	75 grams
or Bread	1,137	850	ditto	ditto	ditto
or Biscuit	569	650	ditto	ditto	ditto
Roasted meat	117	160	1/2 *libra*	640	15 grams
or Pork	96	ditto	ditto	ditto	32 grams
Vegetables (Lentils)	--	40–50	1/3 dry *sextarius*	170	10 grams
Cheese	27	27	1 1/2 *unciae*	90	0 grams
Olive oil		40	1 1/2 *unciae*	350	10 grams
Wine/ Vinegar	327	160	1/2 liquid *sextarius*	190	0 grams
Salt	21	40	4 *cochlearea*	0	0 grams
Total	1,040–1,629	1,117–1,327		3,390	142 grams

One should note that the combination of various elements of the ration resulted in a higher nutritional value than each individual element. For example, grain and beans eaten together provide protein. In fact, all the evidence indicates that the diet of the Roman soldier was excellent, both in quality and quantity.[278] It is noteworthy that among the many complaints aired by mutinous legionaries in

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10, for grain from Foxhall & Forbes (1982) 80, the others from Lapedes (1977) 697–705.

[277] See "Prepared Rations" below pp. 51–3.

[278] Davies (1971) *passim*; Davies (1974) 334; Knights, *et al.* (1983) 250; Junkelmann (1991) 13.

A.D. 14, none concerned bad food, normally a commonplace of military griping.[279]

The Preparation of Food

Modern armies generally utilize central facilities for the preparation of food: in such cases, cooks prepare the soldiers' meals. These cooks are generally non-combatant soldiers or civilians, and they distribute food to the troops in a ready-to-eat form. Stolle argued that the Roman army similarly used central bakeries.[280] In support, he cites an incident in which Cato the Elder wanted to convince some Spanish ambassadors that he was preparing to send them military assistance.

> He ordered warning to be given to one-third of the soldiers of each cohort to cook food (*cibus*) in good season and put it on board ship, and the ships to be made ready for sailing the third day.[281]

This is, however, clearly a special circumstance: Cato wanted to sail in three days, and bread had to be quickly prepared, as baking could not be done on board ship. Indeed it is telling that Cato used rank and file troops, not cooks, for this preparation. Stolle's second piece of evidence is from Pliny. While discussing Fortune, Pliny claims (citing Cicero) that Publius Ventidius, who triumphed in 38 B.C., had once been a *mulio castrensis furnaria*, a mule-driver for a military bakery. This is a rather typical calumny, as Ventidius had actually been a military contractor—supplying pack animals to the army.[282] The "camp bakery" in question is probably a Ciceronian circumlocution for military supplies, although it might refer to a commander's kitchen.[283] This single reference is a thin reed to reconstruct centralized Roman military field-bakeries.[284]

The argument for Roman soldiers preparing their own meals is much stronger. Sallust says that the undisciplined army of Postumius Albinus in Numidia in 110 B.C. "even sold the grain which was alloted

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[279] Tac. *Ann.* 1.35.
[280] Stolle (1914) 9.
[281] Livy 34.12.6–7.
[282] Gel. *NA* 15.4; see Syme (1939) 92, 151.
[283] See below pp. 57–9.
[284] Stolle's view is accepted by Kromayer-Veith (1928) 425, but rejected by Labisch (1975) 37.

them by the state and bought bread from day to day."[285] When
Caecilius Metellus took over this army, one of his reforms was to
ban the selling of prepared or cooked food (*cibus coctus*) within the
camp.[286] Soldiers would certainly not have paid for prepared food,
if the army issued hot meals for free. Plutarch explicitly states that
Roman soldiers prepared their own food. Tacitus criticizes Vitellius
for issuing "prepared food" (*parati cibi*) to each individual soldier "as
if he were fattening gladiators."[287] This passage only makes sense if
it refers to the issuing of meals to soldiers lined up at a central
kitchen, and if this practice was *uncharacteristic* of the Roman army's
normal practice in issuing rations. Herodian refers to Caracalla grind-
ing his own grain and baking his own bread on campaign, "like a
common soldier."[288] On the other hand, Caesar implies that only
the legionaries had the capability of preparing bread,[289] so perhaps
auxiliaries relied on cooks.

This characteristically Roman method of preparing food on open
hearths at the squad level increased the army's logistical flexibility.
Armies with central kitchens must transport portable ovens in their
train, or find such ovens in the surrounding region. The need for
ovens to bake bread can be a serious logistical problem, particularly
when the army is foraging to supplement, or supply, its grain.[290]

The grain portion of the soldier's ration could be eaten in two
basic ways. The first was in the form of *puls*, a porridge or mush,
similar to modern Italian *polenta*, made with water, salt and often
with fat, oil or milk.[291] If available, spices, vegetables, bacon or fresh
meat could be added: Napoleon's troops invading Russia in 1812,
ate rye cooked as porridge with meat and other foodstuffs.[292] During
the African War (46 B.C.), Caesar collected oil and other provisions
on a foraging expedition, and since the troops were "refreshed" with-
out, apparently, having the time to make the wheat into bread, the
army must have consumed the grain as *puls* on that occasion.[293] As

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[285] Sall. *Iug.* 44.5.
[286] Sall. *Iug.* 45.2; see Labisch (1975) 35.
[286a] Plut. *Mar.* 13.1.
[287] Tac. *Hist.* 2.86.
[288] Hdn. 4.7.5.
[289] Caes. *BCiv.* 1.78.
[290] Lynn (1993) 20.
[291] Plin. *HN* 18.84; Kromayer-Veith (1928) 279, 331, 413; André (1961) 62–64;
Davies (1971) 126; Junkelmann (1997) 128–9.
[292] Thorpe (1917) 19.
[293] [Caes.] *BAfr.* 67.2.

late as the fourth century the emperor Julian "prepared himself a meal of *puls*," although Ammianus Marcellinus notes that this was no longer the custom of common soldiers.[294]

Generally, however, soldiers ate their grain ration in the form of bread.[295] A letter quoted in the *Historia Augusta* mentions two kinds of army bread. The first was "military camp bread" (*panis militaris castrensis*), which probably was a black bread, and identical to that referred to as "ration bread" (*cibarius panis*) by Cicero,[296] "military bread" by Pliny[297] and "kneaded" or "simple" bread (*maza*) by Herodian.[298] The second was "military fine bread" (*panis militaris mundus*), probably white bread, intended for officers.[299] While the author of the *Historia Augusta* certainly fabricated the letter in question, there is no reason to think that the types of food mentioned in it are fictional.[300]

Grain must go through several steps before it can be made into bread; these processes affect its weight and nutritional value. First, grain had to be threshed in order to remove the inedible husks. It was Roman military practice to thresh grain before it was issued to troops.[301] This was easily done when the grain in question was shipped to the army, as threshing could be carried out during the collection process. Threshing on a central basis has the advantage of reducing the carrying load of the army by the amount of the chaff discarded. When the army was relying on local grain, however, threshing on the spot was necessary. Appian notes the difference in Macedonian and Roman practice regarding threshing during the Third Macedonian War (172–167 B.C.):

> Both armies employed the rest of the summer in collecting grains, Perseus threshing in the fields, and the Romans in their camp.[302]

Livy, referring to the same war, adds that after bringing the grain in from the fields, each soldier:

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[294] Amm. Marc. 25.2.2.
[295] Junkelmann (1997) 129–136.
[296] Cic. *Tusc.* 5.97.
[297] Plin. *HN* 18.67.
[298] Hdn. 4.7.5. Whittaker in the Loeb edition translates *maza* as "barley-cake", which indeed is its normal Greek meaning, but in this case it would of course have been made of wheat flour.
[299] Revel (1979) 40–41.
[300] *HA Aurel.* 9.6.
[301] Kromayer-Veith (1928) 425.
[302] App. *Mac.* 9,13.

before his tent, was clipping the ears with his sickle (*falx*), so that the grain might be threshed out more cleanly.[303]

The Roman practice of threshing in camp was clearly related to security, as it reduced the amount of time the army remained in the fields, vulnerable to attack.

Two factors affect the weight of bread relative to the weight of threshed grain—reduction during the milling process and increase due to the addition of water. To make bread, grain must be milled, which reduces flour to about 60–65 percent of its original weight, the remainder being bran, which today is sifted away.[304] Bülow-Jacobsen, however, claims that "in antiquity, the bran was almost certainly left in the flour, as in graham flour today."[305] After milling, various elements are added to grain to produce bread, such as leaven, salt, or even lard, but the most important is water, which significantly increases its weight, without increasing its nutritional value.[306] The stronger the flour, the more water will be absorbed and the greater will be the weight of the bread.[307] Scholars differ in their calculation of the relationship between the weight of flour and prepared bread. Pliny says that "military bread" (*panis militaris*) weighed 1/3 more than the grain that went into it, but it is unclear whether Pliny is referring to whole grain or to grain flour.[308] Since water makes up between 65 and 75 percent of bread's weight,[309] it seems most likely that Pliny means the increase in the weight of flour, not of grain. Foxhall and Forbes, citing Pliny, estimate each kilogram of wheat made 1.3 kg. (2.86 lbs.) of bread, a figure derived independently by Goldsworthy.[310] Aymard notes that, although theoretically every kilogram (2.2 lbs.) of wheat should produce 1.2 kilograms (2.64 lbs.) of black bread, in practice only 1 kilogram is usually produced.[311] Conversely, Engels, using comparative material, claims that a kilogram of grain will produce only 880–890 grams (1.9 lbs.) of bread,[312] and Bülow-Jacobsen calculates that a kilogram of grain

[303] Livy 42.64.3.
[304] Aymard (1979) 9; Foxhall & Forbes (1982) 76.
[305] Bülow-Jacobsen (1994) 91.
[306] Frazer (1983) 4; Toussant-Samat (1992) 238.
[307] Foxhall & Forbes (1982) 79–80.
[308] Plin. *HN* 18.67.
[309] Revel in Forster & Ranum (1979) 40–41; Foxhall & Forbes (1982) 64.
[310] Foxhall & Forbes (1982) 80; Goldsworthy (1996) 292.
[311] Aymard (1979) 2.
[312] Engels (1978) 124: his own figures are 3.5 lbs. of bread and 3.9 lbs. of grain.

would produce about 940 grams of bread (2 lbs.).[313] In any case, it appears that flour will produce slightly more or slightly less its weight in bread: therefore, we will assume that the Roman soldier's grain ration of 2 *sextarii* or 850 grams of wheat per day probably produced about 850 grams (1.87 lbs.), that is, 2 1/2 Roman pounds, of bread. The same amount of wheat will produce a loaf approximately 30 percent lighter if baked into white bread, rather than black bread.

Engels suggests that the production of bread causes the loss of "many calories" and that the soldiers would have to consume 1.6 kg. (3.5 lbs.) of bread to obtain 3,600 calories.[314] As noted above, Engels' figure for minimum caloric requirement is too high, and he does not account for other foodstuffs eaten.[315] In any case, wheat does not in fact lose significant nutritional elements or calories when it is made into bread.[316] A daily ration of 850 grams of bread would have provided about 1950 calories, 65 percent of the 3,000 calories required daily by the average Roman soldier.[317] Other foods, such as fat from the meat ration, can be added to the bread, increasing its caloric value.[318]

The time involved in preparing bread is considerable. As noted above, the Latin word *frumentum* normally means unground grain; this is what Livy means when he says that in 169 B.C. the consul Q. Marcius Philippus "distributed the *frumentum* to the soldiers."[319] Such grain still had to be ground by the soldiers on a stone handmill, the *mola manuaria*, which was carried on the unit's pack animals.[320] Plutarch notes that during Antony's retreat from Parthia in 36 B.C., the army lacked mills because many pack animals had died or were needed to carry the wounded.[321] Modern experiments show that a hand-mill can grind only 4 kilograms (10 lbs.) of grain in an hour. One should not assume that each soldier literally did his own grinding and baking each day. A millstone from Saalburg has the inscrip-

[313] Bülow-Jacobsen (1994) 91.
[314] Engels (1978) 124.
[315] See pp. 7–8.
[316] Foxhall & Forbes (1982) 80.
[317] Using the figures given in Foxhall & Forbes (1982) 56.
[318] Frazer (1983) 4.
[319] Livy 44.8.1; see 38.37.9.
[320] Davies (1971) 126; Labisch (1975) 35.
[321] Plut. *Ant.* 45.4.

tion *con(tubernium) Brittonis*, suggesting that the grinding was generally done on the level of the eight-man squad.[322] Similarly, one soldier, or military servant probably did the baking for the entire *contubernium*. Issuing Roman rations to the soldier in unprepared form, meant that he, or more accurately the *contubernium* as a group, had control over the form in which the food would be prepared for each meal. Therefore, it took about 100 minutes to grind the daily ration of grain for the eight men in a *contubernium* (although constant practice would have speeded up the process).[323] Such work is very strenuous and in order to get a reasonably fine meal, it must be repeated two or three times. This work was probably not done every day, but rather enough grain was ground at one time to last for several days. The flour, with water added, then would have to be kneaded by hand: this is a process which both Dio Cassius and Herodian describe as typical of a Roman soldier preparing his own bread.[324] Finally, the bread had to be baked in a camp-fire or hearth: remains of such hearths were found in one of the siege-camps at Masada.[325] Herodian says that Caracalla, after preparing his "kneaded bread (*maza*)" baked it in charcoal.[326] The entire process of preparing the bread—kneading, rising and baking—probably took from 45 minutes to two hours, depending largely on whether leaven was used.[327]

We are but little informed on the methods used to prepare other types of food except that, according to Frontinus, Roman military regulations required that soldiers to bake or boil their meat.[328] This rule was certainly intended to prevent soldiers wasting their time on "gourmet" cooking. Plutarch explicitly makes this point, describing Scipio Aemilianus's disciplining of the army in Spain in 134 B.C.:

> [Scipio] also issued orders that the soldiers should eat their luncheon standing, and that it should be something uncooked, but that they might recline at dinner, and this should be bread or porridge simply, and meat, roasted or boiled.[329]

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[322] Gentry (1976) 20.
[323] Foxhall & Forbes (1982) 81; Junkelmann (1986) 211.
[324] Dio Cass. 62.5.5; Hdn. 4.7.5.
[325] Richmond (1962) 146; Labisch (1975) 35.
[326] Hdn. 4.7.5.
[327] Foxhall & Forbes (1982) 81; Junkelmann (1986) 125.
[328] Front. *Strat.* 4.1.2.
[329] Plut. *Mor.* 201C.

Appian refers to food being "soldierly and plain" (*stratiotikê kai psilê*),[330] and notes that meat (in this case venison and rabbit) was normally boiled and salted.[331] Appian also says that soldiers were allowed to have only a brass pot (*chutra chalkês*) and a spit for cooking (in addition to one drinking cup), and to eat only roasted or boiled meat.[332] This pot was certainly not only for boiling meat: vegetables and *puls* could be cooked in it. The spit perhaps was also used to roast vegetables or even fruit. In cases where the rationing system broke down, for whatever reason, the Roman soldier improvised. Caesar mentions a substitute bread (*effectus panis*) which the soldiers made from the *chara* root (otherwise unknown).[333]

At times, the army issued cooked meals to troops for tactical reasons. During his forced march to meet Hasdrubal's forces in 207 B.C., Claudius Nero, for example, ordered that "prepared food" (*commeatus parati*) be placed along the road by civilians.[334] The Roman rule of squad-level baking also applied only during wartime. During peacetime, centralized cooking was practiced.[335]

The navy also seems to have used a system of prepared meals. In Republican times, the Senate ordered wealthy individuals to provide sailors, armed, paid and provided with cooked rations (*cocta cibaria*) for thirty days.[336] This method of supplying sailors with food is noteworthy and indicates a different supply system than that used by the army. This is not surprising, given the difficulty of preparing and cooking meals on board ship. Such a system probably continued under the Empire.

Officers, naturally, were not expected to prepare their own meals. Even such a paragon of Republican parsimony as Cato the Elder

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[330] App. *Pun.* 17,116.
[331] App. *Hisp.* 9,54.
[332] App. *Hisp.* 14,85.
[333] Caes. *BCiv.* 3.48.
[334] Livy 27.43.10.
[335] In Imperial times, the army introduced centralized food preparation in garrisons, and within permanent forts. At some point, it seems that each century obtained its own mill and baking ovens. A bread stamp from Mainz (*CIL* 13.6935) suggests that two bakers and an assistant were responsible for baking the bread of their century. Imperial soldiers stationed in the Eastern Desert of Egypt received baked bread as rations, as there was no local firewood for cooking (Bülow-Jacobsen (1994) 91; Adams (1995) 119). All of these cases, however, refer only to peacetime logistics, and not to the subject of this study. See Davies (1974) 319; Gentry (1976) 202; Davison (1989) 241–2.
[336] Livy 24.11.7–9.

had his meals prepared and served by a servant.[337] The dining facilities of commanding officers were ubiquitous, but are mentioned only incidentally. For example when Velleius Paterculus praises Tiberius for feeding the sick and wounded from his own field kitchen (*apparatus cibi*)[338] and Suetonius refers to a fire which started in the stove (*caminus*) of the Vitellius's headquarters' dining room (*triclinium*) in Germany.[339]

Prepared Rations

The Roman army's practice of having its soldiers grind, knead and cook their own bread had many advantages—but it also could lead to problems. In the first place, bread spoils in a relatively short time, after about four or five days in warm weather, and about a week in colder climates.[340] The cooking of bread required building fires, which could reveal the army's presence to the enemy. In addition, there were circumstances in which the army had to move rapidly, without bringing mills or stopping to gather firewood.

The major difference between the normal campaign ration and the pre-prepared "iron ration" (to use a modern term) is the substitution of biscuit for bread or *puls* made on the spot from grain. Biscuit can keep a month or longer, is lighter than unground grain and requires no cooking.[341] Re-baking bread into biscuit or hardtack also reduces its weight. When rebaked into biscuit, 850 grams of bread produce around 650 grams of biscuit, but since the main elements lost are water and air, there is little reduction in nutritive value. In Late Latin hardtack was called *buccelatum* (derived from *bucella*, "mouthful"),[342] and this may be what Pliny calls "old or ship's bread" (*vetus aut nauticus panis*).[343] Most likely, such hardtack was prepared at the same level as bread, i.e. by the *contubernium*. The iron ration also may also have replaced fresh or pickled elements of the

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[337] Plut. *Cato Mai.* 21.3.
[338] Vell. Pat. 2.114.2.
[339] Suet. *Vit.* 8.
[340] Goldsworthy (1996) 292.
[341] Stolle (1914) 12.
[342] Amm. Marc. 17.8.2; *HA Avid. Cass.* 5.2. and *Pesc. Nig.* 10.4; *Cod. Theod.* 7.4.6, 7.5.2.
[343] Plin. *HN* 22.68.138.

diet with dried versions—which are lighter and less bulky. The expression *cibaria cocta*, sometimes abbreviated to *cibum*, refers to such rations, prepared in bulk before a march.[344]

Prepared rations were cooked in advance of action either by the soldiers themselves or, in contrast to normal practice, by central kitchens. For example, in 218 B.C. the praetor M. Aemilius ordered Rome's naval allies to maintain their ships on alert and to keep ten days worth of "*cocta cibaria*" on hand.[345] In 206 B.C., Scipio Africanus ordered his men to "furnish themselves with provisions (*ephodia*) for a considerable time" in preparation for a campaign into the interior of Spain.[346] Livy's description of soldiers "preparing rations (*cibum*)" for an expedition during the Spanish campaign of 195–4 B.C. may go back to Cato's memoirs.[347] During the war against Antiochus III (192–189 B.C.), Lucius Scipio ordered his army "to prepare several days' rations (*cibaria*)" for a march against the enemy,[348] and when Aemilius Paulus sent a commando of 5,000 men in order to seize the passes into Perrhaebia in 168 B.C., he arranged for 10 days "cooked rations (*cocta cibaria*)" to be issued to them.[349] Scipio Aemilianus, leading a force of cavalry to rescue four cohorts cut off by the Carthaginians in 149 B.C., ordered his men to take two days rations along.[350]

Indeed, the army expected a disciplined Roman soldier to carry some iron rations with him at all times, so that he might be prepared to move out without delay. Livy has Aemilius Paulus address his soldiers during the 3rd Macedonian War (172–67 B.C.) as follows:

> A soldier should concern himself [only] with the following: his body, to keep it as strong and as nimble as possible; the good condition of his weapons; and the readiness of his food supply for unexpected orders (*cibum paratum ad subita imperia*).[351]

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[344] Nep. *Eum.* 8.4.7. Though Nepos is writing about a Hellenistic Greek army of the third century B.C., he may preserve contemporary Latin military terminology of the 1st century B.C.

[345] Livy 21.49.7.

[346] Polyb. 11.26.6.

[347] Livy 34.12.6.

[348] Livy 37.37.5.

[349] Livy 44.35.13.

[350] App. *Pun.* 15,103.

[351] Livy 44.34.3–4.

According to Frontinus, Scipio Aemilianus insisted that his soldiers carry rations (*cibaria*) on their persons.[352] Plutarch adds that Scipio ordered his men to eat "uncooked" lunches—doubtless referring to prepared rations—intending to accustom them to eating cold meals.[353] When Hadrian ordered maneuvers in North Africa, he noted the soldiers carried their *cibum* with them.[354]

Meals

The Roman army took two meals a day: breakfast (*prandium*) in the morning and the main meal (*cena*) shortly before "taps" (*classicum*).[355] Josephus emphasizes the point that the time of meals in the Roman army was not left to the discretion of the troops, but were taken on command.[356] Onasander discusses the importance of timing meals properly in the face of the enemy and advises commanders to strictly control the soldier's diet:

> The general, if encamped . . . opposite the enemy, should not be care-less of the proper time at which to serve meals. For if he considers that it lies with him to lead out his troops . . . whenever he wishes, he may set a mealtime for his troops at whatever time he wishes. But . . . if it is left in the power of the enemy to attack whenever they desire . . . he should not hesitate to order the first meal at sunrise, lest the enemy, by prior attack, force his men to fight while still hungry.[357]

The Romans' strict control of meal-times was in contrast with "bar-barian" practice: in Plutarch's description of the Ambrones before the battle of Aquae Sextae (102 B.C.), he writes: "the main body were taking their meal after bathing, and some were still bathing."[358] For security reasons, the Romans almost always ate within their camp.[359] Less disciplined armies suffered the consequences: during

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[352] Front. *Strat.* 4.1.1.

[353] Plut. *Mor.* 201C.

[354] *CIL* 8.18042.8b = *ILS* 2487 (Lambaesis, 2nd c. A.D.): *Opere pr[o]bato introgressi castra raptim et cibum et arma cepistis.*

[355] Polyb. 14.3.6; Plut. *Aem. Paul.* 17.3; Plut. *Mor.* 201C; Davies (1974) 319; Labisch (1975) 36–7.

[356] Jos. *BJ* 3.86.

[357] Onas. *Strat.* 12.1. There were several cases when exactly the situation warned of by Onasander actually occurred, see Chapter Seven, pp. 312–3.

[358] Plut. *Mar.* 19.2.

[359] Polyb. 3.67.2.

the war against Antiochus III (192–89 B.C.), the Pergamenes, allied
to the Romans, defeated a Seleucid army by surprising them at din-
ner.[360] Another case occurred in 43 B.C.: Brutus's cavalry in Asia
surprised rebellious Lycians eating breakfast in the open and killed
six hundred of them.[361]

When possible, of course, troops were fed immediately before
battle.[362] On the second day of the battle of Canusium in 209 B.C.,
Claudius Marcellus ordered his men "to strengthen themselves by
eating, so that, if the battle should be prolonged, they might have
sufficient endurance."[363] Polybius remarks that before the battle of
Ilipa in 206 B.C.:

> [A]s soon as it was light . . . [Scipio Africanus] sent a message by his
> aides-de-camps (*hyperetai*) to all the tribunes and soldiers to take their
> morning meal and arm themselves and march out of camp.[364]

In the rare instances of night operations, the *cena* was fed to the
troops before they moved out.[365]

Conversely, an army might be fed immediately *after* a hard-fought
battle. When Acilius Glabrio assaulted Lamia in 190 B.C., his morn-
ing attack was repulsed; he called his troops back into camp around
noon and fed them, then gave them the rest of the day off. The
next morning the Romans successfully stormed the town.[366] After a
battle soldiers were often quite a distance from their camp, partic-
ularly if they had pursued a defeated enemy: in such cases, food
would be sent from the camp to the soldiers in the field.[367] During
sieges, when siegeworks had to be completed quickly, the army would
work in shifts, day and night. Each shift ate its meal in its "off-time"
regardless of the time of day or night.[368]

Roman soldiers normally ate their noon meal in the open in front
of their tents, and took their evening meal inside.[369] Meals were not
eaten alone, but with the other members of one's tent-mess, the root

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[360] App. *Syr.* 5,26.
[361] Plut. *Brut.* 30.3.
[362] Polyb. 3.71.11, 4.71.3; Livy 28.2.2; Plut. *Sulla* 29.4.
[363] Livy 27.13.13.
[364] Polyb. 11.22.4.
[365] Livy 32.11.9; Polyb. 14.3.5–6; Sal. *Iug.* 106.4; Plut. *Aem. Paul.* 15.5.
[366] Livy 37.5.2.
[367] Plut. *Sulla* 30.1.
[368] App. *Pun.* 18,119.
[369] Plut. *Mar.* 7.3.

meaning of *contubernium*. Disciplined armies, at least, used earthen-ware cups and wooden utensils to eat and drink.[370] Soldiers were expected to eat sitting, like slaves and children, or standing up in the open, though they were sometimes allowed to eat their evening meals lying down, as was normal for free Romans.[371] Velleius Paterculus praised Tiberius Caesar for eating sitting down like a common sol-dier, rather than reclining like an aristocrat.[372] In some situations, soldiers ate and drank standing in ranks, as Crassus ordered his men to do during his invasion of Parthia (54–53 B.C.).[373] Commanders sometimes punished soldiers by forcing them to stand while taking meals.[374] Whether the solders actually sat or reclined during eating was often a question of the level of discipline in the camp. The indiscipline of Pompey's army at Pharsalus (48 B.C.) is emphasized by Plutarch in his description of the camp captured by Caesar:

> For every tent was . . . decked out with flowered couches and tables loaded with beakers; bowls of wine were also laid out, and prepara-tion and adornment were those of men who had sacrificed and were holding festival rather than of men who were arming themselves for battle.[375]

Even allowing for hyperbole, and a pro-Caesarian source, the point is well made. During sieges, the strict rules about eating seem to have been relaxed. Stone benches, or *triclinia*, found at Masada in the soldiers' quarters, were probably used both for sleeping and eating.[376]

Diet for the Sick and Wounded

Many military forces prescribe special rations for hospitalized troops.[377] The Roman army was remarkable in pre-modern times for its at-tention to sick and wounded soldiers. By the Imperial period at the

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[370] Hdn. 4.7.5; Plut. *Mor.* 201C.
[371] Livy 28.2.2; Plut. *Mor.* 201C.
[372] Vell. Pat. 2.114.
[373] Plut. *Crass.* 23.5.
[374] Livy 24.16.13.
[375] Plut. *Pomp.* 72.4; cf. Caes. *BCiv.* 3.96.
[376] Yadin (1966) 219.
[377] E.g. in the 18th century British Army, Curtis (1926) 93; but diet in early modern military hospitals was sometimes deficient, see Anderson (1984) 105–6.

latest, legions had regular medical personnel, and legionary camps were furnished with hospitals.[378] Ancient medicine was preoccupied with the role of diet both in the creation and cure of illness,[379] and the same applied to military medicine. Appian says that the Carthaginian army, besieged during the Numidian War in 150 B.C., "fell sick of all kinds of diseases, due to bad food,"[380] and that Roman soldiers in Spain got dysentary from eating meat without salt.[381] Caesar's forces at Pharsalus (48 B.C.), short of supplies and forced to eat roots, were stricken with "a kind of pestilential disease, occasioned by the strangeness of their diet."[382] The disease was cured in a remarkable way:

> ...after [Caesar] had taken the Gomphi, a city of Thessaly, he not only provided food for his soldiers, but also relieved them of their disease unexpectedly. For they fell in with plenty of wine, and after drinking freely of it ... by means of their drunkenness they drove away and got rid of their trouble, since they brought their bodies into a different habit.[383]

The danger of over-eating in a malnourished state was also understood by the ancients. Appian notes that after the lifting of the siege of Mutina in 43 B.C., Brutus's soldiers "fell sick by reason of excessive eating after their famine and suffered from dysentery."[384]

The Romans used some foodstuffs as medicines: Vegetius recommends eating fowl especially for sick soldiers, a cure also noted by Plutarch.[385] For a malady which attacked Aelius Gallus's army marching through the Arabian desert during his campaign of 26–25 B.C. (which may have been heat-stroke), the Roman remedy was to drink and apply to the skin a mixture of olive oil and wine.[386] A papyrus from Masada, dating to the siege of 73, an account of medical supplies, lists "eating oil" (*olei cib(arii)*), which was perhaps intended for the same malady.[387]

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[378] For Roman military medicine, see Le Bohec (1994) 52–3; Kissel (1995) 238–50.
[379] Lonie (1977) 235–60.
[380] App. *Pun.* 10,73.
[381] App. *Hisp.* 9,54.
[382] Plut. *Caes.* 40.4; cf. Caes. *BCiv.* 3.48.
[383] Plut. *Caes.* 41.3; cf. App. *BCiv.* 2.10.64 for a less positive view of the effects of drink on this occasion.
[384] App. *BCiv.* 3.11,81.
[385] Veg. *Epit.* 4.7; Plut. *Pomp.* 2.6.
[386] Dio Cass. 53.29.4–6.
[387] *Mas. Doc.* 723:7–8, 10 [= Cotton & Geiger (1989) 59].

Officers' Diet and Meals

Of course, as a rule, Roman officers ate a much better diet than common soldiers. The elements of the Roman aristocrat's diet while on campaign were probably simpler than while in civilian life, though not by much. Certain commanders were indeed praised for the simplicity of their diet. For example, Frontinus says Cato would drink the same wine as the rowers in the fleet and that Scipio Aemilianus would munch on bread offered to him by his soldiers.[388] In his discussion of Marius, a similar type, Plutarch remarks:

> ... it is a most agreeable spectacle for a Roman soldier when he sees his general eating common bread (*koinon arton*) in public.[389]

Roman historians applied a similar *topos* to soldier-emperors: Tacitus lauds Vespasian for dressing and bearing himself like a common soldier and says that "his food was whatever chance offered (*cibo fortuito*)"[390] and Herodian praises Septimius Severus, also a soldier-emperor, for "taking the same food and drink available to everyone."[391]

Conversely, our sources criticize leaders for overindulgence in food. Polybius disapproves of the Roman garrison commander of Tarentum in 212 B.C., Gaius Livius, for starting his feasts "early in the day" and says that it was about sunset, when "the drinking was at its height" that Hannibal seized the town by treachery. Livius, incapacitated by alcohol, fled to the citadel, where, after sobering up, he held out.[392] Tacitus slights Vitellius for his "extravagent dinners (*prodiga epula*)" and says that "at midday he was tipsy and gorged with food."[393]

In balance, we can assume that most officers often ate quite well, even while on campaign. Civilian aristocrats who accompanied the army appear normally to have been fed on the army's or the commander's stores. At the beginning of the Actium campaign (31 B.C.) Octavian ordered senators and knights accompanying the army to bring their own provisions; Dio Cassius presents this as exceptional.[394]

[388] Front. *Strat.* 4.3.1,9. Other examples: Livy 21.4.6 (Hannibal); Sall. *Cat.* 5.3 (Catiline); Plut. *Sert.* 13.2 (Sertorius); App. *BCiv.* 4.15,114 (Brutus).
[389] Plut. *Mar.* 7.3.
[390] Tac. *Hist.* 2.5.
[391] Hdn. 2.11.2. Other examples: Dio Cass. 69.7.3 (Hadrian); 78.13.1–2 (Caracalla); see Junkelmann (1997) 11–2.
[392] Polyb. 8.30.1–6.
[393] Tac. *Hist.* 1.62.
[394] Dio Cass. 50.11.6.

Officers also benefited from offerings made by locals: for example,
Sulla was offered fish as gift from some Greeks during his cam-
paigning there in 87–86 B.C.[395] In general, while the army supplied,
or at least paid for, provisions for high officers, one cannot speak
of them receiving "rations" since the amounts and types of foods they
ate depended entirely commander's whim.

The rule of eating together also applied to officers.[396] Since cen-
turions had their own separate quarters, it seems likely that they ate
there, probably together with the *optiones* and the standard bearers.
The tribunes and the commander's personal staff (which often in-
cluded friends and relatives who served as informal aides-de-camps),
as well as, perhaps, the most senior centurions, ate with the com-
mander. Thus, the term *contubernium* came to refer to the commander-
in-chief's staff, who shared his meals.[397]

Since, during the Republican period and well into the Empire,
the Romans drew their officer corps almost exclusively from the
aristrocracy, the meals of the commander and of the highest rank-
ing officers, resembled the kind of formal meal enjoyed by the upper
classes in peace-time. Though soldiers are said to "take food" (*cibum
capere*),[398] officers "dine" (*epulare*).[399] While dining in the field was gen-
erally not as elaborate an affair as in peacetime, being able to put
on an elegant dinner party in the field was a sign of good breed-
ing. Sallust has Gaius Marius, the very type of the "new man," com-
plain that: "[the aristocracy] say I am common and of rude manners,
because I cannot give a banquet (*convivium*)."[400] Under normal cir-
cumstances, though, a Roman commander ate in his *praetorium* in
the manner of a Roman aristocrat, reclining on a couch.[401] In Roman
aristocratic fashion, generals virtually never ate alone. Plutarch describes
the two Liberators just before the battle of Philippi (42 B.C.):

> Brutus was full of hopefulness at supper, and after engaging in philo-
> sophical discussion, went to rest; but Cassius, as Messala tells us, supped
> in private with a few of his intimates. . . .[402]

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[395] Plut. *Sulla* 26.4.
[396] Plut. *Pomp.* 3.1–2.
[397] Sall. *Iug.* 59.4; Front. *Strat.* 4.1.11–12.
[398] Livy 27.45.11, 28.2.2; Sall. *Iug.* 91.2; Front. *Strat.* 2.1.1, 5.
[399] Livy, 41.2.13; Vell. Pat. 2.101.3.
[400] Sall. *Iug.* 85.39.
[401] Livy 41.2.12.
[402] Plut. *Brut.* 40.1.

To the victors belong the spoils—including meals. After winning the battle of Pharsalus in 48 B.C., Caesar took Pompey's camp, entered his tent and ate the defeated general's supper.[403]

While it was probably seldom actual practice, there was a *topos* of the good general who ate like a common soldiers. As "soldier emperors" both Septimius Severus and Severus Alexander receive praise for eating military rations (*militaris cibus*) with their troops.[404] Velleius Paterculus lauds Tiberius for sitting while he dined (*cenavit sedens*), at least in company.[405] Frontinus records the case of Gaius Titius, a prefect of a cohort, who was ordered to forgo banquets (*convivia*) by Calpurnius Piso because he had been defeated by slaves in the Sicilian Slave War of 135–2 B.C.[406] Generally, though, slaves would serve even the simplest meal of most Roman officers.

Other Logistical Needs

Firewood

Since the Romans did not prepare their meals centrally, but rather issued uncooked grain to their troops, every eight-man *contuberium* needed its own cooking fire.[407] Of course, not just bread, but meat and vegetables, also needed to be cooked. Therefore, the army in the field had to collect a large amount of firewood or fuel daily.[408] Tacitus calls soldiers deprived of firewood "wretched,"[409] and Frontinus emphasized the danger that lack of firewood could lead to the eating of undercooked meat, causing illness.[410] Caesar considered the lack of firewood as adverse a situation as an absence of water, fodder, or grain,[411] and Vegetius also emphasized the importance of firewood to the army.[412]

Soldiers resented the constant work of obtaining firewood, necessary

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[403] App. *BCiv.* 2.11.81.
[404] *HA Sev. Alex.* 51.5, 61.2.
[405] Vell. Pat. 2.114.
[406] Front. *Strat.* 4.1.26.
[407] See "Preparation of Food" above, pp. 44–5.
[408] *CIL* 13.623 = *ILS* 9119; *CIL* 13.6618; *CIL* 13.11781 (*agens in lignariis*).
[409] Tac. *Ann.* 2.5.
[410] Front. *Strat.* 2.5.13.
[411] Caes. *BCiv.* 1.84.
[412] Veg. *Epit.* 3.3

though it was,[413] and for this reason, a thick growth of trees near the campsite was seen as an advantage.[414] In addition to being inconvenient, gathering firewood could be dangerous (quite aside from the threat of enemy action discussed in Chapter 6). Tacitus reports a tragic winter spent by Corbulo's army under canvas during the Armenian campaign of 57–9 A.D.:

> The case was observed of a soldier, carrying a bundle of firewood (*fascis lignorum*), whose hands had frozen till they adhered to his load and dropped off from the stumps.[415]

Even if this story is hyperbole, frostbite certainly would have been a problem under such freezing conditions, when the gathering of firewood would have been especially important.

Naturally, anything flammable could be used as fuel: Dio Cassius refers to soldiers carrying charcoal,[416] and during his march into Galatia in 189 B.C., Manlius Vulso traversed a woodless region and the army used cow-dung instead of wood as fuel.[417] Roman soldiers in Scotland used peat for fuel.[418] According to Appian, when the Numidians cut off the Carthaginian army under Hasdrubal in 150 B.C., "the supply of wood for cooking failed [and] they burned their shields,"[419] a striking illustration of the importance of fires to an ancient army. Nevertheless, as the Latin term used to refer to the gathering of fuel was *lignatio* (from *ligna*, wood) it is clear that wood was the fuel most often used. Frontinus explicitly says that the Roman army used "felled trees" (*trunci*) as fuel when operating in Germany in 9 A.D.[420]

Latin distinguishes firewood (*lignum*) from wood used for building (*materia*), and even had separate verbs for their collection (*lignari, materiari*).[421] During a siege, when an army stayed in one place for a considerable period of time, the massive amounts of wood needed both for firewood and for building siegeworks and entrenchments often caused significant deforestation. Josephus claims that at Jerusalem,

[413] Tac. *Ann.* 1.35.
[414] Plut. *Sulla* 16.1.
[415] Tac. *Ann.* 13.35.
[416] Dio Cass. 52.25.7.
[417] Livy 38.18.4.
[418] Theodor Kissel, personal correspondence.
[419] App. *Pun.* 10,73.
[420] Front. *Strat.* 4.7.8.
[421] Tac. *Ann.* 1.35; Caes. *BGall.* 7.73; see De Meo (1986) 192; Kissel (1995) 196ff.

in 70, the Romans army consumed all the timber within 90 *stadia* (15 kilometers) of the city during a four months' siege.[422] The building of forts around the boundaries of the Empire also used an enormous amount of timber.[423]

Fodder

Providing fodder of sufficient quantity and quality was absolutely necessary to maintaining the ability of an ancient army to fight and maneuver.[424] It is not surprising, then, that the *Historia Augusta* lists fodder first of items necessary for the army's support.[425] Fodder was certainly the largest item in terms of weight, and if an army encountered logistical difficulties, fodder was almost always the first necessity to be depleted.[426]

Feed for animals is traditionally divided into three categories: "hard fodder," "green fodder" and "pasturage." Hard fodder is usually a grain product, such as barley and oats, which was collected, stored and distributed much in the same way as wheat for the soldiers. Green or dry fodder refers to various crops which are grown on farms specifically for the use of animals. The Roman army certainly made use of green fodder: an inscription mentions a detachment of soldiers (*vexillatio*) sent out to make hay.[427] In addition to hay and straw, the Romans used other crops as green fodder, such as clover, vetch, panic grass, lupines, broad (or fava) beans, fenugreek and alfalfa.[428] When necessary, the Romans could utilize unorthodox fodder, such as the young shoots of trees, unripe grain, chickpeas or lentils,[429] as well as leftovers from human food.[430] The third category, pasturage refers to the grasses and other vegetation which animals eat directly from the fields.[431] The study of equine coprolites (desiccated horse dung) from a Roman military camp reveals a diet of barley, wheat, clover and vetch.[432]

The amounts of fodder suggested for animals in modern field

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[422] Jos. *BJ* 5.263–4; 6.5; cf. Caes. *BGall.* 5.39; Luc. *BC* 3.426; Dio Cass. 65.4.2.
[423] Hanson (1978) 293–308.
[424] Hyland (1990) 86–94.
[425] *HA Tyr. Trig.* 18.6–9.
[426] Van Creveld (1977) 34.
[427] *CIL* 8.4322 [= 18527].
[428] Heichelheim (1938) 131; White (1970) 202–3.
[429] Mishnah *Shabbath* 18:2; 20:5; 21:3; 24:2.
[430] U.S. Army (1935) 196.
[431] Hammond (1980) 257.
[432] Knights, *et al.* (1983) 143.

manuals should be used with even more caution than the recom-
mended daily allowance for human beings. Fodder rations in the
field manuals represent an optimum ration under ideal conditions.
During actual campaigning animals were often fed less than the
paper ration.[433] If provisions had to be reduced for any reason, it
would have been the animals' rations which were cut back first.

Horses
Horses (*equi, hippoi*) were rarely used as pack-animals by the Romans.[434]
They were, however, important as mounts for cavalry and officers.
The ration for a war-horse was certainly higher than that for a pack-
animal; in addition to its larger size and greater dietary needs, both
its monetary and military value were much higher. Indeed, the sen-
sitivity of horses in regard to fodder is one reason why mules, don-
keys, and oxen were preferred as pack- or draft-animals.[435] The
ancients, well acquainted with horses in daily life, were quite aware
of this sensitivity. Polybius says that poor diet and bad conditions
led to an outbreak of "horse-mange" (*limopsoros*) in Hannibal's army:
the Carthaginians cured their horses by rest and an improved diet
made possible by occupying a "rich country."[436]

   Based on modern practice, some scholars suggest a normal ration
for horses would be from 5.5 to 6.5 kg. (12–14 lbs.) of hard fodder
and 6.5 to 7.5 kg. (14–16 lbs.) of green or dry fodder per day.[437]
Others give a considerably higher figure: 8–11 kg. (17–21 lbs.) of
hard fodder and up to 25 kg. (55 lbs.) of green fodder per horse
per day.[438] In wartime conditions, of course, actual rations were cer-
tainly smaller than even the former estimates: in Wellington's Pe-
ninsular army, horses received only 4.5 kg. (10 lbs.) of barley per
day.[439] Hyland argues that as little as 1.5 kg. (3.5 lbs.) of hard fod-
der per day was sufficient for an ancient horse, a figure supported
by Kissel.[440] Horses also need some 15–30 liters of water per day,
more in hot and dry conditions.[441]

   [433] Curtis (1926) 115–6; Goff (1969) 74; Frazer (1983) 10.
   [434] White (1970) 288.
   [435] Van Creveld (1989) 46–7.
   [436] Polyb. 3.87.2–3.
   [437] Kromayer-Veith (1928) 330; Engels (1978) 126; Frazer (1983) 205 n. 65;
Bachrach (1993) 718.
   [438] Perjés (1970) 16–7; van Creveld (1989) 24; Lynn (1993) 26 n. 9.
   [439] Glover (1977) 102.
   [440] Hyland (1990) 90; Kissel (1995) 36.
   [441] Engels (1978) 127; Dixon & Southern (1992) 206 Bachrach (1993) 720.

Polybius provides specific figures for military horse rations in the second century B.C., although their interpretation is problematic. Roman citizen cavalrymen received seven Attic *medimnoi* of barley per day, which translates into around 9 kg. (20 lbs.) and five Attic *medimnoi* of barley around 6.25 kg. (13 3/4) lbs. of barley per day for allied cavalry.[442] If we accept the smaller estimates given above for a horse's needs, both these figures seem too large for a single horse. Quite possibly these rations were meant to feed more than one horse or perhaps an additional pack-animal.[443] This view is supported by a story in Plutarch: Gaius Marius, while serving as a legionary cavalryman, produced both a horse and a mule during an inspection.[444] Uncertainly about the amount of rations needed, and thus about to how many animals are being fed make it impossible to rely on Polybius's figures for fodder.[445]

First-century pay accounts record deductions for fodder, showing that dry fodder was issued as part of the rations. The pay record for Q. Julius Proculus, from Egypt and dating to between 88 and 90 contains a deduction of the equivalent of 10 *HS* for hay (*faenaria*).[446] That of Gaius Messius, found at Masada and dating to just before or just after the siege of 73, has a deduction of 64 *HS* for barley (*hordaria*), as opposed to 80 *HS* in each case for food.[447] Julius Proculus was probably an infantryman whose deduction contributed for the fodder of the *contubernium*'s mule (or mules). Gaius Messius, on the other hand, was probably a legionary cavalryman, so that the larger deduction paid for hard fodder.[448] It is likely that cavalrymen's deductions also paid for his pack mule's fodder. These deductions appear to be standard and seem unrelated to the amount of rough fodder gathered or the extent to which the animals grazed.

A second-century papyrus from Egypt reports that an *ala quingenaria* received 20,000 *artabae* of barley for fodder.[449] The figure of 20,000 *artabae* is usually taken to represent a year's ration (although this is by no means certain), and is variously calculated as equivalent to

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[442] Polyb. 6.39.13–15; Rickman (1980) xiii; Foxhall & Forbes (1982) 76. Kromayer-Veith (1928) 330 estimates the rations as 3.5 kg. and Labisch (1975) 43 as 1.7 kg. of barley per day.

[443] Walker (1974–5) 18–9.

[444] Plut. *Mar.* 13.1–2.

[445] Labisch (1975) 29.

[446] *P. Gen. Lat.* I. (88–90 A.D.) [= Fink (1971) no. 68] ii, 5, 16, 26, iii, 4, 15, 25.

[447] *Mas. Doc.* 722.5, 13. (72 or 75 A.D.) [= Cotton & Geiger (1989) 46–7].

[448] Cotton & Geiger (1989) 52–3.

[449] *P. Amherst* 107 (185 A.D.).

between 568 to 577 metric tons (625 to 635 tons).[450] Assuming that
a quingenary *ala* had 600 horses, this would correspond to around
2.6 kg. (5 3/4 lbs.) of barley per day per horse—although it is also
not certain if the figure represents the entire fodder ration for the
unit, which may have been larger. Roman cavalry horses may have
been slightly smaller than modern equines, in which case they would
have required a bit less fodder.[451] A daily ration of five and a half
pounds of hard fodder (2.5 kg.) seems quite reasonable. Based on
both the ancient evidence, and modern practice, a reasonable esti-
mate of the ration for a Roman horse would be approximately 2.5
kg. (5 1/2 lbs.) of hard fodder and around 7 kg. (15 1/2 lbs.) of
dry fodder per day.[452] This amount could probably be considerably
reduced under wartime conditions.

   Much of a horse's fodder requirement could be obtained by graz-
ing.[453] Vegetius also mentions the practice.[454] Bachrach claims that
horses can only obtain half of their nutrional requirements from
grazing, though he is speaking of the large horses of medieval
Europe.[455] This was probably not true of at least some ancient horses:
noting the toughness of the horses used by the Numidians, Appian
says that they "never even taste grain, they feed on grass alone and
drink but rarely."[456] Appian also notes that the Germans' horses
browsed on trees in times of scarcity.[457] Josephus refers to the graz-
ing of Roman cavalry horses during the siege of Jerusalem in 70.[458]
Frazer notes that in 1852, when Col. Edwin Sumner ordered U.S.
cavalry horses at Albuquerque, New Mexico to be grazed, he reduced
their corn ration from 12 lbs. to 4 1/2 lbs.[459]

   Twice as much forage is needed than dry fodder; approximately
11 kg. (25 lbs.) of green fodder would have been needed for one
horse for one day.[460] Nevertheless, while grazing could contribute to

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[450] Davies (1971) 123; (1974) 318; Adams (1976) 225; Foxhall & Forbes (1982) 76.
[451] Wells (1977) 661–2; Davison (1989) 143–8; Hyland (1990) 67–8.
[452] *P. Oxy.* 43.3091 (216/7 A.D.?) refers to barley collected in Egypt for the use
of Caracalla's army in Syria, but unfortunately does not contain any figures.
[453] Davies (1974) 319; Wells (1977) 662; Hyland (1990) 92–3; see Veg. *Epit.* 3.8
and 22.
[454] Veg. *Epit.* 3.8.
[455] Bachrach (1993) 718.
[456] App. *Pun.* 2,11, cf. 14,99.
[457] App. *Gal.* 1,3.
[458] Jos. *BJ* 6.153.
[459] Frazer (1983) 79.
[460] Perjés (1970) 16.

a horse's diet, a Roman warhorse needed to be fed some grain to remain healthy and vigorous.[461]

Donkeys

Modern field manuals recommend a ration for donkeys (*asini, onoi*) of around 1.5 kg. (3 1/2 lbs.) of hard fodder,[462] and around 5 kg. (11 lbs.) of green fodder, as well as 20 liters (5 gal.) of water per day.[463] In practice, donkeys can function on considerably less than this ration and are capable of withstanding long periods of hunger.[464] In fact, a major military advantage in using donkeys is that they can feed on scarce pasturage and fodder of the poorest quality, and can survive on leaves, thorns, and thistles.[465] During the African campaign of 46 B.C., when Pompeian troops prevented Caesar's force from foraging, donkeys were even fed on sea-weed, washed in fresh water and mixed with a little grass.[466] In practice, armies have been known to work donkeys to death and then replace them with newly requisitioned beasts.[467]

   Donkeys were certainly fed with dry fodder in antiquity, and such items as shredded hay, barley, and very exceptionally, wheat, appear in the sources.[468] The grazing of donkeys by ancient armies is also attested.[469] As in the case of horses, such grazing could considerably reduce the dry fodder required.[470]

Mules

Mules (*muli, hemionoi*) require about three-fourths the rations horses receive; they were generally fed hay and barley in antiquity.[471] Comparative evidence suggests a mule should receive between 2.3 and 4 and kg. (5–8 lbs.) of hard fodder and 6 kg. (13 lbs.) of dry

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[461] Hyland (1990) 70.
[462] Dent (1972) 159.
[463] Foxhall & Forbes (1982) 76, 84.
[464] Col. *RR* 7.1.2.
[465] Olck (1907) 639; White (1970) 293–4; Dent (1972) 165.
[466] [Caes.] *BAfr.* 24; Plut. *Caes.* 52.4.
[467] Hammond (1980) 256–7.
[468] Gal. (ed. Fichtner) *Nat. Fac.* 6.567; Varro *Rust.* 3.17.6; [Luc.] *Luc.* 37,46; Apul. *Met.* 3.27; 7.14; 10.13.
[469] Polyb. 3.55.7; Plut. *Mor.* 790B.
[470] U.S. Army (1916) 484.
[471] Varro *Rust.* 2.82; Olck (1907) 659; Labisch (1975) 29.

fodder or 11 kg. (24 lbs.) of green fodder per day.[472] As was noted
with horses, less fodder was provided in practice than such estimates
suggest. During the Peninsular War, Wellington's Spanish mules—
of very high quality—received 2.3 kg. (5 lbs.) of barley and 4.5 kg.
(10 lbs.) of straw each day.[473] It was not necessary, or even desir-
able, to carry 9 kg. of fodder per day per mule: in fact, a diet of
only barley, without grazing, makes mules too fat and high-spirited.[474]
Mules could, and should, be grazed, and generally sufficient local
fodder would have been available. To keep mules in good health,
a diet of 2 kg. of hard fodder per day was probably sufficient.

Oxen

An ox (*bos, bous*) can convert its diet more efficiently into protein than
either a horse or a mule, but its greater size meant it had larger
food requirements.[475] Cato recommends a ration for oxen of 6.8 kg.
(15 lb.) of hay plus 11 kg. (24 lb.) of mash per day.[476] Bachrach esti-
mates that a modern ox needs about 12 kg. of "dry matter" (i.e. hay)
per 450 kg. of weight, but he also makes the important point that
oxen can obtain a large percentage of their nutritional requirement
through grazing.[477] Like horses, oxen need some 15–30 liters of water
per day in normal weather, more when the temperature rises.[478]

The ration figures given are, of course, approximations, but they
allow a general impression of the amount of fodder that the army
needed each day.

Table IV: Daily Fodder and Forage Requirements

	Hard Fodder	Dry or Green Fodder		Pasturage	Water
Donkey	1.5 kg.	5.0 kg.	or	10.0 kg.	20 liters
Mule	2.0 kg.	6.0 kg.	or	12.0 kg	20 liters

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[472] Kromayer-Veith (1928) 330; Fortescue (1930) 95; Huston (1966) 215; Dent
(1972) 159; Frazer (1983) 205 n. 65; Goldsworthy (1996) 294.

[473] Glover (1977) 102.

[474] Olck (1907) 659.

[475] White (1984) 128–9.

[476] Cato *Agr.* 30; as interpreted in White (1970) 221–2.

[477] Bachrach (1993) 718 n. 48; Goldsworthy (1996) 295.

[478] Bachrach (1993) 720.

(cont.)

	Hard Fodder	Dry or Green Fodder		Pasturage	Water
"Pack-animal"	2 kg.	5.5 kg.	or	11.0 kg.	20 liters
Horse	2.5 kg.	7.0 kg.	or	14.0 kg.	30 liters
Oxen	7.0 kg.	11.0 kg.	or	22.0 kg.	30 liters

Conclusion

The average Roman soldier, being shorter and older than his 20th century American counterpart, had a lower RDA—about 3,000 calories per day. The Roman army filled these nutritional requirements with a regular ration whose main element was the *frumentum*, or grain ration, of two *sextarii* of grain (850 grams or 1.87 lbs.) per day. Under the Augustan system, the size of legionary units (and probably auxiliary ones as well) were set specifically to make calculation of the grain ration easier: the eight-man *contubernium* received one *modius*, the 480-man cohort 60 *modii* and the 4,800-man legion 600 *modii* per day. The reconstruction of the *cibaria*, or non-grain ration, is more problematic, but its elements were probably meat, cheese, vegetables, olive oil, sour wine and salt. The total daily ration of the Roman soldier probably weighed between 1 kg. (2.2. lbs.) and 1.3 kg. (2.85 lbs.)

The Roman army was distinctive in that soldiers prepared their own food, probably on the squad level, rather than purchasing it ready-made or relying on centralized military kitchens. The preparation of bread, the mainstay of the diet, was time-consuming, but, like building a daily camp, was considered part of the soldier's normal duties. At times, though, Romans did issue prepared rations to their soldiers, usually for tactical reasons. A disciplined Roman army strictly controlled when and how the Roman soldier ate. Special diet was also prescribed for sick and wounded soldiers.

While some officers received praise for the simplicity of their diet, in general they ate as befitted their aristocratic background. The army also needed to obtain large amounts of firewood and fodder in order to function. In the latter case, however, grazing and foraging considerably reduced the amount of "hard fodder" the army needed to carry with it.

Having established the needs of the army, the next question in this study is the way in which the army transported its supplies.

PACKS, TRAINS AND SERVANTS

Introduction

Every army must carry its supplies: even one which "lives off the land" has either to transport provisions or spend its entire time foraging. The carrying capacity of an ancient army depended partly on the load of individual soldiers, but also on that of soldiers' servants, drivers and muleteers, pack animals and wagons, all organized into trains. Throughout the medieval and early modern periods, European soldiers carried relatively little in the way of packs—generally only their arms and personal gear. The trains of these armies were unorganized and made up to a large extent with private individuals: private servants, batmen, sutlers, camp-followers, wives and washer-women, who provided much of the logistical support.[1] Since this logistical system immediately preceded the development of modern logistics, it often has been applied to ancient armies in general, and the Roman army in particular. The Roman army, however, resembled modern armies in a number of important elements: the relatively large amount of gear carried by each individual soldier and the standardization and professionalism of its train. An important difference, however, was that the Roman army, in contrast to modern military forces, did not use non-combatant support troops; they relied instead on free and slave military servants attached to the army.

Provisions Carried by Individual Soldiers

The Romans clearly expected each soldier to carry at least some of his ration on his person.[2] The question is, how much did the legionary normally carry, and how much *could* he carry in emergency situa-

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[1] Fortescue (1930) 6–7.
[2] Sall. *Iug.* 45.2; Livy 44.34.3–4; Front. *Strat.* 4.1.7; *CIL* 3.3676.

tions?[3] Josephus, in his detailed description of the Roman army, says that each Roman legionary carried three days' rations.[4] There are, however, several passages in which Livy describes soldiers as carrying 30 days "*frumentum*" with them. During the Senate's investigation of an unauthorized march by Gaius Cassius through Illyricum to Macedonia, in 171 B.C., Livy says that:

> . . . the envoys from Aquileia said that they knew . . . nothing more than that 30 day's grain had been issued to the soldiery.[5]

The emended text of Livy's description of Quintus Marcius Philippus's campaign in the Third Macedonian War (172–167 B.C.) says he "ordered (each) soldier to carry a month's [grain] with him."[6] Similarly, the epitomator of Livy says that Scipio Aemilianus "compelled" (*cogebat*) his soldiers, or perhaps each soldier, (*miles*) at Numantia (134–133 B.C.) "to carry 30 days' grain."[7] In some cases Livy uses "soldier" for "soldiers" as is common in both Latin and English.[8] The use of the word "compelled" (*cogebat*) may suggest an extraordinary measure, and it is possible that the soldiers were carrying *only* the grain without other equipment.[9] The question is, of course, whether Livy (or his source) meant that each individual soldier carried this load, or that the troops as a whole (including their servants and pack animals) carried 30 days' grain. In other passages in which Livy uses the singular *miles* in the context of provisions being issued or eaten, the meaning is ambiguous.[10] When Frontinus describes the same disciplining, he says that Scipio's soldiers carried "several day's rations (*complurium dierum cibaria*)."[11] Various scholars have attempted to explain these texts[12]—none very successfully. If Livy is using *frumentum* in its normal meaning of unground grain, and if the figure of 850 grams per soldier per day is correct, then this would mean

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[3] Fuentes (1991) 87–8.
[4] Jos. *BJ* 3.95.
[5] Livy 43.1.8.
[6] Livy 44.2.4: *menstruum <frumentum> iusso milite secum ferre*; frumentum *add. Madvig: om. V.* The emendation of "grain" in the passage make complete sense, and it is difficult to imagine another.
[7] Livy *Per.* 57.
[8] E.g. Livy 26.8.9, 35.1.6.
[9] As suggested by Dennis Kehoe.
[10] Livy 27.43.10; 44.8.1.
[11] Front. *Strat.* 4.1.1.
[12] Stolle (1914) 16–17; Kromayer-Veith (1928).

a burden of 25.5 kg. (56 lbs.) for each individual soldier. Added to the soldier's normal load, this appears to be impossible. It is also possible that Livy is using "*frumentum*" loosely, to mean already baked bread, but even in the form of biscuit, at 650 grams a ration, this is a load of 19.5 kg. (43 lbs.), not including any other foodstuffs. No source other than Livy claims that the individual Roman soldier carried such a heavy load (if indeed this is his meaning).[13]

There are other references to individual legionaries carrying various amounts of grain. In the context of the complex maneuvering at Ilerda in 49 B.C., Caesar says:

> The [Pompeian] legionaries had some store of grain (*frumentum*) because they had been ordered to bring a 22 days supply from Ilerda (*quod dierum XXII ab Ilerda iussi erant efferre*); the light-armed and auxiliaries (*cetrati auxiliaresque*) had none, since their opportunities for providing it were scanty (*facultates ad parandum exigue*) their bodies were not trained to carry burdens (*onera*).[14]

In the first place, there is some question as to whether the numeral "22" is correct, due to the weight of grain involved (18.7 kg. or 41 lbs.).[15] Secondly, it is possible that the *frumentum* being carried was in the form of biscuit, although 22 days' biscuit ration would weigh 14.3 kg. (31.5 lbs.), still a substantial burden. If the soldiers were carrying biscuit, then, *facultates ad parandum* should be translated "facilities for preparing [biscuit]." In his *Tusculan Disputations*, Cicero praises the Roman soldier for carrying more than half a month's *cibaria*, along with his other equipment.[16] If Cicero means the entire ration its weight would be over 16 kg. (35 lbs.) even if the *frumentum* were in the form of biscuit. The biography of Severus Alexander in the *Historia Augusta* says that Roman soldiers carried 17 days rations (18.8 kg./43.5 lbs.) with them.[17]

It is difficult to interpret the various pieces of evidence for soldiers carrying large amounts of provisions. There are textual problems, as well as questions about the amount, type, weight and form of the rations being borne, not to mention the reliability of the sources.

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[13] Polyb. 4.63.10 says the Macedonian king Philip V distributed 30 days grain to his troops, but does not say the individual soldier carried this amount.

[14] Caes. *BCiv.* 1.78.

[15] Peskitt in a note to the Loeb editions writes: "XXII MSS. The number cannot be right; perhaps VII or VIII or XII should be read."

[16] Cic. *Tusc.* 2.37.

[17] *HA Alex. Sev.* 47.1. Though outside of the period under discussion, two refer-

Estimates of the weight of two weeks or a month's rations range from under 15 kg. (33 lbs.) to over 25 kg. (55 lbs.); is it reasonable to assume that a Roman soldier, or at least a legionary, could carry such burdens?

The Soldiers' Pack (Sarcina)

The Romans understood that the more the army loaded onto the individual soldier, the less that had to be carried by the trains.[18] An important reform introduced in the late second century B.C., and attributed to Gaius Marius, burdened the troops with more equipment, and thereby reduced the army's baggage.[19] There is some evidence that, even before the time of Gaius Marius, the Roman soldier's pack was heavy enough to slow him down. When Claudius Nero made a forced march from southern to northern Italy in 207 B.C., his troops carried "hardly anything except their weapons," presumably because their packs would have delayed them.[20] As noted above, pre-Marian legionaries were expected to carry their own rations.[21] Appian says, however, that Scipio ordered that "when the mules were overburdened . . . the foot soldiers carry a part of the load" this suggests a temporary measure.[22]

In any case, it seems that the idea of reducing the baggage train by transferring gear to the soldier's back goes back at least thirty years before the times of Gaius Marius. It may even be that the Marian "reform" actually restored an original practice that had be abandoned due to late second century B.C. laxity in the army's discipline. It is clear, however, that the Marian reform, whatever its exact nature, did increase the amount of supplies, as well as rations, which the soldiers could carry vis-à-vis pack animals. Plutarch, in his biography of Marius says:

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ences in the fourth century historian Ammianus Marcellinus (a soldier and an eyewitness to Julian's campaigns) merit mention. Amm. Marc. 17.8.2 says that on one occasion, the emperor had 20 days' grain (*frumentum*) baked into biscuit (*bucellatum*) which his soldiers carried "on their shoulders" (*umeris*). According to Amm. Marc. 17.9.2 troops carried 17 days worth of rations (*annona*) "on their necks" (*cervicibus*).

[18] Keppie (1984) 66.
[19] Front. *Strat.* 4.1.7; Gabba (1976) 1–19.
[20] Livy 27.46.2. This might be a Livian anachronism.
[21] Livy 43.1.8; 44.2.4; *Per.* 57; Front. *Strat.* 4.1.1.
[22] App. *Hisp.* 14,86.

> Setting out on the expedition [to Numidia], he labored to perfect his
> army as it went along, practicing his men in all kinds of running and
> in long marches, and compelling them to carry their own baggage,
> and to prepare their own food. Hence, in after times, men who were
> fond of toil and did whatever was enjoined upon them completely and
> without a murmur were called Marian Mules.[23]

Whenever and however this change occurred, it remained the norm
for the Roman soldier well into the Imperial period.

Vegetius reports that the Roman soldier normally carried 60
Roman pounds (20 kg. or 43 lbs.) in addition to his arms (*arma*).[24]
In order to analyze the carrying capacity of the Roman soldier, we
must investigate what personal equipment was included in this
amount and whether Vegetius's figure is plausible in the context of
equipment and arms we know the soldier carried. The Roman soldier
usually called his pack a *sarcina*,[25] although the terms *vas* and *fascis*
are also used.[26]

There were four elements to the Roman soldier's equipment: (1)
clothing and weapons (*arma*); (2) personal equipment, including cook-
ing gear (*vas*); (3) tools (*instrumenta*); and (4) rations (*cibus*). The indi-
vidual soldier obviously carried some of this himself, but in addition,
the *contubernium*'s mule (or mules) could transport gear. Of the four
categories of equipment, only the latter three would have been
included in Vegetius's 60 pounds of weight that the soldier was
expected to carry: he explicitly does not include the weight of the
soldier's clothing and weapons in this amount. Assuming Vegetius's
figure is correct, if one estimates accurately the weight of the sol-
dier's personal equipment and tools, then the remainder amount
should represent the weight of rations each soldier could carry.

Though the Roman soldier may not have worn a "uniform" in
the modern sense, it is clear that there was considerable standard-
ization in his clothing and equipment. The basic equipment, and
the way in which it was carried, seems to have been fairly uniform,

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[23] Plut. *Mar.* 13.1.
[24] Veg. *Epit.* 1.19.
[25] Livy 28.2.3; 31.27.7; 35.4.6; Caes. *BGall.* 2.17.2; [Caes.] *BAfr.* 75.3; Tac. *Ann.*
1.63; *Hist.* 2.40; 4.78; 4.34; Front. *Strat.* 1.5.3. *Sarcina* could also mean a pack ani-
mal's load: Sall. *Jug.* 75.3; Tac. *Ann.* 1.70; 2.23; or even baggage in general: Livy
44.38.7; Tac. *Hist.* 4.60; Front. *Strat.* 1.6.1; Breeze (1986/87) 15–6; Fuentes (1991)
81; Junkelmann (1997) 88, 92–3.
[26] [Caes.] *BAfr.* 47; Livy 27.27.2; Front. *Strat.* 4.1.7.

although, as in any army, the arrangement of details must have varied from unit to unit and even from individual to individual.[27]

Military historians have reconstructed the clothing, weapons and equipment of the Roman legionary in some detail on the basis of illustrations and archaeological remains.[28] Estimates of the total weight of the Roman soldier's clothing and weapons, however, vary considerably. Stolle postulates a figure of 22 kg. (48 lbs.);[29] though both Veith and Watson argue that Stolle consistently under-estimates the weight of equipment. Therefore, Watson, rather arbitrarily, increases Stolle's estimates by 10–20% (i.e. 24–26 kg., 53–57 lbs.) as "it is unlikely that every item should weigh the least possible."[30] Ruge proposes that legionary clothing and weapons weighed 26 kg. (57 lbs.), compared to estimates by Atkinson & Morgan of 24.9 kg. (55 lbs.) and Junkelmann of 29.4 kg. (65 lbs.).[31] The most recent study, however, defends Stolle's figures. In a careful analysis, using literary and archaeological evidence, as well as reconstruction, Fuentes estimated that the Roman legionary's arms and weapons weighed 18 kg. Adding 3 kg. (6 1/2 lbs.) for clothing, Fuentes' total is 21 kg. (46 lbs.), only slightly under Stolle's estimate.[32]

Frontinus notes that Scipio Aemilianus destroyed the *vasa* of his soldiers "which served only the purpose of luxury and were quite unnecessary for expeditions."[33] Plutarch, in describing the same event, says soldiers could keep only a pot, a spit and an earthenware drinking cup.[34] This implies that in addition to the personal items destroyed, there were utensils included in the soldier's *vas*, standardized to some extent, considered appropriate for military use. If, as posited in Chapter One, cooking was done on the squad level, the soldier's *vas* must have been made up of cooking gear, in addition to a mess-kit and personal effects. Junkelman's estimate for the soldier's gear includes a carrying pole, a leather satchel, a string bag for food, a metal canteen, a messkit, a cloak and an extra tunic—a total weight

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[27] Van Driel-Murray (1985) *passim*; Fuentes (1991) 65–6.

[28] Stolle (1914); Kromayer-Veith (1928) 423–6; Watson (1969) 62–3; Labisch (1975) 5; Junkelmann (1986) *passim*; Fuentes (1991) 71–89.

[29] Stolle (1914) 27, 52–3.

[30] Kromayer-Veith (1928) 423; Watson (1969) 62–3.

[31] Ruge (1965) 1763; Atkinson & Morgan (1987) Table I; Junkelmann (1986) 197.

[32] Fuentes (1991) 86.

[33] Front. *Strat.* 4.1.1.

[34] Plut. *Mor.* 201C.

of 13.6 kg. (30 lbs.).[35] Fuentes estimates lower weights: he postulates that rations were carried inside the leather satchel, and that the string bag held a water skin. Arguing for a lighter messkit and no extra tunic, Fuentes's estimated weight for the *vas* (without rations) is 6.6 kg. (14.5 lbs.).[36]

The Roman soldier's gear also included tools for entrenching: Corbulo quipped that the Romans won their wars as much with their axes (*dolabrae*) as with their swords.[37] Josephus claims that each soldier carried an ax, a basket, a spade, a rope, a chain, a saw and a sickle.[38] In addition to these tools, the Romans brought with them *pila muralia*. These were rectangular double-pointed stakes used in entrenching. They varied in length from 1.5 to 2.0 meters and probably weighed around 2.45 kg. each.[39] This would increase the weight of tools to about 15 kg. (33 lbs.). Caesar records an incident in the Gallic Wars, in which troops were already entrenching when the baggage train arrived, so most scholars agree that the soldier carried tools on his person.[40] On the other hand, Tacitus describes legionaries being without entrenching tools after an ambush by the Cherusci in 15 A.D.[41] In another case, Flavian troops arrived at Cremona during the Civil War of 69 without their train, and thus lacked axes and picks, which had been left behind at Bedriacum.[42] The question of which tools were carried by the soldier, and which by pack-animals must remain, to some extent, open.

In any case, as Fuentes points out, it does not make sense for every soldier to carry each tool: the *contubernium* did not need 8 axes, 8 spades, 8 saws, etc. He postulates that each soldier carried a sickle, a basket and perhaps a saw. In his opinion, various members of the squad carried the long-handled tools, like the *dolabra*, the spade and the adze; and the soldiers' *sarcinae* hung from these tools, not from a specially designated pole, as historians generally assume. The *pila muralia* were, he thinks, carried by the unit mule.[43] If Fuentes is correct,

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[35] Junkelmann (1986) 199; cf. (1997) 94–102.
[36] Fuentes (1991) 89.
[37] Front. *Strat.* 4.7.2.
[38] Jos. *BJ* 3.55. Livy 42.64.3 reports soldiers using sickles to clean wheat.
[39] Bennett (1982) 201–4.
[40] Caes. *BGall.* 2.19; see Labisch (1975) 80; Fuentes (1991) 77.
[41] Tac. *Ann.* 1.65.
[42] Tac. *Hist.* 3.20.
[43] Fuentes (1991) 76–77.

then each soldier need have carried no more than 5 kg. (11 lbs.) of tools, again agreeing with Stolle's estimate.[44]

The difference between the heavier and lighter estimates of the Roman soldier's load become quite significant when one adds together clothing, arms, armor, tools and personal equipment. High estimates run from 40 kg. (88 lbs.) to 45 kg. (100 lbs.), without rations.[45] Some scholars object to this amount of weight as being impossibly heavy,[46] but it has been experimentally demonstrated that a Roman legionary could have carried up to 45 kg. (100 lbs.) of equipment. A group of German civilians, dressed as first century legionaries, led by Junkelmann and using his reconstruction of the Roman pack, carried weights totaling at least 43–46 kg. for 500 km. over the Alps, averaging 25 km. per day.[47] The participants were not athletes or chosen for stamina, although they did train on an individual basis for the march.[48] If twentieth-century German civilians could handle such loads, trained first century Roman soldiers could certainly have done so. Indeed, the ancient evidence indicates that the Roman soldier carried a formidable load. During the African campaign of 46 B.C., Labienus assumed that Caesar's troops would be unable to fight after a march since "they were burdened with their packs (*sarcinae*)." Caesar, however, had a force of "*expediti*" from each legion, marching without packs and ready to fight.[49] In the mutiny of 14 A.D. angry soldiers loaded an unpopular *praefectus castrorum* with a full pack and scornfully asked the officer if he enjoyed such heavy burdens (*immensa onera*).[50] Vegetius specifically makes the point that the Roman army trained its troops to carry burdens, implying they were extraordinarily heavy.[51]

The key to soldiers carrying such great weight over long distances is its proper distribution over the body. Whether or not Gaius Marius

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[44] Stolle (1914) 50.

[45] Kromayer-Veith (1928) 423–6; Junkelmann (1986) 199.

[46] Kromayer-Veith (1928) 423; Labisch (1975) 79; Watson (1969) 62–3; Keegan (1993) 301–2.

[47] Junkelmann (1986) 200.

[48] They ranged from 27 to 46 years of age, from 1.6 to 1.95 meters (5'3"–6'5") in height and from 66 to 98 kg. (145–216 lbs.) in weight. (Several reported losing 4–5 kg. (9–11 lbs.) during the march). Their professions were: plumber, civilian employee of the U.S. Army, actor, businessman, insurance salesman, policeman, sanitation official, student and historian. Junkelmann (1986) 43–58.

[49] [Caes.] *BAfr.* 75.

[50] Tac. *Ann.* 1.20. For the *praefectus castrorum*, see Chapter Six, pp. 272–3.

[51] Veg. *Epit.* 1.19.

himself was responsible for the change, the Romans developed a standardized method of bearing equipment which functioned in the same way as a modern back pack. Frontinus describes it as follows:

> C. Marius had the equipment (*vasa*) and the provisions (*cibaria*) of the soldier, packed together in a suitable bundle, lain on forks (*furcae*), so that under these it was both easy to handle the load, and rest stops were easy to manage.[52]

Festus adds the detail that the burden (*onera*) was carried on a "little board" (*tabella*) laid between the forks (*in furca interposita*).[53] There is no reason to think that this system changed significantly from the late Republic to the Early Empire. In fact, a scene on Trajan's column illustrates the carrying method described in the literary sources. In one panel, the front line of soldiers bear shields on their left arms, their right hands being empty, but the soldiers of the rear line carry their gear attached to the end of a pole. On top of the pole, a pack or *sarcina* is represented in minute detail, with its contents clearly visible, as described above.[54] The cross-bar mentioned in the sources is not visible, but the position of the sack and satchel shows that one must have been present to arrange the items as illustrated. One detail, however, appears to be incorrect: the Roman soldier could not possibly have carried his gear suspended high over the shoulder in the manner shown on the column.[55] The artist of Trajan's Column clearly has taken some artistic license. He did not include shields when he illustrated soldiers carrying their *sarcina*, although the outline of a shield is perhaps recognizable on the left shoulder of the first soldier behind the *signifer*. The artist also took the liberty of extending the pole high over the soldier's head and eliminating the shield in order to make the *sarcina* more visible. In practice, each soldier must have carried his shield, and it is the necessity of bearing the shield and the *sarcina* simultaneously that clarifies the method the Romans used. The most natural way to carry the shield on marches was not on the arm, but rather slung over the back. The reconstruction of the carrying system by Junkelmann and Fuentes

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[52] Front. *Strat.* 4.1.7. Other descriptions are in Plut. *Mar.* 13 and Fest. *apud Diac.* (ed. Lindsay) 24M.

[53] Fest. *apud Diac.* (ed. Lindsay) 148M; Stolle (1914) 33.

[54] Trajan's Column scene IV [= Lepper & Frere (1988) plate VII]; Richmond (1982) 10–11.

[55] As noted as early as Stolle (1914) 32–33.

differ, but they agree on a fundamental point: the *sarcina* was not carried high over the head, but rather balanced on the top of the shield. Such a method would have distributed the weight of the *sarcina* as effectively as a modern back-pack.[56]

Fuentes's estimates of the legionary's total load are considerably lighter: he calculates the total burden as 24.6 kg. (54 lbs.) without rations.[57] If he is correct, then the Roman soldier could have carried 17 days rations (18.8 kg./43 lbs.), and kept his total load to 43.4 kg. (95.5 lbs.). Junkelmann's experiment has shown that this is plausible. Vegetius' statement that the Roman soldier carried 60 Roman pounds in addition to his equipment is plausible.

Equipment of the Contubernium

The eight soldiers of the *contubernium* shared two pieces of equipment that were carried by the unit mule: the squad's tent and hand-mill. The tent (*papilio*), made of leather or goat skin, was large enough to accommodate the entire squad.[58] It weighed an estimated 40 kg. (88 lbs.). Since the unit was issued unground grain as a ration, each *contubernium* had to have its own hand-mill (*mola*). Such hand-mills consisted of two massive round stone disks, usually made of basalt. The upper stone of the mill reconstructed by Junkelmann had a diameter of 31 cm. (12") and weighed 14 kg. (30 lbs.). The lower one weighed 10 kg. (22 lbs.), and with the vat and the wooden crank, the total weighed around 27 kg. (60 lbs.).[59] Plutarch describes such hand-mills being carried on pack-animals during Antony's Parthian campaign of 36 B.C.:

> [T]he army . . . was not well-furnished with mills. These had been abandoned for the most part, since some of the pack-animals had died.[60]

Thus, the total equipment of a *contubernium* weighed some 145 kg.: the tent with accessories, 40 kg.; the stone mill with vat, 27 kg.; 16 *pila muralia*, 39.2 kg.; the tools and baskets 18.7 kg.; the cooking-pot,

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[56] Junkelmann (1986) 201.
[57] Fuentes (1991) 89.
[58] For the military use of tents see Kissel (1995) 222–5.
[59] Junkelmann (1986) 210–1.
[60] Plut. *Ant.* 45.4.

630 g.; and the pack-saddle (*stramentum*), 20 kg.[61] The equipment of
the *contubernium*, plus five days' rations, easily could have been car-
ried by its eight men and a single mule, with a combined capacity
of more than 200 kg. A second mule could carry a further 11 days
(at 125 kg.) or 13 days (at 150 kg.) worth of rations. If there were
two mules in the *contubernium*, they easily could have been managed
by a single muleteer.[62]

Cavalry Equipment

Hyland estimates the total load of the Roman cavalry horse as 38.5
kg. (85 lbs.), exclusive of the rider, although her estimates of weapons
and armor are somewhat low.[63] In any case, cavalry certainly had
a carrying capacity considerably greater than that of infantry. Using
panniers, horses can carry 180 kg. (400 lbs.), a greater weight than
mules. As a general rule, however, the Romans did not use horses
as pack-animals, and in the military they seem to have been used
exclusively as cavalry mounts.[64] Nevertheless, cavalry horses can carry
considerable provisions and fodder in addition to the weight of the
rider and his gear. The Byzantine military treatise of Pseudo-Maurice
instructs each cavalryman to carry in his saddlebags a pound or two
of bread, barley (for fodder, but the amount is not given), meat
(boiled or cured) and a canteen of water.[65] It is likely that the Roman
cavalryman also carried his own rations and fodder.

  In the Imperial period, legionary cavalry were administratively
attached to the legion's centuries and therefore, probably shared their
meals with the *contubernium* to which they were attached.[66] In con-
trast, auxiliary cavalry, organized into separate units, must have eaten
together. The fodder for all the army's cavalry horses, however, were
certainly handled separately from that of the pack-animals. Whereas
pack-animals could be fed substandard fodder, the combat effectiveness

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[61] Junkelmann (1986) 212; Labisch (1975) 35.
[62] The Latin term *mulio* probably refers to all drivers of pack-animals, not just
muleteers as suggested by Jean-Jacques Aubert (personal communication).
[63] Hyland (1990) 154.
[64] White (1984) 129, 288; cf. Veg. *Mul.* 4.6.2; Varro *RR* 2.8.5; Hyland (1990)
88 suggests ponies replaced mules in Britain as pack animals.
[65] [Maur.] *Strat.* 7.10.
[66] Roth (1994) 353.

of cavalry mounts demanded a higher quality diet. This assumption gains some support from the pay document from Masada, which probably derives from a legionary *eques* and contains a separate deduction for barley (*ad hordaria*), indicating that this supply was handled independently.[67]

As indicated above, the cavalry horse probably received a ration of about 2.5 kg. (5.5 lbs.) per day of barley, (in addition to the hay which was collected almost daily). Therefore, each *eques* would need about 75 kg. (165 lbs.) of barley per month, and one mule could carry two weeks' worth of this provision for the two cavalrymen per century. It makes sense, then, to add an additional mule per century for the legionary cavalry. Of course, auxiliary cavalry units would have needed more pack animals than similarly sized infantry units.

Trains

The wagons and pack-animals traveling with the army and hauling supplies are known collectively as its train. There were four kinds of trains: (1) a troop train attached to an individual unit, which carries its gear and supplies; (2) an army train containing equipment and provisions common to the entire force; (3) an officers' train, transporting their personal equipment; and (4) a siege train for the specialized equipment needed to take a walled city.[68] Latin military writing collectively referred to baggage trains as *impedimenta*[69] or sometimes *agmina*;[70] Tacitus once calls the baggage train *impedimentorum agmen*.[71] Greek descriptions of the Roman army called the baggage train as a whole the *skeue*,[72] *aposkeue*[73] or *paraskeue*.[74]

Ancient sources often sub-divide the train into various categories.[75] Vegetius, when recommending an ideal order of march, describes it

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[67] *Mas. Doc.* 722.6, 13 [= Cotton & Geiger (1989) 46] (72 or 75 A.D.).
[68] Kromayer-Veith (1928) 314.
[69] Caes. *BGall.* 2.17; 5.49; 6.5; 7.10; *BCiv.* 1.69; Livy 35.28.4; 38.40.6; 39.30.11; 44.36.6; Tac. *Ann.* 13.40; *Hist.* 3.22; 4.34; 4.78; Vell. Pat. 2.82.2; Front. *Strat.* 1.5.17; 1.6.1; 2.5.31; 4.1.7.
[70] Livy 35.5.14; 38.49.9; 39.1.7; Tac. *Ann.* 4.73; *Hist.* 4.35.
[71] Tac. *Ann.* 2.5.
[72] App. *BCiv.* 2.8,53; Dio Cass. 36.12.2; 46.38.3; 49.7.5.
[73] Polyb. 6.40.1.
[74] Polyb. 11.27.1; App. *BCiv.* 2.8,53.
[75] Hammond (1983) 27–31.

as having "the baggage train (*impedimenta*), pack animals (*sagmarii*), servants (*calones*) and wagons (*vehicula*) in the middle."[76] Here he probably means to say that the baggage train is made up of pack animals, servants and wagons. Similarly, Plutarch divides a train into pack animals (*skeuagoga*) and wagons (*hamaxai*).[77] These divisions are simply illustrative, as a modern source might describe a column of "trucks and jeeps" and do not reflect technical military terminology. Some sources distinguish the baggage train from the siege train.[78] The latter, containing battering rams, siege towers and extra artillery, was probably seen as a special addendum to the army's normal *impedimenta*.

In certain cases, however, the troop and army trains are distinguished, and this appears to reflect Roman logistical organization.[79] For example, Livy and Tacitus differentiate between the *sarcina* and the *impedimenta*,[80] and this difference is reflected in the Greek terms *aposkeuê (tôn stratiôtôn)* and *hupozugia* used by Polybius, Onasander and Josephus.[81] These distinctions probably refer to the troop train and the army train, respectively. For example, when Lucius Scipio marched through Thrace to Lysimacheia in 190 B.C., he waited a few days to allow his baggage (*impedimenta*) to arrive—this is clearly the army train.[82] Before crossing to Dyrrachium in 48 B.C., Caesar ordered his soldiers to leave their slaves (*mancipia*) and baggage (*impedimenta*) in Italy, and travel "lightly equipped" (*expediti*) because of the lack of space on the ships.[83] When Caesar describes his army's arrival in Britain (in 55 B.C.), he describes it as *sine impedimentis*, which suggests that in this case *impedimenta* also meant army train. His soldiers must have carried their tents, tools and provisions in troop trains.[84] On the other hand, when crossing from Sicily to Africa in 47 B.C., Caesar ordered only the troops with their arms embarked, without baggage (*vas*) or slaves (*mancipium*). When the soldiers arrived, they lacked tents, so it seems that the *sarcina*, or troop train, had been left behind.[85]

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[76] Veg. *Epit.* 3.6.
[77] Plut. *Pomp.* 6.4.
[78] Vell. Pat. 2.82.2; Jos. *BJ* 3.121–5; Front. *Strat.* 1.5.17.
[79] Kromayer-Veith (1928) 394; Labisch (1975) 77.
[80] Livy 23.16.6; 35.28.4; 40.39.7; Tac. *Hist.* 4.34.
[81] Polyb. 3.79.1; Onas. *Strat.* 6.6; Jos. *BJ* 3.125.
[82] Livy 37.33.3.
[83] Caes. *BCiv.* 3.6.
[84] Caes. *BGall.* 4.30.
[85] [Caes.] *BAfr.* 47.

   With only a few references, and these a mixture of technical and non-technical vocabulary, certainty is impossible, but it is probable that the division between the troop train and the army train was a part of Roman military practice. In his description of the Second Punic War (218–202 B.C.), Livy refers to cohorts being "*expediti*," that is without *impedimenta*.[86] Used as a strategic expression *expeditus* refers to an army moving without heavy baggage, that is, without its army train. It does not mean that the army carried no baggage at all. Aulus Hirtius explains that for the campaign against the Bellovaci in 51 B.C. Caesar's *impedimenta* was "of middling size (*mediocre*), as is customary during *expeditiones*."[87]
   The Roman army had to carry a great deal of equipment with it, in addition to provisions, and the necessary animals had a major impact on the amount of fodder needed. The size of the trains that followed the army was an important factor in the ability of the army to move and fight. A lack of carrying capacity reduced the army's combat capability, but too large a train could restrict movement.[88] Under the Empire, when parts of legions were sent on expeditions as "*vexillationes*," these fragments of units must have had their own trains to move to the area of operations. It is noteworthy that Ps.-Hyginus refers to the *impedimenta* of such sub-units in his description of an Imperial Roman camp.[89]
   The Romans were well aware of the importance of reducing the size of the trains. Livy notes that the train of Manlius Vulso, returning from the Galatian campaign of 189 B.C. was so long and loaded with booty that it managed to march only 5 miles a day.[90] There is evidence that commanders and armies were criticized for having too large a train, particularly one filled with unnecessary luxuries.[91] Periodic reforms of the Roman army often involved measures to reduce its size. For example, when Scipio Aemilianus reorganized the Roman army in Spain (134 B.C.), he forced the soldiers to sell superfluous equipment, as well as private wagons and pack-animals. Part of the rationale for such regulations was to instill a sense of discipline among the men, but Scipio certainly was also concerned

   [86] Livy 27.40.10.
   [87] Aul. Hirt. *BGall.* 8.8.
   [88] Van Creveld, 1989, 47.
   [89] [Hyg.] *De met. castr.* 4. For the *vexillarii* of Pseudo-Hyginus, see note 329 below.
   [90] Livy 38.15.15.
   [91] App. *Pun.* 2,12.

with reducing the army's baggage train for the long siege about to be carried out far in the interior of Spain. If Scipio's army were to carry sufficient supplies, it needed all available wagons and pack-animals. This is no doubt why the soldiers were ordered to sell their private wagons and mules to the army for its use. The Romans certainly had wagons and pack-animals later in the campaign.[92]

The Troop Train

In Polybius's description of the army in the 2nd century B.C., each of the maniples had a pack train attached.[93] This doubtless represents the troop train transporting all the unit's equipment and provisions not carried by the individual soldiers. Plutarch notes an incident during Caesar's Greek campaign of 48 B.C.:

> At break of day, Caesar was about to decamp and move to Scotussa, and his soldiers were taking down their tents and sending on ahead the beasts of burden (*hupozugia*) and the servants (*therapontes*) . . .[94]

The wording suggests that the pack animals and military servants were under the control of the soldiers, but some sources suggest that pack trains, at least in the first century B.C., were assigned to the legion as a whole. When Pompey raised three legions during the Civil War of 49–45 B.C., he provide each with "food, pack animals (*skeuagoga*), wagons (*hamaxai*) and other needful equipment (*paraskeue*)."[95] Velleius Paterculus refers to the *impedimenta* of individual legions, as well as that of the army as a whole.[96] With only these few asides to rely on, the organization of the train below the level of the legion, if such there was, cannot be reconstructed.

Estimates for the number of pack-animals per legion vary widely. One, a drastic underestimate, is as low as 60 per legion,[97] but more realistic assessments range from around 1,000[98] to as high as 1,200–1,500 pack animals per legion.[99] Without direct evidence, any figure

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[92] App. *Hisp.* 14,85–87.
[93] Polyb. 6.40.10–14.
[94] Plut. *Pomp.* 68.3.
[95] Plut. *Pomp.* 6.4.
[96] Vell. Pat. 2.28.2–3.
[97] Petrikovits (1975) 58.
[98] Pitts & St. Joseph (1985) 181; Welwei (1988) 93; Kissel (1995) 37, n. 21; Goldsworthy (1996) 289–90.
[99] Kromayer-Veith (1928) 394; see also Stolle (1914) 30–31; Labisch (1975) 26, 77–83; Adams (1976) 224; Engels (1978) 17; Peddie (1994) 57; Erdkamp (1995) 185.

must remain at best an estimate. Comparative evidence is not very helpful. Napoleon's army in the campaign against Russia in 1812 had one animal for every three men, but this number includes those for artillery and ammunition.[100] During the Mexican War, the American Army assigned one pack-mule for each 8 men, plus 3 to each company officer.[101] On the other hand, in the American Civil War, the ratio of soldiers to mules and horses was sometimes as low as 1:2.[102] Assuming two mules per *contubernium*, as suggested above, this would mean twenty mules per century, a total of 1,200 for the legion. Adding 60 extra mules for the cavalry and the same number for the centurions, and 70 spare mules (5%), adds up to around 1,400 mules. For a legion of 4,800, this works out to one animal for each 3.4 men.

Fourteen hundred mules could have provided a carrying capacity of 175 metric tons, the equivalent of about 350 wagons. Livy specifically mentions wagons (*plaustra*) in the *impedimenta* of Manlius Vulso during his ill-fated march through Thrace in 188 B.C.,[103] and wagons, some drawn by oxen and others by mules, are illustrated both on Trajan's column and on the column of Marcus Aurelius.[104] These, however, may have belonged to the army train. There is some reason to think, that the legionary troop train was made up entirely of pack-animals, and that wagons were used only between campaigns by the army train. As Veith points out, Ps.-Hyginus, in his description of the Roman camp, speaks only of *iumenta*, and there does not seem to be space in his plan for wagons.[105] This would have given the legions added flexibility in operations, as they would have been capable of moving independently of the army train and also of increasing their marching speed beyond the capability of wagons.

The exception to this rule would have been the wagons that carried the army's artillery.[106] Indeed, the artillery accompanying the Roman legion certainly made up a significant part of the troop

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[100] Thorpe (1917) 20 considers this an excessive number of pack animals.
[101] Risch (1982) 271.
[102] Huston (1966) 219.
[103] Livy 38.40.6.
[104] Trajan's Column scenes XXXVIII, XL, XLIX, LXI–II, LXV–VI, CVII [= Lepper & Frere (1988) plates XXIX, XXXI, XXXVI, XLII–III, XLVI, LXXIX]; Marcus Aurelius' Column scenes XXV, XXVI, XXIX, XXXV, XXXVIII, XXXIX, XCIII, CIII, CXI [= Caprino (1955) figures 35, 38, 46, 48, 49, 112, 121, 132].
[105] Kromayer-Veith (1928) 314, 500, n. 2.
[106] Livy 42.55.7.

train.[107] In addition, wagons or pack-animals were needed to carry sufficient ammunition. The light artillery, *catapultae*, fired mostly bolts with square or flat iron points; the heavy artillery, *ballistae*, that were used not only against people but also fortifications, fired hewn stones.[108] It is difficult to calculate the number of bolts or stones the army would have carried with it, but if one assumes a reserve of 20 bolts or stones per artillery piece, the total is more than 1,300 bolts or stones for the army's artillery. At an average weight of 2 kg. per piece of ammunition, approximately 20 pack-animals or 5 wagons would have been needed to carry a load of 2.5 metric tons of spare ammunition. Goldsworthy estimates that about 70 wagons, with some 160 animals, were needed to transport a legion's artillery.[109]

Auxiliary Troop Train
There are a number of references to the use of wagons by peoples who contributed troops to the Roman army. Livy records the number of wagons (*carpenta*) captured by the Romans from Gauls and Germans on various occasions.[110] Caesar mentions that Gallic cavalry used wagons to carry their gear, "according to [their] custom."[111] Caesar's reference suggests that auxiliary troops, at least in the Late Republic, were responsible for their own transportation. This may be applicable to the Principate as well: auxiliary units were usually garrisoned separately and they must have had some sort of transport system. On the other hand, the process of integration into the Roman army probably affected transport as well, and eventually auxiliary usage would not have differed much from legionary practice.[112]

Our sources sometimes call auxiliary troops "lightly armed" (*levis armatura*) or simply "light" (*levis*).[113] This must refer to their having less armor and/or equipment than legionaries.[114] The only explicit reference to auxiliary *sarcina* indicates that they were not trained to carry loads as heavy as those of the legionary.[115] Whether this situ-

[107] Vell. Pat. 28.2.2.
[108] Tac. *Hist.* 3.23; 4.23; Jos. *BJ* 2.546.
[109] Goldsworthy (1996) 290.
[110] Livy 31.21.17; 32.30.12–13; 36.38.6.
[111] Caes. *BCiv.* 1.51.
[112] Keppie (1984) 182–6; Coulston (1985) 280; Le Bohec (1994) 93–9.
[113] Livy 35.28.8; Tac. *Ann.* 3.39.
[114] See Cheesman (1914) 130. Atkinson and Morgan (1987) 100 estimate the auxiliary load, without *sarcina*, as 9.7 kg. (21.3 lbs.).
[115] Caes. *BCiv.* 1.78.

ation changed in Imperial times is difficult to judge, due to the lack of evidence.[116] Indications are that even in the late first century, auxiliaries fought in their native, rather than in the Roman manner,[117] which suggests that they were not used to the heavy loads carried by legionaries. Although the auxiliary's armor and weapons were lighter than that of the legionaries, the weight of many necessities, e.g. cooking utensils and provisions, would have been constant. Therefore, the less that the auxiliaries carried, the more pack-animals would have been necessary and the auxiliary train was probably, relatively speaking, larger than that of legions. If the ratio of animals to men is increased to 1:3 (as opposed to the 1:3.4 calculated for the legions above p. 83) a *cohors quingenaria* would have had 160 mules, a *cohors milliaria* 320. Assuming one pack-animal per two cavalrymen and one for each officer, as for the legionary cavalry, and an *ala quingenaria* would have had some 275 mules, the *ala milliaria* would have had 550, the *cohors equitata quingenaria* 230 (160 for the infantry, 70 for the cavalry) and the *cohors equitata milliaria* would have included 460 pack-animals. Of course, all of these numbers are conjectural.

Allied Troop Train

Although legionary troops were trained in archery and slinging, most of the bowmen and light infantry in the Roman army from Late Republican times onward were provided by allied force.[118] Nominally independent "allied" units were, of course, clothed and armed by the government that raised and contributed them. There are indications that, in general, such units were organized and equipped along Roman lines; however, little is known of their logistical system.[119] If one assumes, however, the same ratio of one animal for three infantry, and one animal for two cavalry, one can estimate the number of pack animals used by allied troops. Spare missiles and ammunition for the archers and the slingers had to be carried by a train.[120]

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[116] The description of equipment in Jos. *BJ* 3.94 –5 referring to infantry is almost certainly speaking of legionaries.

[117] Cheesman (1914) 116.

[118] Coulston (1983) *passim.*

[119] Keppie (1984) 641–2.

[120] Kromayer-Veith (1928) 314, 395; Labisch (1975) 77.

The Army Train

Every Roman army on campaign was routinely accompanied by its train.[121] There is no evidence, however, that the Romans kept a standing army train between campaigns. Rather, gathering the army's *impedimenta* seems to have been an integral part of the planning for each campaign.[122] The army train would have included both pack-animals and wagons, a point also made explicitly by Herodian,[123] and spare animals, both for the cavalry and for transport purposes. The train also carried the headquarters' baggage, spare equipment, the raw material for blacksmiths and other workers.

Regular medical personnel were attached to each legion and hospitals erected in permanent camps.[124] The fragment of a receipt for medical supplies found at Masada indicates that such hospitals were present also in campaign conditions.[125] Therefore, the gear of the medical staff doubtless also made up part of the train. Livy describes sick and wounded soldiers (*invalidi*) as being with the baggage train during the Second Punic War (218–202 B.C.),[126] and the army used spare pack-animals and wagons, as opportunity provided, to carry wounded soldiers.[127] During his forced march against Hasdrubal in 207 B.C., Claudius Nero requisitioned horses and pack-animals to carry soldiers exhausted by marching.[128] In the Numantine campaign of 134–133 B.C., Scipio Aemilianus ordered his cavalry to dismount and give their horses over to carry sick soldiers.[129] Dio Cassius notes, disapprovingly, that because vehicles were lacking, those too seriously wounded to walk were abandoned during Crassus's retreat from Parthia in 53 B.C.[130]

The size of the army train would have varied according to the necessities of the campaign, as well as the logistical decisions made by the commander. It is difficult to venture a reasonable estimate for

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[121] Jos. *BJ* 3.125; 5.49; see Breeze (1969) 55; Petrikovits (1975) 58–9; Speidel (1989) 239–40.

[122] Tac. *Ann.* 1.47.

[123] Hdn. 8.1.2.

[124] Kissel (1995) 238–50. Note that the *therapeia* mentioned in Onas. *Strat.* 6.6. refers to military slaves and not, as Titchener and Pease translate in the Loeb edition, "medical equpiment."

[125] *Mas. Doc.* 723:7–8, 10 [= Cotton & Geiger (1989) 59].

[126] Livy 23.16.8.

[127] Livy 23.36.4; [Caes.] *BAfr.* 21.2; Plut. *Ant.* 45; Kromayer-Veith (1928) 395.

[128] Livy 27.43.11.

[129] App. *Hisp.* 14,86.

[130] Dio Cass. 40.25.1.

the total amount of equipment carried by the army train. In his *Life of Antony*, Plutarch writes that in his Parthian expedition of 36 B.C., 300 wagons carried Antony's "siege equipment." This seems excessive, and possibly refers to the entire army train. After the destruction of these wagons by Phraates IV the Parthian King, it is noteworthy that the Romans experienced food shortages, possibly because their reserve provisions were carried by these very wagons.[131] During the 3rd Macedonian War (172–167 B.C.), Perseus ambushed a Roman force while foraging, and captured 1,000 wagons with their teams (*iuncta vehicula*).[132] It is not clear if this represents the army's train, requisitioned vehicles, or a combination of both.

The army train certainly consisted of both wagons and mules. The proportion of mules and wagons used, however, cannot be determined. Comparative evidence is helpful to some extent, though it must be borne in mind that modern wagons are more efficient than those used in antiquity. During the Mexican War, Winfield Scott reported that he needed 2,000 to 3,000 mules and 800 to 1,000 wagons for a force of 10,000 men (including their ammunition), a ratio of from 2.5 to 3 pack-animals per wagon.[133] In June, 1864, for a force of 100,000 men, Gen. Sherman had 32,600 pack-mules and 5,180 wagons, a ratio of six pack-animals to each wagon, although he realized that this train was excessively large: "Soldiering as we have been doing for the past two years with such trains and impediments has been a farce. . . ."[134] Wagons therefore probably made up from 15% to 30% of the army train relative to pack-animals.

Historians of Roman logistics dispute whether rations were carried with the troop, or in the army train.[135] There are few explicit references to what was carried in the troop train of the Roman army, particularly with reference to provisions. Polybius notes that Hannibal, when marching through marshland in northern Italy in 218 B.C. "intermingl[ed] the baggage train (*aposkeue*) with the [troops], so that for the present they might be kept supplied with food."[136] It is not clear if this can be applied to the Roman army as well. It is quite possible that rations were carried by both, as inferred by

[131] Plut. *Ant.* 38.2–40.1.
[132] Livy 42.65.3.
[133] Risch (1982) 291.
[134] Major & Fitch (1911) 10, 25.
[135] Stolle (1914) 4–6; Labisch (1975) 79.
[136] Polyb. 3.79.1.

Caesar's comment that during the Spanish War (49 B.C.), the Pompeians expected that the Caesarians would have logistical problems because they had "marched without their pack-animals (*iumenta*) and their train (*impedimenta*)."[137] Furthermore, during the winter of 44–43 B.C., Brutus undertook a forced march to Dyrrhacchium to intercept the Caesarean forces under Marc Antony's brother Gaius. Plutarch says:

> Brutus . . . marched through regions difficult of passage, in snow-storms, and far in advance of his provision train.[138]

By the time they had reached their destination, "not one of his soldiers had anything in the shape of food."[139] It is clear that, in this case, whatever food was carried in the troops packs, or in their train, was exhausted, and the main portion of the army's supplies must have been carried with the army train.[140] Therefore, the provision train must have caught up with the army. Plutarch's description suggests than under normal circumstances the train would have stayed with the army and been able to provision it. This view is supported another of Plutarch's accounts, that of Metellus's siege of Langobritae in 79 B.C. Metellus thought the siege would be a short one and ordered his men to bring along only five days' provisions. The siege, however, lasted longer and Metellus was forced to send out a foraging party. It is clear that he did not have reserve supplies, and the only reasonable explanation is that his train had been left behind for some reason.[141] In another case, during the campaign of Ilerda (49 B.C.), the Pompeian baggage animals (*sarcinaria iumenta*) were killed because of lack of fodder, but when the Pompeians surrendered, they still had pack-animals (*iumenta*) with them, presumably those which carried rations.[142] To sum up, it appears as if the Roman army's main supply of food was carried in the army train. Grain, however, was issued at regular periods to the centuries and *contubernia*, which carried several days supply with them in their troop train. Some of this supply, whether in the form of unground grain or prepared bread, was carried by the soldiers themselves.

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[137] Caes. *BCiv.* 1.69.1.
[138] Plut. *Brut.* 25.3.
[139] Plut. *Brut.* 26.1.
[140] Plut. *Brut.* 26.2.
[141] Plut. *Sert.* 13.6.
[142] Caes. *BCiv.* 1.81.7; 84.1; see Labisch (1975) 82–84.

Officers' Train

The baggage of the army's officers could be considerable: Josephus says the officers' baggage train (*ta tôn hegemonôn skeuphora*) formed a separate part of the Roman army's marching order.[143] High ranking officers brought not only their personal equipment, but also servants or even entire households with them on campaign. In his description of a Middle-Republican camp, Polybius notes that 50 (Roman) feet behind the tribunes' tents was allotted to make room for these officers' horses, mules and baggage.[144] Plutarch reports that Cato the Elder was accompanied on campaign by a single servant as a junior officer and only five when commander-in-chief in Spain (195 B.C.)[145] This is clearly intended as a very low figure, used to illustrate Cato's "old-fashioned" self-reliance. In his biography of Cato the Younger, Plutarch says this Cato traveled with just 15 slaves, two freedmen and four friends, and implies that this was a small entourage for an individual of senatorial rank.[146] It is noteworthy that the group included both a baker and a cook.[147] The retinue of neither Cato should be seen as typical: a senatorial officer's entourage, not including his military staff, probably comprised dozens of individuals.

An officer's personal train would have carried his tent and other military equipment. Junior officers shared a tent, but senior officers would have had their own, or even several tents.[148] Plutarch describes the activities of Junius Brutus before the battle of Pharsalus (48 B.C.):

> . . . they that carried the tent of Brutus were slow in coming . . . and . . . it was almost noon before he anointed himself and took a little food . . .[149]

It appears that along with his tent, Brutus's train included, at the very least, his food, his cook and the niceties of Roman toilet. The kind of superfluous equipment carried by ranking Romans is indicated by an anecdote related by Plutarch: Scipio Aemilianus found a wine cooler, set with precious stones, in the personal train of one

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[143] Jos. *BJ* 5.49.
[144] Polyb. 6.27.5.
[145] Plut. *Cato Mai.* 1.7; 10.5. Plut. *Cato Mai.* 5.6. claims that Cato's retinue consumed only three Attic *medimoi* of wheat a month, and his pack-animals one and a half *medimnoi* of barley. This ration equals that of approximately five common soldiers, according to the figures given in Polyb. 6.39.13.
[146] Plut. *Cato Min.* 9.2.
[147] Plut. *Cato Min.* 12.2.
[148] Kissel (1995) 223.
[149] Plut. *Brut.* 4.3–4.

of his military tribunes, Gaius Memmius.[150] The pseudonymous author
of the *African War*, says that during the Caesarian army's crossing from
Sicily in 47 B.C.:

> Gaius Avienus, a military tribune of the Tenth Legion, had comman-
> deered a vessel from the convoy (*ex commeatu*) and filled it with his own
> household slaves (*familia sua*) and beasts of burden (*iumenta*), without
> transporting a single soldier . . .[151]

Velleius Paterculus reports that the future emperor Tiberius brought
a personal medical staff, kitchen, portable bathing implements and
even a litter along on his Pannonian campaign. Velleius apparently
did not think this sort of personal equipment exceptionally lavish,
as he praises Tiberius's frugality in not riding in a carriage![152] In
way of historical analogy, Lord Peterborough, campaigning in Spain
in 1707, had his personal gear carried by 16 wagons and over 50
mules, a carrying capacity of around 10 metric tons.[153] Officers' trains
might have had a significant effect on the logistics of an army; an
exceptionally large officers' trains could be a serious impediment to
the army. It may have been in response to such a situation that
Scipio Aemilianus, when commanding the army in Spain in 134 B.C.
ordered:

> all wagons and their superfluous contents be sold, and all pack ani-
> mals, except such that he himself permitted to remain.[154]

This regulation applied to all ranks, but may well have been espe-
cially aimed at reducing the officers' train.

   Though some of the officers' equipment was personal, the state
bore the cost of at least some of it. Plutarch, in another example of
Cato the Elder's parsimony, says that he sold his horse after cam-
paigning as consul in Spain in 195 B.C., in order to spare the state
the cost of transporting it.[155] Presumably, most general officers were
not so cost conscious.

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[150] Plut. *Mor.* 201D; see Front. *Strat.* 4.1.1.
[151] [Caes.] *BAfr.* 54.
[152] Vell. Pat. 2.114.
[153] Fortescue (1930) 23.
[154] App. *Hisp.* 14,85.
[155] Plut. *Cato Mai.* 5.6.

Siege Train

Many of the materials for siege warfare would be the same as those for building a camp, except they would be needed in much larger quantities.[156] The army gathered some siege materials such as timber, on site, but in the case of others, in particular, tools, rope and nails, it must have brought them along. The heaviest element of the siege train were the battering rams. These were normally transported with the army and not secured locally, as trunks of sufficient size are not common. Rams were probably moved on wheels and would have needed upwards of 20 mules or 10 oxen to haul them. According to Plutarch, Antony's army siege train in the Parthian War of 36 B.C. was carried in 340 wagons.[157] As noted above, this seems an excessive number of wagons for a siege train and probably includes Antony's army train.[158]

Non-Combatant Support Personnel ("Soldiers' Servants")

Modern armies typically use non-combatant personnel to provide support services for the fighting force. The Roman army certainly needed men who would drive the pack-animals and vehicles, tend to the baggage and perform many other important, particularly logistical jobs. The Roman army, at least in Imperial times, had a category of soldiers known as "*immunes*" and some historians sometimes consider them to be non-combatant personnel, analogous to those of modern times. These *immunes*, however, were specialists exempted from fatigue duties and were expected to fight in the ranks during battles. The Roman legion had no non-combatant soldiers.[159] There may have been non-combatant support units among the auxiliaries during Imperial times, although the evidence is slender. A *numerus* of bargemen from the Tigris was assigned to the Roman depot at South Shields, and the term "*numerus*" also may have been applied to other units of non-combatants.[160] The evidence is clear, however, that in general the Roman army used slave and free non-military

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[156] Kissel (1995) 196–7.
[157] Plut. *Ant.* 38.2.
[158] See above p. 87.
[159] Roth (1994) 352–3.
[160] Webster (1985) 151.

personnel to provide logistical support for its army, and did not use
the sort of non-combatant support units common in modern armies.

On many occasions, our sources refer to "*calones*" and "*lixae*," often to-
gether.[161] These terms represent two categories of the Roman army's
non-combatant support personnel. This is illustrated in Frontinus'
description of an incident during the Second Punic War (218–203 B.C.),
in which Claudius Marcellus:

> fearing that a feeble battle cry would reveal the small number of his
> forces, commanded that the *lixae, calones* and camp-followers (*sequellae*)
> of every sort should join in the cry."[162]

The non-combatants, whether *calones* or *lixae* were known collectively
as the "servicemen" (*apparitores*) or "helpers" (*adiutores*—not to be con-
fused with the high-ranking *adiutores* involved in logistical adminis-
tration); in Greek the terms *therapontes* (attendants), *therapeia* (in the
sense of a body of attendants) and *huperetai* are used.[163] The distinc-
tion between the *calo* and the *lixa*, and their function within the logis-
tical system of the Roman army, however, remains obscure. Generally,
historians of the Roman army have translated *calo* as "soldier's serv-
ant", i.e. the personal slave of a soldier and *lixa* as "sutler", i.e. a
private individuals who sold goods to the army for profit.[164] As will
be seen below, these categorizations are problematic.

There were other Latin terms used which referred specifically to
military servants. In his description of the early Republican army,
Livy refers to a military order called the *accensi*.[165] The term *accensi*
might refer to light infantry drawn from the sixth, and lowest, wealth
class at Rome, but could also conceivably mean a category of mil-
itary servants.[166] At one point Vegetius defines *accensi* as those "assigned
to serve officers,"[167] though elsewhere he says term is synonymous
with *tirones*, or recruits.[168] Frontinus mentions *agasones* being armed

[161] Livy 23.16.8; 40.28.3; 41.3.2; *Per.* 67; Tac. *Hist.* 1.49; 3.20; 3.33; Suet. *Galb.*
20.2.4; Curt. 3.3.25; 6.8.23; 8.4.13.
[162] Front. *Strat.* 2.4.8.
[163] Plut. *Pomp.* 72.3; Onas. *Strat.* 6.6; App. *BCiv.* 2.7,46; cf. Lyd. *Mag.* 1.4.
[164] Labisch (1975) 100 n. 3; Rouland (1977) 34; Welwei (1988) 90; Speidel (1989)
239–247; Ivanov (1990) 133–5.
[165] Livy 8.8–10.
[166] Keppie (1984) 20; Horsmann (1991) 7–8.
[167] Veg. *Epit.* 2.19.
[168] Veg. *Epit.* 3.14; see Milner (1993) 52 n. 6.

by Marius in order to imitate cavalry at the battle of Aquae Sextiae
in 102 B.C.[169] Festus defines these *agasones* as "cavalry attendants"
(*equos agentes*),[170] and it is generally translated as "groom." The terms
cacula, clavator and *galearius* also are used to describe soldier's serv-
ants.[171] One finds the words *mulio*, "muleteer,"[172] *ascitus* "carter" and
cararius "cartwright" in military contexts, but these describe functions
rather than positions within the army.[173] Brutus habitually used the
term "Briges" to refer to military slaves.[174] The Briges were a Thracian
people, whom Herodotus considered Phrygians,[175] and in classical
Greek, "Phrygian" served as a virtual synonym for slave. The use
of Briges as a nickname for military slaves is unattested elsewhere
and the pedantic Brutus probably coined it himself.

The Lixa

Most Roman military historians define *lixa* as "sutler," that is, a mer-
chant who made his living selling goods to the army.[176] There are
certainly some cases in which *lixa* does mean "sutler," (discussed
below pp. 96–101), but in other instances, *lixa* appears to refer to
some sort of military servant. For example, the etymologists Nonius
Marcellus and Isidore of Seville both explain *lixa* as "water-carrier"[177]
and manuscript glosses define *lixa* as "public slave (or servant) (*servus
publicus*)" and "soldier's slave (or servant) (*servus militis*)."[178] These
glosses are clearly not referring to sutlers. Sallust refers to *lixae* as sol-
diers' servants when describing the ill-disciplined army of Postumius
Albinus in Numidia in 109 B.C.:

> . . . men absented themselves from duty whenever they pleased. *Lixae*
> and soldiers ranged about in company day and night, and . . . laid
> waste to the country, stormed farmhouses, and vied with one another

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[169] Front. *Strat.* 2.4.6.
[170] Fest. *apud* Diac. (ed. Lindsay) s.v. agaso.
[171] Rouland (1975) 34.
[172] *P. Dura* 64 [= Fink (1971) no. 91], *AE* 1955.266; see Davis (1967) 69–70.
[173] Le Bohec (1994) 52.
[174] Plut. *Brut.* 45.1 citing the historian Marcus Valerius Messala Corvinus, an eye-
witness.
[175] Hdt. 7.73.
[176] Rouland (1977) 38–9; Speidel (1984) 204, Le Bohec (1994) 226.
[177] Non. (ed. Lindsay) 48.17; 62.6; Isid., *Etym.* s.v. lixones.
[178] *TLL* 7.2.1550.

> in amassing booty in the form of cattle and slaves, which they bartered
> with the traders (*mercatores*). . . . They even sold the grain which was
> allotted them by the state . . .[179]

In Sallust's description, the *lixae* sell their booty to the *mercatores*, who
are clearly sutlers in this case. Thus the *lixae* themselves cannot be
sutlers. The *lixae*, like the soldiers, receive a ration of grain, which
they also sell. It is true that, in the very next chapter, Sallust, in
describing the reforms that the new commander of the Roman army
in Numidia, Caecilius Metellus, introduced, notes an edict that:

> no-one should sell bread or any cooked food within the camp [and]
> that *lixae* should not follow (*sequerentur*) the army.[180]

It appears at first glance that *lixa* here means "sutler," but Sallust
may well mean that the soldiers' servants were to remain in camp
when the army went out to forage or train.

An anecdote related by Tacitus attests to the presence of *lixae* in
Rome in 69 A.D., and in this case they also appear to be military
servants rather than sutlers. After the murder of the emperor Galba,
Tacitus reports that a group of *lixae*, along with some *calones*, made
sport with his severed head.[181] The city was filled with military units,
there were at least two legions as well as auxiliary troops present
in the city, presumably with their servants.[182] There was no need
for sutlers in Rome, that is, no reason to thus characterize city mer-
chants selling to the army. These *lixae* in Rome, like the *calones*, must
have been attached to the army which had occupied the city, although
they may have belonged to the Praetorians. In his *Institutes* Quintilian
writes:

> You might compare it to an army with as many (*lixae*) as soldiers, that
> is to say, which has doubled its numbers, without doubling its strength.[183]

If *lixae* is translated "sutlers" his analogy is ludicrous, and here *lixa*
clearly means "camp-follower" or "soldier's servant." When Vegetius
recommends that *lixae*, as well as soldiers, be taught to swim, he is
using the term as a generic one for military servants.[184] In the late

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179 Sall. *Iug.* 44.5.
180 Sall. *Iug.* 45.2.
181 Tac. *Hist.* 1.49.
182 Tac. *Hist.* 1.6.
183 Quint. *Inst.* 8.6.42.
184 Veg. *Epit.* 1.10.

Empire, support personnel, such as bakers, were known as *lixae*.[185]
These passages have been seen as errors or late usages,[186] but may
well reflect the primary meaning of *lixa*.

In Latin literature, the *lixa* was used metaphorically to represent
the lowest-ranking member of an army (rather than a merchant or
sutler). Lucan describing, in his epic poem *The Civil War*, Cato's
army discovering a spring after a long thirsty march, wrote:

> he (Cato) was the last to drink
> and stood still till the *lixa* drank.[187]

Similarly, Seneca, in his tragic drama, *The Phoenician Women*, asked
rhetorically: "shall I like a humble *lixa* attend upon her domineering
father?"[188]

Several sources state, or suggest, that the *lixae* were slaves. Manu-
script glosses use the term "*servus*," normally "slave," but sometimes
"servant," to define *lixa*.[189] A scholiast on Horace's *Satires* contrasts
the *calones* "soldiers' servants (but) free men (*ministri militum*, *liberi
homines*)" with the *lixae*, who are "in fact, slaves (*vero servi*)."[190] Velleius
Paterculus says that both *calones* and slaves (*servitia*) were destroyed,
along with the army's baggage (*impedimenta*) during Antony's retreat
from Parthia in 35 B.C.[191] In describing Vitellius's undisciplined army,
Tacitus says that "even among the slaves (*inter servos*) the *lixae* were
the most unruly."[192]

On the other hand, some references indicate that the *lixa* was free.
Livy has the consul Gaius Aurelius question the triumph given to
the praetor Lucius Furius for his victory over Hamilcar and the
Gauls in northern Italy in 200 B.C.:

> Was there no one from the army which had fought against the Gauls,
> no camp-follower (*lixa*) at least, if there was no soldier, whom the
> senate could ask how much truth or untruth there was in the prae-
> tor's report?[193]

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[185] Amm. Marc. 28.4.4.
[186] Rouland (1977) 38, 40.
[187] Luc. *BCiv.* 9.593.
[188] Sen. *Phoen.* 597.
[189] *TLL* 7.2.1550.
[190] Porph. *ad* Hor. *Sat.* 1.22.44.
[191] Vell. Pat. 2.82.3.
[192] Tac. *Hist.* 2.86.
[193] Livy 31.49.11.

Whether or not this speech contains any element of Aurelius's actual
words, or is completely a composition of Livy, in this case the term
lixa must refer to a free man, for a slave could never bear witness
to anything in front of the Senate or any other Roman judicial body.

A number of inscriptions exist which may support the view that
the *lixae* were free employees of military units. There is an epitaph
from Syria reading "M. Titius, *lixa* of the 3rd Thracian cohort of
Syria."[194] This individual seems to be free, but not a soldier: never-
theless he is in some way attached to the cohort. Another funerary
inscription, this one from Oescus, in modern Bulgaria, reads: "Lucius
Freius Faustus, freedman of Lucius, lixa of the 5th Legion."[195] There
are other epigraphic references to *lixae* who are clearly not slaves,
but in which no military unit is mentioned.[196] The *lixae* in these cases
might be seen as free employees of the unit—a military servant,
though not a military slave. On the other hand, as noted below,
there are some cases in which *lixa* clearly does mean sutler. These
inscriptions might be taken to mean that the individual is a sutler
licensed to trade with a particular unit.[197]

Sutlers and Private Markets

Festus's book of etymology defines *lixae* as "those who follow the
army for the sake of profit (*quaestus gratia*)."[198] Livy, contrasting the
wealth to be gained fighting in Asia with the poverty of Liguria,
where Romans were fighting in 186 B.C., wrote:

> The district was poor, which constrained the soldiers to simple living
> (*parsimonia*) and offered them little plunder. Accordingly, there was no
> *lixa*, no long train of pack-animals stretched out along the column.
> There was nothing except arms and men who placed all their trust in
> arms.[199]

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[194] Speidel (1984) 203–5, originally interpreted *Lixa* as a cognomen, but subse-
quently changed his view; see Ivanov (1990) 134 n. 29.

[195] Ivanov (1990) 130.

[196] *CIL* 13.8732; *CIL* 3.11259.

[197] For more on this argument see below, pp. 97–8.

[198] Fest. *apud* Diac. (ed. Lindsay) s.v. lixa. The development of this meaning from
a word for military servant parallels the derivation of the English term sutler, which
derives from a Dutch term "*soeteler*," from *soetellen* "to do befouling work."

[199] Livy 39.1.7.

In these cases, the *lixa* clearly is a sutler, following the army as a private businessman. Determining the relation of sutlers to the army train is problematic. The author of the *African War* notes that when Titus Labienus attack the rear of Caesar's army he

> cut off the baggage trains (*sarcina*) of the sutlers (*lixae*) and merchants (*mercatores*) who were carrying their wares (*merces*) in carts (*plaustra*).[200]

It is unlikely that the baggage train in question was the army's, despite the use of the term *sarcina*, as Caesar would have placed the train securely in the center of his column. The *lixae* here, like the *mercatores*, were private individuals who followed the army's column at their own risk. It is noteworthy that the author of the *African War* lists two separate categories of merchants in this case. Tacitus notes that when, in 16 A.D., the usurper Catualda overthrew the Marco-mannic king Maroboduus, and seized his palace, he found:

> . . . a number of *lixae* and traders (*negotiatores*) out of the Roman provinces, drawn from their respective homes and implanted on hostile soil first by the commercial privileges, then by the lure of increased profits, and finally by oblivion of their country.[201]

The *lixae* in this case are clearly merchants. This is probably also true in the incident, described by Tacitus, in which *lixae* were caught out in the countryside, again along with *negotiatores*, and massacred, by an unexpected incursion of the Frisians in 69.[202] It is unclear why lixae are distinguished from *negotiatores* or *mercatores*. One might under-stand the term "*lixa* of the legion" or "*lixa* of the cohort," discussed above, in the context of controlling private trade within the army, whether by soldiers or civilians. Le Bohec argues that this term means something like "licensed purveyor" to a unit, rather than a military servant in that unit.[203] Given the two meanings of the term, it is impossible to decide this issue without further evidence, but this might explain the distinction between *lixae* and *negotiatores*. Perhaps the term *lixae*, in this context, refers to officially sanctioned sutlers and *mercatores* to those who followed the army without authorization. Sometimes the meaning of *lixa* is ambiguous, and it is not clear if

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[200] [Caes.] *BAfr.* 75.
[201] Tac. *Ann.* 2.26.
[202] Tac. *Hist.* 4.15.
[203] Bohec (1994) 226.

it means "military servant" or sutler." For example, when Frontinus describes the disciplining of the Roman army in Spain by Scipio Aemilianus in 134 B.C., he writes:

> When the Roman army before Numantia had become demoralized by the slackness of previous commanders, Publius Scipio reformed it by dismissing an enormous numbers of *lixae*.[204]

This obviously could refer either to servants or to sutlers.

There is a great deal of evidence of private merchants supplying foodstuffs to the army in peacetime.[205] Traders who followed the army on campaign to sell commodities and services (including provisions), were a ubiquitous element of armies up until modern times;[206] Roman merchants (*lixae, mercatores, negotiatores*) were often found in the context of Roman military activity.[207] Roman military garrisons also attracted private merchants, which led to the development of market towns. According to Tacitus, when the revolt of Julius Civilis broke out in 69 A.D., the commander of the legionary camp at Vetera took the precaution of:

> t[earing] down the buildings that had been erected during the long peace, and which in fact had grown into a town not far from camp.[208]

The "crowd of sutlers" (*lixarum multitudo*) who joined in the defense of Vetera were certainly merchants who ran these business establishments. The problem of security did not halt the process; throughout the Imperial period *canabae*, or civilian settlements, surrounded many Roman garrisons.[209]

Private individuals certainly had some role in supplying the Roman army in wartime. Appian attributes a speech to Scipio Aemilianus at the siege of Carthage in 147 B.C., which though fictitious, probably contains some reliable details about the battle. Scipio, speaking to the army's sutlers, says:

> Now all of you who are not soldiers must leave the camp today, except those who have my permission to remain, and of those who go, I shall

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[204] Front. *Strat.* 4.1.1.
[205] Wierschowski (1984) 112–121; Schlippschuh (1987) 20–21; Kissel (1995) 50–53.
[206] Fortescue (1930) 5–6.
[207] Middleton (1979) 85.
[208] Tac. *Hist.* 4.22.1.
[209] Wierschowski (1984) 126.

allow none to come back except such as bring food (*agora*) and this must be plain soldiers' food (*stratiokê kai psilê*).[210]

This passage reveals a number of interesting details about sutlers. First, some soldiers doubled as businessmen, selling food to their comrades (a practice that continues even in modern armies). Second, sutlers needed the permission of the army commander to operate legally, though in this case many had apparently evaded this regulation. Third, the army did purchase food from sutlers, some of it apparently luxury or gourmet food: exactly what Scipio banned.

Trading or buying and selling food among soldiers on a small scale is relatively harmless to military discipline. If a large number of troops are functioning as businessmen, however, it can be a serious military problem for an army on campaign. Sallust notes that the widespread trading of state-issued grain for privately baked bread was a problem in Albinus's undisciplined army, until it was banned by Metellus.[211] Soldiers enjoyed tax exemption in imperial times,[212] but Nero ruled that this immunity did not apply "in cases of goods which [soldiers] offered for sale."[213]

The Romans felt, not without reason, that the presence of too many sutlers in the army was deleterious to discipline. The army had an interest in reducing the number of non-combatants, and in shifting the responsibility for unit supply onto the soldier, as much as possible. Metellus, upon taking over Albinus's army in 109 B.C., disciplined it in a way which illustrates the army's attitude to private merchants:

> [He] removed the incentives to indolence by an edict that no one should sell bread or any other cooked food in the camp, that sutlers (*lixae*) should not attend the army . . .[214]

Lixae did assist in the defense of the legionary camps at Bonna (Bonn) and Vetera (Xanten) during the revolt of Julius Civilis in 69 A.D.[215] Whether the individuals in question were military servants or sutlers, it is not surprising to see them fighting under such circumstances.

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[210] App. *Pun.* 18,117.
[211] Sall. *Iug.* 44.5; 45.2.
[212] Gaius *Inst.* 1.57.
[213] Tac. *Ann.* 13.51.
[214] Sall. *Iug.* 45.2; cf. Front. *Strat.* 4.1.1.
[215] Tac. *Hist.* 4.20.22.

Although soldiers could, and certainly did, purchase food from the traders or sutlers who followed the army, it is clear that the Romans, as opposed to armies both earlier and later, did not normally rely wholly, or even primarily, on private merchants to supply the needs of their army in the field.[216] Although when listing the logistical troubles of Antony and Octavian's forces before the battle of Philippi in 42 B.C., Appian notes that "they could obtain nothing through merchants (*emporoi*)." This was certainly a special case, as the normal overseas supply lines, from Spain, Africa and Italy had been cut off by Republican fleets.[217] It would have been difficult, if not impossible, for sutlers to have supplied the needs of even an average-sized Roman army.[218] In addition, merchants accompanying an army are highly vulnerable to attack, and this was certainly one reason that the Roman army did not rely on them for necessary provisions.[219]

One must distinguish between markets, at which the soldiers buy provisions from private merchants and distribution points from which the army provides supplies to the soldiers, even though, when money is deducted for its issuance, the soldiers are technically "buying" their rations. Polybius has a place for a "market" (*agora*) in the Roman camp, but he is certainly referring to a supply distribution point, rather than a military market in the Greek sense.[220] The Roman army, at least disciplined ones, did not allow sutlers within the camp. This is shown by an incident that occurred in 53 B.C. The camp of Quintus Cicero was expecting a German attack; when it came the traders (*mercatores*) were camped outside the ramparts.[221] It was natural for true markets to spring up spontaneously around garrisons and during sieges. The so-called "*canabae*" at Masada (73), however, are probably not houses for sutlers (as Yigael Yadin claimed), but rather quarters for the supervisors or impressed workers.[222]

When Rome was at war, Roman, and Italian, merchants who found themselves in the area of operations naturally provided a potential for logistical support. They also were at risk from enemy action.

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[216] Kromayer-Veith (1928) 528; Labisch (1975) 42; Erdkamp (1995) 180–183. The role of private merchants in the administration of supply is discussed in Chapter Five, pp. 230–1, Chapter Six, pp. 270–1.

[217] App. *BCiv.* 4.14,108.

[218] Labisch (1976) 47; Erdkamp (1995) 190.

[219] Kromayer-Veith (1928) 395.

[220] Polyb. 6.39.

[221] Caes. *BGall.* 6.37.

[222] Yadin (1966) 224–225; Roth (1995) 94.

The massacre of 80,000 Roman and Italian merchants in Asia at the beginning of the Mithridatic War in 88 B.C. shows this clearly.[223] In 46 B.C, during Caesar's campaign in North Africa, envoys came from the town of Thysdra, in which:

> 300,000 *modii* of wheat had been collected by Italian merchants and farmers. These envoys now informed Caesar of the large quantity of grain they had and prayed him to send a garrison (*praesidium*) whereby both their grain and all their stocks (*copia*) might be the more readily kept safe.[224]

Caesar promised, but did not provide, help, which suggests that this considerable amount of grain was not needed by the army. The town was subsequently occupied by the Pompeians.[225]

Though the diet of the Roman soldier was quite adequate, at least under normal circumstances, one of the ways the soldiers must have used their pay was to improve the variety of the rather monotonous provisions.[226] The sutlers and merchants probably did not sell grain, or indeed any provisions in large amounts, but sold items which could be added to the rations for variety, such as fish sauce, spices, wine and vinegar.[227] Therefore, the contribution of sutlers should be considered an appendix to, and not a part of, the regular supply system.

The Calo

Since the Roman army did not rely on private merchants or sutlers for the bulk of its logistical support, military slaves must have performed at least some of the non-combatant roles.[228] At times the sources refer to these military slaves by the normal Latin words for unfree persons: *servi*,[229] *servitia*,[230] *pueri*,[231] *mancipia*[232] or the equivalent Greek

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[223] Livy *Per.* 78; App. *Mith.* 4,22–9; Plut. *Sulla* 11; Dio Cass. 31–35. fr. 101.
[224] [Caes.] *BAfr.* 36.
[225] [Caes.] *BAfr.* 76; 86; 93.
[226] Wierschowski (1984) 112; cf. *HA Hadr.* 10.2; *Avid. Cass.* 5.3; *Pesc. Nig.* 10.
[227] Kromayer-Veith (1928) 413.
[228] Forni (1953) 122–125; Rouland (1975) 28–44; MacMullen (1984) 444–5; Welwei (1988) 81–112.
[229] Caes. *BGall.* 7.20; Aul Hirt. *BGall.* 8.10.
[230] [Caes.] *BAlex.* 73; [Caes.] *BAfr.* 85; Vell. Pat. 2.82.3; *HA Hadr.* 13.7.
[231] [Caes.] *BAfr.* 85.
[232] Caes. *BCiv.* 3.6; [Caes.] *BAfr.* 47; Tac. *Ann.* 15.15.

vocabulary: *therapontes*,[233] *therapeia*,[234] *aner*[235] and *oiketai*.[236] The term *calo*, however, is used specifically to refer to slaves employed by soldiers or by the army as a whole. Festus defines "*calones*" as "slaves of the soldiers, so-called because they carry loads of firewood (*lignea*), which the Greeks call "*kala*."[237] Whether or not Festus's etymology is correct, most ancient lexicographers scholiasts and manuscript glosses agree that the *calones* were military slaves.[238]

Greek armies routinely used slave attendants to carry gear and lead or drive animals, and Latin writers discussing Greek military history often use *calo* to refer to such slaves. For example, Frontinus tells the following story:

> When Antiochus [the First] was besieging the fortified town of Suenda in Cappadocia, he intercepted some beasts of burden (*iumenta*) which had gone out to procure grain (*frumentatum*). Then killing their attendants (*calones*), he dressed his own soldiers in their clothes. . . . The sentinals . . . mistaking the soldiers for teamsters (*custodes*), let the troops . . . enter.[239]

In another passage, discussing the reforms of Philip II, Frontinus uses *calo* both to mean a cavalryman's attendant, and also the individual who was detailed to carry the mills (*molae*) and ropes (*funes*) for ten infantry soldiers.[240] Livy describes how, during the Achaean-Spartan War of 192 B.C., Philopoemen, the Achaean commander set a guard over his baggage (*impedimenta*) and *calones*.[241]

There remains the important question, both for the Republican and the Imperial periods, whether the *calones* were privately owned or belonged to the state. Most scholars who have addressed this issue

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[233] Jos. *BJ* 3.69; Plut. *Aem. Paul.* 22.1; *Pomp.* 72.3; App. *Pun.* 5,30; *Mith.* 13,88; *BCiv.* 4.14,112

[234] Plut. *Mar.* 19.1; Dio Cass. 56.20.1–2; App. *BCiv.* 1.14,109; 2.8,53.

[235] Plut. *Caes.* 63.2.

[236] Polyb. 8.30.6; Onas. *Strat.* 6.6; Jos. *BJ* 3.70; 3.125; 5.49; Plut. *Caes.* 46.2; *Brut.* 45.1; Dio Cass. 50.11.6.

[237] Fest. *apud* Diac. (ed. Lindsay) s.v. calo.

[238] Serv. *ad Aen.* 6.1; Porph. *ad* Hor. *Sat.* 1.2.44. The latter author in 1.22.44 writes: "*calone*s are the soldiers' servants (*ministri*), free men" and "*lixae* are in fact the slaves of the same [soldiers]", but he may well be reversing the words' meanings. Glosses on "*calo*" from *TLL* 3.178: "*doulos êtoi hupêretês stratiôtou. Therapôn ê hupêretês stratiôtou. servus vel minister militum. id est vinum vendit vel propinator.*"

[239] Front. *Strat.* 3.2.9.

[240] Front. *Strat.* 4.1.6.

[241] Livy 35.28.9.

hold that all the slaves in the Roman army were privately owned.[242] There is no question that there were private slaves and freedmen in the army, who were brought along by officers, and in some cases by rank and file soldiers.[243] High commanders certainly kept a retinue of private slaves with them. When Polybius describes Gaius Livius fleeing into the citadel of Tarentum "with his servants (*oiketon*) "in 213 B.C., he probably means his private slaves, particularly as Livius was interrupted during a feast by Hannibal's attack on the city.[244] Appian mentions in passing that at the siege of Utica in 203–202 B.C., one of the Roman cavalrymen—or perhaps an equestrian officer (*hippeos Romaiou*)—was accompanied by a "Spanish servant" (*therapon Iber*).[245] During Caesar's crossing from Sicily to Africa in January 47 B.C., Gaius Avienus, one of Caesar's officers, filled an entire ship with his personal slaves and his baggage.[246] Given the danger of the winter crossing, Caesar's displeasure at this luxury is not surprising. When Octavian organized a crossing from Italy to Greece in 31 B.C., before the Actium campaign, he limited the number of private servants his senatorial and equestrian officers could bring with them.[247] Tacitus notes that during the mutiny of 14 A.D., rebellious soldiers tortured the slaves—presumably the private slaves—of their commander, Junius Blaesus.[248] Personal slaves of Imperial soldiers appear frequently in the papyri and the law codes, although they are rather rare in the epigraphic record, the main source for military organization.[249] An early first century inscription does mention two slaves of a centurion who apparently died with him at the Battle of Teutoburger Wald.[250] The fact that there were private military slaves does not prove, however, that this was the only type utilized by the army. While many soldiers certainly owned slaves, the Imperial army

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[242] Rouland (1977) 30–1; Welwei (1988) 91–107.
[243] Plut. *Brut.* 45.1.
[244] Polyb. 8.30.6.
[245] App. *Pun.* 5,30.
[246] [Caes.] *BAfr.* 54.
[247] Dio Cass. 50.11.6.
[248] Dio Cass. 57.4.2.
[249] Welwei (1988) 100 identifies only four: *CIL* 6.3596 (Rome), three *vernae* owned by a *subcornicularius tribuni; CIL* 13.6888 (Mogontiacum, I A.D.) slave of an aquilifer; *CIL* 13.8648 (Vetera, c. 10 A.D.); *CIL* 13.11836 (Mogontiacum) slaves of centurions. See Forni (1953) 125; MacMullen (1963) 106, n. 29; Welwei (1988) 91ff.; Speidel (1989) 239–42.
[250] *CIL* 13.8648 = *ILS* 2244 (Vetera, ca. 10 A.D.).

probably discouraged, and perhaps even prohibited, rank and file soldiers from bringing along personal slaves on campaign.[251]

The Romans used public slaves for a number of purposes. The aqueducts of Rome, for example, employed a large number of public slaves (*servi publici*) for both administrative work and manual labor.[252] There are some direct indications that the state also owned the military slaves known as *calones*.[253] When Caecilius Metellus sought to discipline his army in Numidia in 109 B.C. he commanded that:

> no private soldier should have a slave (*servus*) or a pack animal (*iumentum*) in camp or on the march.[254]

Since the army clearly could not have functioned without pack-animals or servants to handle them, Sallust probably means that personally owned slaves and animals were banned, and only the slaves belonging to the army's train were allowed to remain. In this case, there must have been state-owned slaves, as well as donkeys and mules. There are two cases in which the army's slaves are explicitly mentioned. When emphasizing the complete destruction of the Caesarian army under Curio in Africa in 48 B.C., Appian specifically refers to "the servants belonging to the army (*huperetou tou stratou*)" being lost as well.[255] In 129, the emperor Hadrian accepted the gift of slaves from the Cappadocians for use by the army.[256] Although it is possible that Hadrian bought the slaves in order to free them and turn them into soldiers,[257] one can certainly take the passage at face value and see it as a reference to army-owned slaves.

A number of inscriptions from the legionary camp at Lambaesis mention Imperial slaves and freedmen associated with the legio III Augusta.[258] Le Bohec suggested that slaves were attached not to the

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[251] Forni (1953) 125 and Rouland (1975) 32 argue that rank and file soldiers did bring slaves along on campaign, but a distinction should be made between regulation and practice.

[252] Front. *Aq.* 2.100, 116.

[253] Harmand (1967) 159; Labisch (1975) 101 n. 13.

[254] Sall. *Iug.* 45.2.

[255] App. *BCiv.* 2.7,46.

[256] *HA Hadr.* 13.7: *deinde a Cappadocibus servitia castris profutura suscepit*; cf. 18.7; see MacMullen (1963) 106 n. 29; Rouland (1975) 28; Wierschowski (1984) 66.

[257] Welwei (1988) 105–6.

[258] Either *Augusti verna* or *Augusti libertus; dispensator: AE* 1973.83 (Rome), *CIL* 8.3288 and 3291 = *AE* 1969–70.664 (Lambaesis, late 2nd, early 3rd c.), *CIL* 8.3289 (Lambaesis, Septimius Severus); *actor: CIL* 8.2803 = 18140 (Lambaesis); *vikarius: CIL* 8.3288 and 3291 = *AE* 1969–70.664 (Lambaesis, late 2nd, early 3rd c.); *tabularius* or *adiutor tabularii: AE* 1956.123 (Lambaesis, late 2nd early 3rd c.), *CIL* 8.3290

legion, but either to the *territorium legionis* or to the legate personally[259] It is possible, though, that these were state military slaves attached to the legion, who through their positions on the staff accumulated enough money to put up monuments to themselves.

If one accepts the idea of state-owned military slaves, the question remains, how the Roman army obtained them. Some certainly would have been purchased, others obtained through requisition. Scipio Africanus requisitioned 2,000 slaves in the aftermath of the capture of New Carthage in 209 B.C.[260] In this case, the slaves were intended to produce arms, and they were employed temporarily. Nevertheless, the same method may well have been used to get *calones* for the army. During the humiliating withdrawal of Paetus's army negotiated with the Parthians in 62 A.D., the latter "lined the roads, identifying and dragging off slaves (*mancipia*) and pack-animals (*iumenta*) which had been captured long before. . . ."[261] Apparently both slaves and animals had been seized by the Roman army during an earlier conflict, either requisitioned or taken as booty, and had remained in service for a considerable period.

Several passages suggest that the number of military servants in the army was a matter of record, and that the military kept lists of them. Although as slaves they did not count, technically, on the army's rolls,[262] they appear to have been considered, in a very real sense, part of the army. The epitomator of Livy, citing Valerius Antias, says that at the Battle of Arausio, in 105 B.C. the Germans killed "80,000 soldiers and 40,000 servants and camp-followers (*calonum et lixarum*)."[263] In his biography of Lucullus, Plutarch counts military servants among the Roman army's casualties,[264] as does Appian in his description of the battle of Philippi (42 B.C.).[265]

Whether or not military slaves were privately-owned or state-owned, they clearly were subject to army discipline. During the dangerous Gallic uprising of 53 B.C., Quintus Cicero, one of Caesar's

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(Lambaesis, 3rd c.); *arkarius: CIL* 8.3289 (Lambaesis, 193–211); *curator: AE* 1946.370: (198–201); *CIL* 8.18327: (Lambaesis, 3rd c.). Slaves without titles are also mentioned in a military context: *CIL* 8.2482 = 17976 *CIL* 8.2557 = 18050; see Passerini (1949) 621; Welwei (1988) 112 n. 214.

[259] Le Bohec (1989) 194–5; 257–8.
[260] Polyb. 10.17.9–11.
[261] Tac. *Ann.* 15.15.
[262] Kromayer-Veith (1928) 494.
[263] Livy *Per.* 67.
[264] Plut. *Luc.* 11.6.
[265] App. *BCiv.* 4.14,112; cf. Jos. *BJ* 3.69.

legionary commanders, "carefully confined his troops to camp, allow-
ing not even a single camp-follower (*calo*) to pass beyond the entrench-
ment."[266] The discipline and standardization under which the *calones*
operated accounts for several cases in which they were mistaken for
Roman soldiers by the enemy.[267]

At the beginning of the period under discussion, the *calones* do not
appear to have been armed. Livy also describes a *turba calonum* "mixed
in" with soldiers (*inmixta armatis*) during the battle of Baecula in 208
B.C., pelting Carthaginians with stones.[268] By the end of the 2nd
century B.C., the army was training and arming *calones*.[269] Describing
Marius's campaign against the Teutones, Plutarch writes:

> . . . the throng of camp-servants (*therapeia*), who had no water either for
> themselves or their beasts, went down in a body to the river, some
> taking hatchets, some axes, and some also swords and lances along
> with their water-jars (*hudrioi*), determined to get their water even if
> they had to fight for it.[270]

This fight over water led to the battle of Aquae Sextae (102 B.C.)
During the battle of the Sambre in 57 B.C., after the arrival of 10th
Legion turned the tide of battle, Caesar writes:

> The *calones* seeing the panic of the enemy, met [the Belgae's] armed
> assault even though they were *inermes* . . .[271]

In this case "*inermes*" must mean "lightly armed" or "unarmored,"
rather than "unarmed" as these military slaves could not possibly
have fought the Gauls without any weapons whatsoever.

Our sources sometimes contrast one category of non-combatants
that was armed with another that was unarmed. The author of the
African War, describing the Battle of Thapsus in 46 B.C., refers to
an unarmed (*inermis*) *lixa* being crushed by an elephant, as well as
"the slaves (*servi*) and "lackeys" (*pueri*) in the camp" fighting with
stones and javelins (*pila*).[272] The javelins may have belonged to the
calones, and "*pueri*" might refer to the truly unarmed *lixae*, who were
reduced to fighting with stones. The supposition that the *lixae*, whether

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[266] Caes. *BGall.* 6.36.
[267] [Caes.] *BAlex.* 74; Front. *Strat.* 2.4.6.
[268] Livy 27.18.12.
[269] Rouland (1977) 34, 35 n. 61; Welwei (1988) 77; Speidel (1989) 242–5.
[270] Plut. *Mar.* 19.1.
[271] Caes. *BGall.* 2.27.
[272] [Caes.] *BAfr.* 84–5.

meaning sutlers or military servants, were normally unarmed gets some support from Tacitus's statement that Calpurnius Piso, in his struggle with Germanicus over control of Syria in 19 A.D. "armed the *lixae*."[273] Similarly, during the Batavian attack on Bonn, 69 A.D., Herrenius Gallus armed peasants (*pagani*) and *lixae* as a sort of militia; Tacitus calls both of these groups "unwarlike (*ignava*) but bold before they met actual danger."[274] Furthermore, Ammianus Marcellinus, writing in the fourth century, contrasts *calones* and "the unarmed service (*apparitio imbellis*)."[275]

In Greek sources, one also sees two different categories of military servants: Onasander distinguishes between *psiloi* (spearmen) and *anoploi* (unarmed men),[276] Plutarch between *skênophulakes* (tent defenders) and *therapontes* (attendants)[277] and Dio Cassius between *hypaspistai* (shield-men) and *skeuophoroi* (baggage-carriers) within the Roman camp.[278] The "aides" (*hyperetai*) and "armor-bearers" (*hypapistai*) who march along with Scipio's scribes during his triumph of 201 B.C., might also represent these two groups.[279] In another passage, referring to the battle of Philippi in 42 B.C., Appian says Cassius lost 8,000 men "including the slave shield-bearers (*paraspizontes therapontes*)."[280] The distinction between these categories of non-combatants is not entirely clear in Republican times, but it appears that there was a type of armed and a type of unarmed slave.

In the Imperial period, our sources describe soldiers' servants almost as a paramilitary force. By this time, we certainly see a category of armed, trained military slaves. Josephus, discussing the servants in Vespasian's army of 67 A.D. says:

> [They] may properly be included in the category of combatants (*machimoi*) whose military training they shared; for taking part in peacetime in all their masters' maneuvers, and in wartime in their dangers, they yield to none but them in skill and prowess.[281]

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[273] Tac. *Ann.* 2.78.

[274] Tac. *Hist.* 4.20.

[275] Amm. Marc. 24.1.4. Ammianus was a soldier and likely to use technical vocabulary: Crump (1975) 6ff. Note that in the late period *apparitor*, like *adiutor* also could also mean a high-ranking commissary official: Amm. Marc. 23.6 and *Cod. Theod.* 7.22.11.

[276] Onas. *Strat.* 10.8.

[277] Plut. *Pomp.* 72.3: in the parallel account in *Caes.* 46.2 they are collectively called *oiketai*, and it is noted that Plutarch's source is the history of Asinius Pollio.

[278] Dio Cass. 79.26.6.

[279] App. *Pun.* 9,66.

[280] App. *BCiv.* 4.14,112.

[281] Jos. *BJ* 3.69.

When the legion went into battle the non-combatants had the respon-
sibility of defending the camp. At the Battle of Nisibis, in 217 A.D.,
Dio Cassius reports that:

> Macrinus . . . came near to losing his very camp; but the armor bear-
> ers (*hypaspistai*) and baggage carriers (*skeuophoroi*) who happened to be
> there saved it. For in their confidence these rushed out first and charged
> upon the barbarians, and the very unexpectedness of their opposition
> proved an advantage to them, causing them to appear to be armed
> soldiers, rather than mere helpers (*huperetai*).[282]

Livy reports the loss of *calones* alongside that of soldiers after Manlius
Vulso's baggage train was ambushed in Thrace in 188 B.C. and im-
plies they had been functioning as guards (*custodes*) for the baggage.[283]
The defensive function of military servants was not only an emer-
gency measure, as some claim, but was routine.[284] This point is empha-
sized by Plutarch when he calls the army's servants "baggage guards
(*skênophulakes*)."[285] The *galearius*, a type of military servant who wore
a helmet (*galea*) might have served as a kind of officer over the other
military slaves. Vegetius describes this individual as follows:

> The ancients took very thorough precautions against disturbance to the
> fighting troops by servants . . . Therefore they decided to marshal the
> baggage-trains like the soldiers under certain standards. So they selected
> men of ability and practical experience from among the servants whom
> they call *galearii*, and put them in charge of up to 200 pack-animals
> and grooms (*pueri*).[286]

A soldier named Theon, apparently a cavalryman, stationed in Upper
Egypt, mentions a *galearius* in a letter that reads in part: "I did not
find someone to bring the barley to you. If you wish to send your
[or the] *galearius*, and let him get it."[287]

Since the *calones* had some training and experience with weapons,
they could, in desperate circumstances, be recruited as soldiers—of
course after having first been freed. The speech against Lepidus that
Sallust puts in the mouth of L. Marcius Phillipus and sets in 77 B.C.
says that:

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[282] Dio Cass. 79.26.5–6.
[283] Livy 38.40.10–13.
[284] *Pace* Speidel (1989) 244–5; Welwei (1988) 108.
[285] Plut. *Pomp.* 72.3.
[286] Veg. *Epit.* 3.6, in the same section, Vegetius calls the servants "*calones*."
[287] Bagnall (1976) 58.

> At that time . . . Lepidus was a mere brigand (*latro*) at the head of a few camp-followers (*calones*) and cut-throats (*sicarii*), any one of whom would have sold his life for a day's wages.[288]

When Lucius Lucullus's legate Fabius was defeated by Mithridates in 68 B.C., he "freed the slaves (*therapoi*) who had been in his camp and fought again another day."[289] If this story is reliable, it must refer to *calones*—who were already armed and had some military experience and discipline. Untrained freedmen would have been less than useless in a battle. Describing Cataline's last stand at the Battle of Pistoria in 62 B.C., Sallust says that "[Cataline] himself with his freedmen and *calones* took his place beside the eagle."[290]

On the other hand, one does not always find military slaves exhibiting such bravery and discipline. When Livy describes the surprise attack on the Roman camp during the Istrian War of 178 B.C., he likens the soldiers who were strolling around unarmed and away from their units to a "mob" (*turba*) of *calones* and *lixae*.[291] Indeed, the words *turba* and *multitudo*, which refer to a disorganized and generally unruly crowd, are used to describe the non-combatants as a group.[292] During the Battle of the Sambre, in 57 B.C., the *calones* left the Roman camp to plunder the baggage of the Belgae; when the Gauls took the camp in their absence, the *calones* fled panic-stricken. The panic spread among some of the allied soldiers and almost led to Caesar's defeat. In fairness, after the arrival of the 10th legion turned the tide of battle, the *calones* rallied and actually defeated a force of Gauls.[293] Caesar also describes an incident during a *frumentatio*, in which the *calones* accompanying the foraging party were attacked by Germans and fled into the covering party's ranks; only good leadership and bravery on the part of the soldiers prevented a general defeat.[294]

Despite the fact that *calones* did not always perform bravely, it seems unlikely that the highly organized Roman army would have given arms and military training to privately-owned slaves or relied on the property of common soldiers to perform such vital military

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288 Sall. *Hist.* 1.77.7.
289 App. *Mith.* 13,88.
290 Sall. *Cat.* 49.3.
291 Livy 41.3–6.
292 Caes. *BGall.* 6.36; [Caes.] *BAlex.* 74; Livy 27.18.12; 35.28.9; Curt. 6.8.23.
293 Caes. *BGall.* 2.24–7.
294 Caes. *BGall.* 6.39–40.

functions as guarding the army's baggage or the camp itself. During the Republican period, the army was raised anew every year. One can only surmise that servants, whether slaves or free employees were bought, requisitioned or engaged by authority of the same Senatorial decree that established the army itself. Under Augustus's military system, however, military units had a *de facto*, if not *de jure*, permanent existence. Thus, both *calones* and *lixae* would "belong to" the legion, cohort or *ala* in which they worked.[295] This would explain two passages in which Josephus refers to "the legion's servants."[296] Army reliance on personal servants, rather than on state-owned slaves, does seem to have been the norm in the Late Empire.[297]

Requisitioned Civilians

In addition to the military servants on permanent assignment to the legions and auxiliary units, the army must have had another category of non-combatant: requisitioned civilian labor. When the army went on campaign, its transportation needs were obviously greater than in peace-time and it needed non-combatant personnel for the army train.[298] Both animals and drivers, including slaves, freedmen and free persons were requisitioned for such duty.[299] The Roman army also routinely requisitioned civilians to carry supplies.[300]

It is not surprising to see such forced labor referred to by the provincials in their literature: when the Mishnah mentions "idol-worshipers" (*gilulim*), i.e., Romans, carrying off Jews; it probably refers to conscription to corvée labor, which would include service as porters.[301] St. Matthew, has Jesus say: "whoever impresses (*angareusei*) you to go one mile, go with him two miles." Whether or not this represents Jesus' actual words, the Greek uses the technical word for corvée labor, as well as a loan-word from Latin to mean "mile" (*milion*).[302] In first century Palestine, a Latin loan-word in such a con-

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[295] Welwei (1988) 83.
[296] Jos. *BJ* 3.125 and 5.49.
[297] Welwei (1988) 170ff.; Speidel (1989) 246 n. 35.
[298] Hammond (1983) 27–31; Welwei (1988) 56–80; 81–112, esp. 109–110.
[299] Petrikovits (1975) 167 n. 41; Welwei (1988) 90; Kissel (1995) 235, 257.
[300] Plut. *Luc.* 14.1; *Ant.* 68; Dio Cass. 64.4.5; Jos. *BJ* 7.277–8; see "Porters" pp. 212–3.
[301] Tosefta *Baba Mezia* 7:8; Mishnah *Erubbin* 4:1; see Sperber (1969) 164–8, Isaac (1992) 295–7.
[302] Matt. 5:41. The practice of pressing civilians into service for the state, includ-

text strongly suggests the "whoever" in this case represents a military officer. The army was practically the only Latin-speaking Roman institution encountered by common people in Palestine at that time.

Logistical Functions of Military Servants

Most duties assigned to military servants concerned logistical needs: assisting in foraging, milling and cooking, as well as in carrying gear and supplies.[303] Military servants also participated in foraging expeditions. Caesar describes a *frumentatio* sent out by Quintus Cicero in 53 B.C. in which *calones* are sent along:

> [Cicero] sent 5 cohorts to get grain in the nearest fields . . . and besides, a great host of camp-followers (*multitudo calonum*) got leave (*facta potestate*) to follow with a great number of pack-animals (*magna vis iumentorum*), which had remained in the camp.[304]

Later in the Gallic War, Vercingetorix captured Roman slaves (*servi*) who had been taking part in a *pabulatio*.[305] Aulus Hirtius notes that *calones*, along with pack animals (*iumenta*) took part in *pabulatio*s during the campaign against the Bellovaci in 51 B.C.[306] During the Ilerda campaign of 49 B.C., when Caesar was short of supplies, and needed to requisition cattle from the local Spanish villages, he sent *calones* to the more distant ones, presumably to drive the cattle back to the army. In the same campaign, some *calones* were killed when the Pompeian forces attacked a train bringing supplies from the Ruteni to Caesar's army.[307] At the siege of Cremona in 69 A.D., Antonius Primus sent his *calones* and *lixae* to Bedriacum to bring back supplies—including siege equipment—for the army, which had been left behind with the baggage trains.[308] The exact role of the *calones*, however, is unclear. The question of whether they, or the soldiers, did the actual foraging is discussed in the next chapter (pp. 121, 124, 127–8, 132).

Calones and *lixae* also served in the troop and the army trains.

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ing the military, was included in the corvée labor described in Greek as *angareia*; cf. Matthew 27:32; Mark 15:21. For the Latin cognate *angariare* see Dig. 49.18.4.
   [303] Speidel (1989) 242–245.
   [304] Caes. *BGall.* 6.36.
   [305] Caes. *BGall.* 7.20.
   [306] Aul. Hirt. *BGall.* 8.10.
   [307] Caes. *BCiv.* 1.51–2.
   [308] Tac. *Hist.* 3.20.

During the siege of Nola in 216 B.C., Claudius Marcellus ordered his *impedimenta* to bring up the rear; the *calones, lixae* and wounded soldiers, who were with it, were told to carry palisade stakes.[309] Our sources indicate that the *calones* handled both the soldiers' baggage and the equipment of the *contubernium*. At Baecula in 208 B.C., when Scipio led several cohorts forward without their baggage (*expediti*) against a Carthaginian position, they were accompanied by their *calones*.[310] On the other hand, during Manlius Vulso's march through Thrace (188 B.C.), Livy says "there was loss both of *impedimenta* and of *calones*."[311]

Lixae are also found in the trains. At First Bedriacum in 69, the Othonian line became mixed in with the army's *lixae* and wagons (*vehicula*).[312] If only the Roman army train used wagons, as has been suggested above, this is an indication that the *lixae* were associated with this part of the baggage train, but the loose way in which the sources often use the terms for military servants and trains, make it impossible to derive a definite conclusion.

Military servants were also available for unforeseen tasks. At Zela, (47 B.C.), Caesar ordered the army's slaves (*servitii*) to carry building material for the building of the camp's rampart, "so that none of the troops would quit their work of fortification."[313] Troops normally did this type of work,[314] so the *calones*' assistance in camp-building was an emergency measure, and not a normal part of their duties. Non-combatants also played other roles, such as morale-building. On several occasions, the *calones* and *lixae* joined in the general battle-cry which was intended to raise the Romans' spirits and demoralize the enemy.[315] Roman soldiers returning from their victory at the battle of Pydna (168 B.C.) were met by slaves (*therapontes*) with torches who led them back to their tents.[316]

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[309] Livy 23.16.8, 14.
[310] Livy 27.18.12; according to Caes. *BGall.* 2.24 (Battle of the Sambre, 57 B.C.) the *calones* are present with the army, although the *impedimenta* had not yet arrived; see Labisch (1975) 101.
[311] Livy 38.41.3; cf. Tac. *Hist.* 4.60.
[312] Tac. *Hist.* 2.41.
[313] [Caes.] *BAlex.* 73.
[314] Caes. *BGall.* 3.25; Jos. *BJ.* 3.161–5. Sometimes local labor was requisitioned to carry building material, e.g. [Caes.] *BAlex.* 73.2, but the building of fortifications was always done by the soldiers themselves; see Roth (1995) 94.
[315] Front. *Strat.* 2.4.8.
[316] Plut. *Aem. Paul.* 22.1.

Numbers and Organization of Non-Combatants

There are no certain indicators of the number of non-combatants in the Roman Army. The Epitome of Livy says, citing Valerius Antias, that at the disastrous Battle of Arausio in 105 B.C. 80,000 soldiers and 40,000 *calones* died.[317] This suggests a combatant/non-combatant ration of 2:1, but since this is only a casualty figure, one even Livy did not entirely trust, it should not be generalized. Tacitus states, on two separate occasions, that Vitellius's notorious army, advancing on Rome in 69 A.D., had more *calones* and *lixae* than soldiers.[318] He says this is an extraordinary example of poor discipline, and probably includes private slaves (the "unofficial" train) as well as the army's "regular" servants.[319] There is no question that the number of servants in these cases is exaggerated. When Quintilian refers to the idea of an army having as many *lixae* as soldiers, "that is to say, which has doubled its numbers, without doubling its strength,"[320] it is rhetoric and not history.

The permanent troop train of legions and other units required some personnel to drive and care for the mules and wagons. Peddie estimates that there were 1,000 servants per legion, based on one servant per animal.[321] A papyrus from Dura-Europus refers to muleteers (*muliones*) attached to a detachment of cavalry.[322] A single *mulio*, however, could control more than one animal, so the number of drivers was probably considerably smaller than the total number of animals.[323] Comparative evidence from 19th-century American pack-trains indicates a mule-to-driver ratio of around 5:1. According to U.S. Army regulations of that period, a military pack train was made up of a cargador, a cook, a blacksmith, ten packers, one bell mare, fourteen saddle mules and fifty pack mules, a total of 14 men and 64 mules. When a single cavalry company was in the field for ten days to two weeks, however, the train often was made up of ten mules with two or three packers, and for the entire regiment, 25–30

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[317] Livy *Per.* 67; cf. Tac. *Germ.* 37; Cic. *Balb.* 28; Val. Max. 4.7.3.
[318] Tac. *Hist.* 2.86–7; 3.33.
[319] Welwei (1988) 85.
[320] Quint. *Inst.* 8.6.42.
[321] Peddie (1994) 52.
[322] *P. Dur.* 64 recto, 7 (221) [= Fink (1971) no. 91].
[323] See Veg. *Epit.* 2.10; 3.6; Petrikovits (1975) 57.

mules with five or six packers.[324] Therefore, the 1400 mules in the legion's troop train would have required only 280 *muliones*, or mule-teers. Nevertheless, since the one or two mules per *contubernium* carried that unit's gear and rations, one of the squad's *calones* almost certainly stayed with the unit mules, which would account for some 600 of them. If wagons were used by the army, as they most probably were, then each wagon would have needed a driver. Some of the remaining 600 *calones* may well have been assigned to this duty. Many *calones*, however, would have been needed for duties other than caring for animals.

For a highly professional military force such as the Roman army, a combatant/non-combatant ratio of 4:1 seems reasonable. This would mean 1,200 *calones* per legion of 4,800. i.e. 120 military slaves per cohort, 20 per century and 2 per *contubernium*.[325] Presumably the doubled first cohort of the Imperial legion would have had the same proportion of *calones*, i.e. 240, for a total of 1,200 men. Thus, there would have been 1,320 *calones* in the "expanded" legion (with a doubled first cohort) for a total of 6,600 men. It should be noted that these are merely estimates, but large numbers of public slaves are not unattested in Roman state service.[326]

Doubtless the auxiliary infantry, like legionaries and auxiliary cavalry also had attached *calones*. There is only one extant auxiliary infantry tombstone showing a servant along with a soldier.[327] There is no way of knowing if the proportions of combatants to non-combatants were the same as in the legions, but assuming they were, there would be approximately 120 non-combatants in an quingenarian cohort. Goldsworthy argues that Gallic auxiliary cavalry units may have retained the custom of each trooper having his own servant.[328] Since the cavalry were no longer aristocrats in the Imperial period, but rather professional soldiers, this is unlikely.

The personnel of the army and troop train most likely were organized into units, perhaps called *vexilla*, or *numeri*. Vegetius says that *pueri* in the train were organized in groups of 200 under a standard (*vexillum*), and led by a *galearius*.[329] An officer, such as a prefect or

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[324] Essin (1970) 55.
[325] See Roth (1994) 354–8.
[326] Polyb. 10.17.9–11; Front. *Aq.* 2.116.
[327] Wierschowski (1984) 65.
[328] Goldsworthy (1996) 72–3.
[329] Veg. *Epit.* 3.6. The *vexillarii* mentioned in several passages in Ps.-Hyginus hand-

tribune, probably was put in charge of the *impedimenta*, but we have no attestation of such an assignment.

Conclusion

The organization of the Roman army's transport reflected its professional nature. The individual Roman soldier—at least the legionary soldier—was trained to carry a considerable load on his person. While the amount he could and did carry is disputed by historians, the evidence suggests that Vegetius' figure—60 Roman pounds in addition to his equipment—ought to be taken seriously. This amount would have included rations. The *furca*, a bifurcated pole balanced on the soldier's shield, which itself was slung over the back, and functioned like a modern pack, and efficiently distributed such heavy weights. A mule attached to each eight-man *contubernium* carried the unit's tent, mill and probably tools and extra rations. It is possible that two mules were assigned to the *contubernium*.

The Roman army utilized two types of trains. Troop trains were attached to legions, cohorts and other units and army trains supported a military force as a whole. Each legion took with it an estimated 1,400 mules; thousands of pack animals and hundreds of wagons accompanied the army as a whole. In addition to the troop and army trains, there were also officers' trains and siege trains. All of these trains needed drivers and support personnel. As a rule, the Roman army did not contain non-combatant support units.

Such duties, as well as other logistical tasks were carried out by professional military servants, probably employed by the army itself.

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book on the military camp ([Hyg.] *De mun. castr.* 5.1–9; 30.2) are taken by Rouland (1975) 37 and Welwei (1988) 83 to refer to these non-combatant personnel of the train. Petrikovits (1975) 47 agrees and citing [Hyg.] *De mun. castr.* 5.5–9: *Ad vallum, si fieri potest, ideo tendere non debent, quod legatus eorum pariter non sit et si casu ab hoste vallum interruptum fuerit, legio et legatus eorum per vexillarios factum esse contendit*, takes this to mean that the *vexillarii* are not under the command of the legionary legate, and that they should not be placed next to the camp wall as they are non-combatants. But as noted by Pitts & St. Joseph (1985) 169, the term is normally used to mean soldiers of a legionary *vexillatio* (cf. Vell. Pat. 2.110.6; Tac. *Hist.* 2.100). These *vexillarii* are legionary soldiers: Ps.-Hyginus is pointing out that their commander (*legatus*) is not of equal rank as the legionary legate, and that if a break-through were made in a sector of the wall guarded by these troops, they would bring shame on their mother legion.

While some support was rendered by private sutlers and requisi-
tioned civilian labor, this was an addendum to the professional sup-
port system. At least some of the Roman army's military servants
made up a paramilitary force, being armed and trained and pro-
viding defense for the train and camp, as well as an emergency
reserve force.

Having discussed the needs of the Roman army, and its train, we
now turn to how these needs were met. Some supplies were drawn
from the area in which the army operated—through foraging, requi-
sition and pillaging—as will be discussed in the next chapter.

CHAPTER THREE

FORAGE, REQUISITION AND PILLAGE

Introduction

A student of military history might think of foraging as simply "liv-ing off the land," but this expression is misleading in its implied sim-plicity. Supplying an army by foraging, even in a fertile area, requires a great deal of organization and planning, as well as technical knowl-edge.[1] Indeed, foraging, though an important element in ancient logistics, was only rarely used to completely support an army, and then only because of duress or negligence. As Bernard Bachrach noted in his study of medieval logistics: "to rely as a matter of long-term strategy planning on success at foraging is a prescription for military disaster."[2]

Requisition and plunder can be considered variants of, or perhaps better sub-categories of, foraging. They all differ in certain ways, although the boundaries between them are often indistinct. Foraging usually has the army sending out units of soldiers assigned to return with specific items, usually in enemy territory. Requisitioning involves obtaining supplies from at least ostensibly friendly authorities or indi-viduals. The contributors often bring such requisitioned supplies to the army, unlike foraging, in which the army goes to the supplies. Plundering, a popular military pasttime throughout history, normally means both the destruction of, as well as the seizing of provisions, and of course other property. Historically it has normally been done by individual soldiers, usually in an unorganized fashion. The Roman army, with characteristic discipline, required that such plunder be turned into the military authorities, who then redistributed it.[3] Although plundering might superficially resemble foraging (particularly from the point of view of the individual whose property was seized), it differs

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[1] Perjés (1970) 18; van Creveld (1977) 37; Lynn (1993) 15–9; Kissel (1995) 11.
[2] Bachrach (1993) 715.
[3] Shatzman (1972); cf. Ziolkowski (1993). See the discussion below pp. 148–9.

from the military's perspective. Each method of collection will be considered in turn.

Foraging

In a strict sense, the English word "foraging" refers only to the gathering of fodder for animals. It is also used more broadly, however, to refer to the regular collection of specific provisions by groups of soldiers from the immediate area of operations.[4] The Romans distinguished various types of foraging depending on its object. The first century B.C. historian Quintus Claudius Quadrigarius noted the technical Latin terms *lignari* (to gather firewood), *pabulari* (to obtain fodder) and *aquari* (to fetch water), used for various types of foraging.[5] These expressions, with the addition of *frumentari* (to collect grain) are all present in Caesar,[6] and other writers on military subjects use them as well.[7] Greeks, when describing the Roman army, often use terms which translate this technical Latin military vocabulary: *xuleia* is equivalent to *lignatio, episitismos, sitologia* and *sitagoga* render *frumentatio, hudreia* translates *aquatio*, and *chortologia* means *pabulatio*.[8] In order to understand the Roman logistical system properly, one must carefully distinguish these various types of foraging.

Under ancient conditions, fodder, water, and firewood would normally be obtained locally, because of the large amounts needed and problems of transport. Quadrigarius, in another fragment, makes this point: an army ought to have fodder, water and firewood available locally.[9] One hears, however, of some exceptions to this rule, in particular for desert campaigns, during which even water and fodder had to be transported.[10] In contrast to the collection of food (discussed below pp. 130ff.), foraging for water, firewood and fodder was done frequently.[11] In a stationary army foraging parties went out just

[4] Perjés (1970) 17.
[5] Cited in Gell. *NA* 17.2.9; see the discussion of *ligna* and *materia*, Chapter 1, pp. 60–1.
[6] For the numerous citations from Caesar, see Labisch (1975) 62–3.
[7] Sall. *Iug.* 93.2; Livy 25.34.3; 31.36.5; 31.42.2; 33.7.9; 40.25.4; 40.30.9; 91.18 frag. ex cod. vat.; Front. *Strat.* 1.1.7; 2.13.6; 3.2.9; 3.9.3; Tac. *Ann.* 1.35; 12.38.
[8] Polyb. 18.22.1; 21.39.12; Jos. *BJ.* 3.85–6; App. *Pun.* 14,99; *Mith.* 5,32; 15,99; *BCiv.* 1.14,109; 4.14,107; Dio Cass. 49.27.2.
[9] Quadrigarius, *Ann.* 2.36 (= HRR 1².218).
[10] van Creveld (1989) 47–8.
[11] Aul. Hirt. *BGall.* 8.10.3.

before dawn to collect fodder and firewood.[12] An army moving into a new camp would set up and then send out foraging parties to get fodder and wood while it was still light.[13] If practical, foraging parties would try to combine *frumentationes, pabulationes, lignationes* and *aquatores* into one operation.[14]

Foraging for Water (Aquatio)

The most basic need of the Roman army, like any army, was not food or fodder, but water. The needs of men and animals had to be provided daily and in enormous amounts; obtaining sufficient water for the army was a major logistical problem. Each and every member of the army required a minimum of two liters of water per man per day,[15] in addition to the two liters a day consumed through food and absorbed by breathing air.[16] Horses, pack- and draft-animals can require 15–30 liters of water a day.[17] For an army of 40,000, this represents a daily need in excess of 80,000 liters (21,000 gallons) of water for the men and an additional 600,000 liters (158,000 gallons) of water for the animals. A large force might more water than could be provided by a single spring,[18] but under normal circumstances natural water sources, such as creeks or pools would suffice.

If insufficient water were available, the army's animals would soon be rendered useless and in a matter of days, the troops themselves would be in danger of death. The pathos of soldiers dying of thirst was an attractive theme to historians,[19] but this is no mere *topos*. The lack of water, a serious threat, could quickly cripple an army. Appian portrayed the soldiers of Octavian's general Cornificius as unable to resist the enemy's attacks during the campaign against Sextus Pompeius (36 B.C.) because of thirst and heat exhaustion. They were saved when an enemy force guarding the only local spring was driven off by reinforcements.[20]

Water supply is weather-dependent; in the Mediterranean region

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[12] Livy 25.39.8.
[13] Caes. *BCiv.* 1.80; Livy 44.20.2; Front. *Strat.* 2.13.6.
[14] App. *Pun.* 14,99.
[15] Atkinson & Morgan (1987) 101; Engels (1978) 125.
[16] U.S. Army (1961) 6.
[17] See Chapter 1, pp. 62–7.
[18] Tac. *Ann.* 4.49 (in this case a barbarian army).
[19] Caes. *BCiv.* 1.84; Tac. *Ann.* 4.49; Dio Cass. 37.3.6; App. *BCiv.* 2.7,45.
[20] App. *BCiv.* 5.12,114; Dio Cass. 49.6.1–6.

even springs dry up during the summer months, exactly when the need for water was greatest.[21] Lack of springs or rivers forced armies to dig wells—an exhausting job which further reduced the troops' military efficacy.[22] Interestingly enough, Appian considered water drawn from freshly-dug wells to be superior to that from rivers.[23] When operating in the Meseta during a hot Spanish summer, however the wells Scipio Aemilianus dug yielded only bitter water. Although Scipio saved all of his soldiers, he lost a number of horses and pack animals to thirst.[24] Excessive heat was not the only cause for lack of water, excessive cold could produce the same effect. When campaigning in the mountains of Armenia in the fall of 69 B.C., Lucullus's cavalry had difficulty watering their horses in rivers thick with ice.[25] Of course, at times an army was forced to cross regions with little or no water for tactical or strategic reasons.[26]

The availability of water was a vital factor in picking a campsite, for not only was the quantity of water important, but also its proximity and the ability to secure it from the enemy.[27] Properly placing a large army so that it would have sufficient access to local water supplies took experience and technical skill. Tacitus criticizes the incompetence of the Othonian commanders (69 A.D.), which led to a lack of water "in spite of the fact that it was spring and there were many rivers about them."[28] Frontinus mentions a case in which, during the campaign against the Cimbri in 101 B.C., Gaius Marius's surveyors (*metatores*) mistakenly placed his camp where the enemy controlled the water-supply.[29]

It is obvious that a camp ought not be built directly over streams or rivers, as these would breach its walls and compromise its security. Usually, therefore, it was necessary to send men outside the camp to gather water. The descriptions of various campaigns mention these water carriers (in Latin *aquatores or utrarii*; in Greek *hudreu-*

[21] Caes. *BCiv.* 3.49; Veg. *Epit.* 3.8.
[22] App. *Pun.* 7,40; Livy 44.33.1; Plut. *Aem. Paul.* 14.1.
[23] App. *BCiv.* 4.14,110.
[24] App. *Hisp.* 14,88.
[25] Plut. *Luc.* 32.1.
[26] App. *BCiv.* 4.13,103.
[27] Polyb. 6.27.3; Livy 35.28.6; Sall. *Iug.* 98.3; Caes. *BCiv.* 2.37; Veg. *Epit.* 3.6, 8.
[28] Tac. *Hist.* 2.39.
[29] Front. *Strat.* 2.7.12.

menoi).[30] Livy discusses the problem of access to sources of water for the *aquatores* when describing the Roman camps at Cannae in 216 B.C.:

> The river Aufidus, flowing past both their camps, was readily accessible to water-carriers (*aquatores*) at such spots as were convenient for each, though not without fighting; it was, however, from the smaller camp, which was situated across the Aufidus, that the Romans could fetch water (*aquabantur*) more freely, since the enemy had no troops posted on the further bank.[31]

Whether these *aquatores* were soldiers or military slaves is problematic. When describing how Hannibal sent Numidian horsemen to attack a group of water-carriers, Livy called the latter "an unorganized rabble" (*incondita turba*).[32] The 4th century lexicographer Nonius Marcellus says that *lixae* carried water to the camp.[33] On the other hand, when Philip V attacked the Aetolians during the 2nd Macedonian War (200–196 B.C.), Livy notes that only "two or three men from each company" were sent to obtain water for their comrades.[34] Given the level of discipline in logistical matters, it is not surprising that Roman soldiers drank water brought to them in the camp by water-carriers (*utrarii*), rather than roaming down individually to rivers or springs.[35]

Sometimes for tactical reasons camps had to be built far from water sources, and water-carriers had to travel long distances.[36] Dio Cassius reports that when the Romans faced problems with their water supply at Jerusalem in 70 they employed water carriers (*hudreumenoi*), presumably to carry water for long distances.[37] Such water carriers must also have been employed at desert sieges such as Masada (73) and Hatra (117, 198), with no local water supplies, although they are not directly attested.[38] During sieges, defenders also faced a shortage of water. Fortresses were generally placed where natural water sources were available, but if not, then elaborate cisterns and other hydraulic works might be constructed, as was the

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[30] Caes. *BCiv.* 1.73; [Caes.] *BHisp.* 21; Plut. *Sert.* 7.3.
[31] Livy 22.44.2–3.
[32] Livy 22.45.3.
[33] Non. (ed. Lindsay) 48.17; 62.6.
[34] Livy 31.42.4.
[35] Livy 44.33.1.
[36] Caes. *BCiv.* 1.81; [Caes.] *BAfr.* 51.
[37] Dio Cass. 65.4.5.
[38] Jos. *BJ* 7.277; Dio Cass. 69.31.4.

case with Herod's well-known fortress at Masada.[39] Water was often stored in anticipation of a siege, particularly in forts.[40] No fortified place could hold out without sufficient water; Vegetius devotes an entire chapter to suggestions on how to obtain and store water during a siege.[41]

When moving, the army moved water and other liquids in leather bags (*cullei*) or waterskins/bottles (Latin *utres*, Greek *askoi*)[42] and in wooden barrels/vessels (*vasa*).[43] A series of ostraka from Egypt's Eastern Desert record the use of waterskins in very large numbers by the military. One such ostrakon evidences the importance of oil, which was used to prevent cracking and decrease porosity.[44] Skins used to carry water, or wine, deteriorate rapidly and are easily broken, particularly in transit.[45] This explains why Caecilius Metellus, loading his pack animals with water for march through the desert to Thala in Numidia (in 108 B.C.) preferred wooden containers (*vasa*) to skins, and why Gaius Marius, preparing a march on Capsa in Numidia the next year, had new waterskins (*utres*) produced by the troops.[46] In battle, of course, a thirsty soldier refreshed himself as best he could, sometimes using his helmets as a handy vessel.[47]

Our sources record several occasions in which the Roman army received its water supply directly from rain-water. The careful preparations made by Caecilius Metellus to bring a supply of water with him over the Numidian desert turned out to be unnecessary. As Sallust reports:

> . . . suddenly such an abundance of rain is said to have fallen . . . that this alone furnished the army with water enough and to spare . . . religious motives led the soldiers to prefer the rain water [to the water brought with the army] and its fall added greatly to their spirits; for they thought that they enjoyed the favor of the immortal gods.[48]

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[39] Netzer (1991) 644–6.
[40] Caes. *BCiv.* 3.12.
[41] Veg. *Epit.* 4.10.
[42] Plin. *HN* 7.82; Sall. *Iug.* 75.3; 91.1; cf. Plut. *Alex.* 42.7.
[43] Such barrels are illustrated on Trajan's column, scenes II, LXI, LXII = Lepper & Frere (1988) plates V, VI, XLII, XLIII.
[44] Daniel (1994) 61–66.
[45] Matt. 9:17; Mark 2:22; Luke 5:37–8; Daniel (1994) 66.
[46] Sall. *Iug.* 75.4; 91.1.
[47] Plut. *Brut.* 51.2–3; *Ant.* 47.3.
[48] Sall. *Iug.* 75.7–9.

The Romans were superstitious, and the soldiers and officers of their army no less so. Dio Cassius, a firm believer in the supernatural, describes two cases of magic being used to induce rainfall. The first was during Gnaeus Hostidius Geta's campaign against the Moors in 42 A.D.:

> While Geta . . . was in a quandary as to what he should do, one of the natives . . . persuaded him to try some incantations and enchantments, telling him that as the result of such rites abundant water had often given to his people. No sooner had Geta followed his advice than so much rain fell from the sky as to allay the soldiers' thirst completely and at the same time to alarm the enemy, who thought that Heaven was coming to the assistance of the Romans.[49]

The second incident occurred during the Marcomannic War (168–75 A.D.): Dio Cassius credits an Egyptian magician named Arnuphis with bringing on a sudden rainstorm that saved the Roman army from disaster.[50]

In an arid region water sources are limited and are thus particularly vulnerable to tampering. During the Second Punic War, Hannibal is said to have thrown dead bodies into a brook upstream from the Roman position in order to contaminate their water supply.[51] Similarly, when the Caesarian general Curio invaded Africa in 49 B.C., the local inhabitants, supporters of Pompey, poisoned the wells near his camp, probably by placing dead animals in them. This cause widespread illness among the Caesarian soldiers.[52] Water, however, did not have to be deliberately poisoned in order to cause disease: Tacitus says that when the Vitellian army occupied Rome in 69 A.D. the troops suffered illness because they drank from the polluted Tiber river.[53]

Foraging for Wood (Lignatio)

Like all pre-modern armies, the Romans needed a constant supply of firewood both to prepare meals and to provide warmth and light at night.[54] The lack of firewood was very serious, as Roman soldiers

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[49] Dio Cass. 60.9.2–4.
[50] Dio Cass. 72.10.3–4.
[51] Zon. 9.1.
[52] App. *BCiv.* 2.7,44; cf. Sall. *Iug.* 55.8.
[53] Tac. *Hist.* 2.93.
[54] Kissel (1995) 207–208.

Particularly in the case of sieges, armies often obtained wood by breaking up abandoned houses.[65]

When possible, wood-gatherers (*lignatores*) operated in the immediate vicinity of the camp for security purposes.[66] In a relatively barren area, however, wood-gatherers might have to travel a considerable distance to collect sufficient quantities.[67] In contrasting the favorable position of Brutus and Cassius's camp at Philippi (42 B.C.) with that of Octavian and Antony, Appian says that the former drew their firewood from the slopes of Mount Pangaeus, while the latter had to use wood from a local marsh.[68]

Foraging for Fodder (Pabulatio)

Fodder (*pabulum*) was, in terms of weight, the largest requirement of any pre-industrial army; even as late as the American Civil War, daily forage requirements were three times as great in tonnage as subsistence requirements.[69] There are two types of fodder: the first is rough fodder (also called green fodder), such as grasses and hay. This could be in the form of fodder cut or mown from the fields, or grazed by the animals themselves. Most of the fodder used by the army, in terms of bulk, was in the form of rough fodder.[70] The second is hard or dry fodder, such as barley and oats.[71] The Romans, however, also issued dry fodder, mainly in the form of barley, to cavalry horses. Polybius mentions barley being issued to cavalrymen in the Republican period,[72] and papyri from Egypt and Judaea refer to the same practice under the Empire.[73] Since the amount of barley attested in these sources appears too great for a single horse alone, it was probably also meant to feed the cavalry's baggage animals. As noted in the discussion of the nutritional requirements of animals, a certain proportion of dry fodder was needed to maintain the health of horses and mules (see pp. 64−5), and this was particularly important for cavalry mounts.[74] In addition, one could feed

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[65] Livy 36.22.11.
[66] Livy 35.28.6; [Caes.] *BAfr.* 31.
[67] Caes. *BCiv.* 3.76.
[68] App. *BCiv.* 4.14,107.
[69] Huston (1966) 219.
[70] Lynn (1993) 19.
[71] Labisch (1975) 62.
[72] Polyb. 6.39.14−15.
[73] *P. Gen. Lat.* 1 *recto*, pt. 1, ii.5; *Mas. Doc.* 722.6, 13; *SB* 9202.
[74] Hyland (1990) 86.

donkeys and mules, but not, as a rule, horses, on what might be called "alternative fodder," including branches and thistles.[75]

The army's need for fodder was normally satisfied by either foraging (*pabulatio*) or requisitions made on the spot; usually the entire army's requirements could be collected in a few hours.[76] Caesar states that foraging for fodder was normally done daily (*cotidiana consuetudine*).[77] Of course, like so many daily tasks of the Roman army, foraging for fodder was generally attested in the literary sources only when some unusual event was connected with it.[78] For example, Sallust remarks that the consul Albinus kept his army in a permanent camp, changing it only except when the stench or the need for fodder made it necessary.[79] Indeed, an army would quickly use up local fodder if it did not move. This is why, at the siege of Alesia (52 B.C.), Caesar ordered thirty days' fodder collected beforehand.[80]

As a rule, for convenience, armies collected fodder in the vicinity of the camp, and brought it inside on the backs of pack animals.[81] Due to the danger of enemy patrols, foragers generally operated to the rear of its camp.[82] Though, for these reasons an army would try to gather fodder as close to camp as was feasible, this was not always possible. Frontinus notes a case during Pompey's campaign against Sertorius in 73 B.C., in which there were only two areas (*regiones*) from which fodder could be gathered, one close to and one far away from camp. By harassing the foragers in the nearer area and ignoring the farther one, Sertorius lured Pompey's *pabulatores* to the latter, where they were ambushed.[83]

Armies commonly gathered fodder, in the right season, by mowing hay or grain from the fields. Appian mentions mowing in the context of the siege of Numantia in 134−3 B.C.:

> [Scipio Aemilianus] foraged through all the fields behind his camp and cut down the still unripe grain.[84]

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[75] Olck (1907) 639; White (1970) 293–4; Dent (1972) 165. Cf. Varro *RR* 1.20.4; 2.8.2; Plin. *HN* 8.169; 25.94; [Luc.] *Luc.* 27.

[76] Perjés (1970) 10; Lynn (1993) 16.

[77] Caes. *BCiv.* 1.40.3. See also Caes. *BGall.* 7.14; Aul. Hirt. *BGall.* 8.10.4; Plut. *Ant.* 46.1.

[78] Labisch (1975) 64.

[79] Sall. *Iug.* 44.4−5.

[80] Aul. Hirt. *BGall.* 8.74.2.

[81] Plut. *Aem. Paul.* 18.1; Livy 41.3.6.

[82] Livy 40.30.9.

[83] Front. *Strat.* 2.5.31. See App. *BCiv.* 1.14,109.

[84] App. *Hisp.* 14,87.

The specific reference to unripe grain shows that this is being collected as fodder for the horses, and not as food for the soldiers. Appian also mentions other instances in which crops were harvested by foraging parties.[85] The soldiers illustrated cutting grain on Trajan's column may well have been collecting it for fodder,[86] and an inscription refers to a detachment (*vexillatio*) sent out to make hay.[87] Seventeenth century military manuals estimated that two men could mow a hectare in a day,[88] but in practice large numbers of men would take part in the mowing to reduce the time the foragers in the field were vulnerable to attack. Caesar notes that when it was not possible for an army to collect fodder by mowing, it requisitioned supplies of *pabulum* from the stocks of local farmers. This suggests that the former was normal, the latter an exigency.[89]

Appian describes a foraging party of Scipio Aemilianus in the Third Punic War, in which "those harvesting" were surrounded by infantry and cavalry, and straggling harvesters were punished severely.[90] This implies that the harvesters were non-combatants, but the passage is by no means unambiguous. On the other hand, during the Armenian War of 69 B.C., Tigranes is said to have "attacked the Roman foragers (*sitologoi*) and was beaten."[91] This in turn suggests that the foragers in question were soldiers, but Appian may be lumping the foragers together with its guard. A passage in Livy is a bit more straightforward: he describes the foraging parties sent out by Fabius Maximus during the Second Punic War:

> He would keep his men in camp, except . . . when they went out for fodder (*pabulum*) and firewood (*ligna*), they were neither few in number nor dispersed; a guard (*statio*) of cavalry and light infantry (*levis armatura*), drawn up and ready for sudden onsets, made everything safe for his own men and dangerous for the scattered pillagers of the enemy.[92]

It is clear that in this case, at least, it is soldiers (*milites*) doing both the collection and providing security. Livy, however, also mentions

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[85] App. *Pun.* 14,99; *Mac.* 9,13.
[86] Scene CX [= Lepper & Frere (1988) plate LXXXI].
[87] *CIL* 8.4322 = 18527.
[88] Perjés (1970) 17.
[89] Caes. *BGall.* 7.14.4; see also Aul. Hirt. *BGall.* 8.3.2.
[90] App. *Pun.* 14,99.
[91] App. *Mith.* 13,87.
[92] Livy 22.12.8–9; cf. Aul. Hirt. *BGall.* 8.17.3.

two slaves who were captured "among the foragers" (*inter pabulatores*); both belonged to cavalrymen (or knights—*equites*), and so they might be personal servants.[93] While our literary sources leave some ambiguity, the illustrations on Trajan's column trips the scale towards soldiers doing the actual foraging work.

Not all the army's fodder needs had to be provided by foraging or requisition. Grazing provided fodder for both baggage animals and cavalry horses even during peacetime. A number of inscriptions from the Imperial period refer to the *prata*, or pastureland, of various legions and garrisons.[94] Under wartime conditions, pasturage took on special importance and the Roman campaigning season often began, as Livy notes, "as soon as there was an abundance of pasture in the fields."[95] During the siege of Jerusalem in 70 A.D., the Roman cavalry let their horses graze while they collected wood or fodder, and Appian notes that the hardy Numidan ponies "never even taste grain; they feed on grass alone."[96] Vegetius also refers to this practice.[97] Grazing significantly reduces the amount of fodder an army needs to acquire by foraging, requisition or transportation, since surrounding pastures and grasslands become direct sources of supply.[98]

According to calculations in early modern military manuals, one hectare (2.47 acres) of pasture could support 130 horses for one day, although Perjés claims that in practice one hectare could provide for only 70 horses due to the trampling of fields.[99] Since, in the Roman army, most animals would have been donkeys or mules, needing less fodder than horses, a figure of 100 animals per hectare is reasonable. Thus, every 10,000 animals of the army train needed about 100 hectares (247 acres or .38 sq. mile). Theoretically, as long as sufficient pasture land was available and an army kept moving, its animals could be fed solely from grazing. Such ideal conditions, of course, usually did not obtain: one reason that ancient armies found

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[93] Livy 22.42.11.
[94] *ILS* 2454, 2455, 2456; Vittinghof (1974) 109–24; Le Bohec (1994) 219–20; Hyland (1990) 91.
[95] Livy 27.12.7.
[96] Jos. *BJ* 6.153; App. *Pun.* 2,11.
[97] Veg. *Epit.* 3.6.
[98] U.S. Army (1916) 484.
[99] Perjés (1970) 17. Van Creveld (1977) 34 further reduces the figure to around twenty horses per hectare, but does not explain his reasons.

it necessary to go into winter quarters was the lack of fodder during that season.[100] The winter resources of peasants in antiquity were often so inadequate that they had difficulty in maintaining their own animals, let alone those of a passing army.[101]

The availability of fodder was affected by environmental factors, such as snow, frosts, floods and storms, as well as by enemy action, such as a "scorched earth" policy.[102] Natural disasters might also affect the ability to graze: in the Parthian War of 54–63 A.D., a plague of locusts so devastated the countryside that the Parthian cavalry could not operate due to lack of fodder.[103] In general, foraging was detrimental to the local economy: as part of the terms of a truce arranged in 181 B.C., the Ligurian Ingauni asked that the Romans refrain from gathering fodder and wood in the cultivated parts of their territory.[104]

If normal fodder, such as grasses, ran out, the situation required use of alternative foodstuffs: it was not usually possible in ancient conditions to transport overland quantities of fodder sufficient for the army.[105] When, in 46 B.C., Caesar's enemies confined his army to a small strip of African coastline, his troops, unable to obtain regular foodder, fed the pack animals on seaweed, washed in fresh water.[106] During the siege of Dyrrachium (48 B.C.), Caesar's forces cut off Pompey's access to forage, which led to a series of emergency measures:

> There was a great scarcity of fodder (*pabulum*), so much so that the Pompeians fed their horses on leaves stripped from trees and on ground-up roots of reeds, for they had used up the grain (*frumentum*) which had been sown inside the camp. They were forced to bring fodder (*pabulum*) a long distance by sea from Corcyra and Acarnania, augmenting their fodder with barley and by these methods keep their horses alive.[107]

Pompey had not stored fodder beforehand in camp and the army was unable to graze its horses or to gather fodder from around the

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[100] Hyland (1990) 92.
[101] Perjés (1970) 43.
[102] Bachrach (1993) 720.
[103] Tac. *Ann.* 15.5.
[104] Livy 40.25.4.
[105] Van Creveld (1989) 47.
[106] [Caes.] *BAfr.* 24.
[107] Caes. *BCiv.* 3.58.

camps. The emergency measures taken, in order of their exceptional
nature were: (1) feeding the horses on foliage and weeds, (2) using
grain (*frumentum*) normally used only for human consumption, and
(3) bringing in barley by sea (at great expense).[108]

The seasonal availability of fodder affected the timing of cam-
paigns; Roman generals show a keen awareness of the need to time
operations, even on a tactical level, to correspond to the availabil-
ity of fodder. In 215 B.C., when Q. Fabius Maximus was operat-
ing in Campania,

> . . . the consul moved his camp back again [to Suesulla] so that the
> Campanians might do their sowing. And he did not ravage the
> Campanian country until the growing grain (*herbae*) in the fields was
> tall enough to furnish fodder.[109]

Similarly, Caesar delayed an expedition against the Belgae in 57
B.C. until sufficient forage was available in the area of operations.[110]

Foraging for Grain and other Provisions (Frumentatio)

Frumentatio literally means the collection of grain, but in military usage
referred to the collection of all sorts of foodstuffs. This definition is
illustrated by an incident during the African War of 46 B.C., when
Caesar went out "on a foraging mission round the farmsteads (*fru-
mentatum circum villas*) and on his return brought back wheat, barley,
oil, wine and figs."[111] Although *frumentatio* and *pabulatio* are often men-
tioned together in military writing, particularly in Caesar,[112] they
were quite different in nature.[113] As noted above, collecting fodder,
water and firewood were daily tasks, indeed often a large number
of different foraging parties often operated outside the camp simul-
taneously: hauling water, searching for fodder, bringing back firewood
and so forth.[114] A *frumentatio*, on the other hand, was done only infre-
quently and required a large number of troops. Indeed, it was often
a major military operation, often supervised by a tribune.[115] In one

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[108] Labisch (1975) 64.
[109] Livy 23.48.1–2.
[110] Caes. *BGall.* 2.2.2; Lynn (1993) 12 and n. 3.
[111] [Caes.] *BAfr.* 67.
[112] Caes. *BGall.* 7.16.3, 64.2, 74.2; *BCiv.* 1.48; Aul. Hirt. *BGall.* 8.7.7, 10.1, 17.2;
[Caes.] *BAlex.* 61.6.
[113] Lynn (1993) 16.
[114] [Caes.] *BAfr.* 31.
[115] App. *Pun.* 14,99. See Chapter Seven, pp. 288–9.

frumentatio during the 3rd Macedonian War (172–67 B.C.), over 1,000 wagons were in use.[116] Another important difference is that although water, firewood and fodder can be used with little or no processing, most of the food obtained through foraging, particularly grain, must be prepared before it is cooked, much less eaten.[117]

Conducting a *frumentatio* sometimes involved obtaining foodstuffs directly from the fields. Usually, troops marched out in light order (*cum expedita manu*), carrying only their weapons and leaving their packs in camp.[118] This allowed them to move more quickly, and better defend themselves, and also freed up pack animals for use in carrying forage. A few years later, during Quinctius Flamininus's campaign against the Spartan tyrant Nabis in 195 B.C., the Romans:

> sent light cohorts (*expeditae cohortes*) to forage (*frumentatum*). The ripe grain was harvested and brought into camp; the unripe was trampled down and destroyed to prevent the enemy from enjoying it later.[119]

Livy gives a number of other examples of Roman soldiers reaping grain in the fields.[120] The practice continued into the imperial period. During Corbulo's operations in Armenia (in 58 A.D.), the Roman army, after suffering a severe lack of supplies, finally reached a fertile region and "cut down the crops" directly from the fields.[121]

The soldiers would have laid their weapons aside and mowed the grain with the sickles (*falces*) they carried with them, as is clearly illustrated on Trajan's Column.[122] Josephus says that each soldier carried a *drepanos*, a word that can mean either sickle or billhook.[123] Livy describes a *frumentatio* of Ampius's army during his raid into Boii territory in northern Italy in 201 B.C.:

> . . . choosing near the fortified town (*castra*) of Mutilum, a camp site (*locus*) suitable for reaping the crops (*demetenda frumenta*)—for the grain was now ripe—he set out without reconnoitering the neighborhood or establishing sufficiently strong posts (*stationes*) of armed men to protect

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[116] Livy 42.65.3.
[117] Lynn (1993) 19–20.
[118] [Caes.] *BAfr.* 9.
[119] Livy 34.26.8.
[120] Livy 31.36.7; 38.41.8; 42.64.2–3, 65.1.
[121] Tac. *Ann.* 14.24.
[122] Scene CX [=Lepper & Frere (1988) plate LXXXI].
[123] Jos. *BJ* 3.95. In a study of the soldier's equipment, Fuentes (1991) 74 says "perhaps it would be best to regard the *falx/drepanos* as an all-purpose lightweight cutting tool, akin to the billhook."

the unarmed parties (*inermes*) who were intent upon the work, and when the Gauls made an unexpected attack, he and his foragers (*frumentatores*) were surrounded.[124]

The Romans lost 7,000 men, an indication of the size of a foraging operation. Note also that in this case, the actual harvesting was done by "unarmed men" (*inermes*). This term (Latin *inermes* and its Greek counterpart *aoploi* or *anoploi*) is frequently used to describe non-combatant military servants,[125] but, as in the case of the *pabulatores*, this could also mean soldiers who have laid their weapons aside to mow the fields. Caesar refers explicitly to soldiers "grounding arms while engaged in reaping (*depositis armis in metendo occupatos*).[126] In all likelihood, then, the *frumentatio* was an operation normally carried out by soldiers. Foraging involved hard work for the soldiers, a point stressed by Appian.[127] It was reminiscent of the agricultural work which many soldiers had escaped by enlisting in the army, and there was certainly always some resentment among the rank and file in participating in foraging parties. Nevertheless, even the common soldier must have recognized its necessity.

It was far easier to collect provisions from civilian storage areas than to mow or harvest them. Dio Cassius, describing Antony's army foraging during the Parthian campaign of 36–3 B.C., says they went "out to the villages" not "into the fields."[128] When the Romans seized enemy towns or villages, they often took provisions from them. When the consul Q. Sulpicius Galba sent out soldiers to forage (*frumentatum*) during the 2nd Macedonian War (200–196 B.C.), Livy specifically says he did so "among the granaries (*horrea*) of the Dassaretii."[129] After the battle of Myonnesus in 190 B.C., Antiochus III negligently abandoned his base at Lysimacheia without removing or destroying the "great stores" of grain there—which were then captured by Scipio Asiaticus.[130]

Seventeenth-century European armies generally collected four or five days' provisions at a time, because to gather more was imprac-

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[124] Livy 31.2.7–8.
[125] Caes. *BGall.* 2.27.1; Livy 35.28.4; 41.2.7; Dio Cass. 56.20.5; Onas. *Strat.* 10.8.
[126] Caes. *BGall.* 4.32.5.
[127] App. *BCiv.* 2.10,66.
[128] Dio Cass. 49.27.2.
[129] Livy 31.22.6; cf. Polyb. 2.34.10.
[130] App. *Syr.* 5,28–9. Other examples: Plut. *Luc.* 30.2; Jos. *Vit.* 58; 118–120; *BJ* 4.509–13.

tical, due to preservation and transportation problems.[131] The Romans probably used a similar interval when foraging. Sometimes foraging parties might be sent considerable distances. Faced with a serious shortage of supplies at Philippi in 42 B.C., Antony and Octavian sent a legion all the way to Achaea "to collect all the food they could find and send it . . . in haste."[132] The distance involved is unclear, but it was certainly over 100 miles. Although this was an emergency measure, it is significant in indicating the distances over which foragers might operate.[133] Since local resources were quickly used up in sieges, unless supply lines had been established, foragers had to go considerable distances, as occurred during Antony's siege of Praaspa in Media Atropatene in 36 B.C.[134]

There were times in which farmers voluntarily supplied an army defending it. This is not technically requisition, but it is worth discussing here, particularly because its voluntary nature is sometimes questionable. Livy notes that Roman farmers contributed to the army of C. Claudius Nero, marching north to meet Hasdrubal's invading force:

> They vied with each other in invitations and offers and in importuning [the soldiers] to take from them in preference to others whatever would serve the men themselves and their pack animals (*iumenta*).[135]

In the winter of 65–64 B.C., Afranius's army returning from an invasion of Parthia, and suffering from a lack of supplies and unable to forage, was saved by provisions freely given by the Greek inhabitants of Carrhae.[136] As Tacitus points out, however, such "voluntary" contributions might be made through force or under duress. During Vitellius's revolt his soldiers:

> tried to find an excuse for war against the Aeduans; [but] when ordered to furnish money and arms, the Aeduans went so far as to provide the army with supplies (*commeatus*) without cost and what the Aeduans had done from fear, the people of Lugdunum did from joy.[137]

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[131] Perjés (1970) 19.
[132] App. *BCiv.* 4.16,122.
[133] Note than the same is true in peacetime. *BM* 2851 ("Hunt's Pridianum") [= Fink (1971) no. 64] refers to soldiers going from Moesia to Gaul (or Greece) to obtain grain and clothing.
[134] Dio Cass. 49.26.4.
[135] Livy 27.45.10.
[136] Dio Cass. 37.5.5.
[137] Tac. *Ann.* 1.64.

When Jugurtha wished to emphasize his intention not to resist
Metellus's invasion of Numidia in 109 B.C., he ordered his royal
officers to supply the incoming Roman army and provide transport,
as well as "to do everything they were ordered."[138]

Though requisitioning fulfilled a practical function—feeding the
soldiers—it could also have political ramifications, as usually a choice
was made on whom the burden would fall. For example, after his
victory in Sardinia in 215 B.C., Titus Manlius "exacted tribute and
grain in proportion to the resources of each [city] or its guilt.[139]
Sometimes questions of when and where to requisition could turn
on personal considerations. The threat of requisition was used by
Manlius Vulso to blackmail Moagetes, the tyrant of Cibyra in Galatia,
using the Roman army's power to pillage and devastate as a potent
weapon. As the army approached his territory Moagetes offered 25
talents of silver as a "contribution." Manlius, however, demanded
500 talents—an enormous sum. After some negotiation, Moagetes
finally paid 100 talents plus 10,000 *medimnoi* of wheat. Shortly there-
after, using the same tactics Manlius pried 50 talents and 40,000
medimnoi of grain from the Pisidians.[140] Similarly, when Caecilius
Metellus's invaded Numidia in 109 B.C.:

> He . . . marched into the most fertile parts of Numidia, laid waste the
> country captured and burned many strongholds and towns . . . ordered
> the death of all the adults and gave everything to his soldiers as booty.
> In this way he caused such terror that . . . grain and other necessities
> were furnished in abundance. . . .[141]

Dio Cassius, discussing the 3rd Mithridatic War (65–3 B.C.), says
that Pompey's army "received everything (other than water) by the
free gift of the natives, and for this reason they committed no depre-
dations."[142] Tacitus disapproved of the Vitellian general Valens tak-
ing bribes from landowners and magistrates not to camp nearby and
thus subjecting estates and cities to requisition.[143]

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[138] Sall. *Iug.* 46.5.
[139] Livy 23.41.6.
[140] Livy 38.14.14; 38.15.11–12.
[141] Sall. *Iug.* 54.9–10.
[142] Dio Cass. 37.3.6.
[143] Tac. *Hist.* 1.66.

Economic Factors in Foraging

The local availability of various types of supplies limited the extent to which the Romans could utilize resources. Not all areas were suitable for foraging, even fertile ones. Hannibal, relying on foraging due to the lack of a supply base, abandoned the Falernian district because:

> though a land of plenty for the present, it could not support him permanently, being taken up with orchards and vineyards, and planted everywhere with agreeable rather than necessary fruits.[144]

Under the Republic, Roman censuses counted only Roman citizens. After Augustus's time, the Imperial authorities conducted censuses throughout the Empire, so that the Romans had a fairly accurate idea of the regions over which they had political control.[145] On the other hand, it is questionable whether the military had access to such figures, or if they did, whether they connected these figures to the availability of local resources. The reports of travelers, and those found in the geographers, give some information as to the relative fertility of areas outside of the Roman Empire. This information, however, was necessarily vague and indeed often inaccurate.

Even with some knowledge of average crop yields, the Romans could not have always relied on the availability of enough food to support an army by foraging. Throughout the eastern Mediterranean, yields of major subsistence crops can fluctuate between 30 and 50 percent from year to year. For example, in Thessaly in the early 1900's wheat production went from surplus of 228.9 metric tons over subsistence needs one year to a deficit of 462.4 metric tons the next.[146] This fluctuation would have had a major impact on logistical planning, as the Romans had no method of forecasting what resources would be available in a region, in order to support it by foraging. Naturally, this was not a problem for relatively small forces, or in very fertile regions; but for a large army in an area of marginal production, a bad harvest meant that little or no surplus would be available for military use. Other factors, such as an infestation of

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[144] Livy 22.15.2–3.
[145] Kissel (1995) 113.
[146] Gallant (1989) 394–7.

insects or a blight, could have catastrophic affects on crops, and
dramatically affect military operations.[147]

Of course, the storage and transport of foodstuffs could balance
such fluctuations to some extent.[148] A study by Garnsey, Gallant and
Rathbone suggests that in a subsistence economy approximately 30
to 50 percent of the previous year's wheat crop would still be in
storage bins belonging to primary producers the following spring.
Even an individual household could keep a considerable amount of
stored grain.[149] The local storage of foodstuffs increases the army's
opportunity to forage, as it can seize this material relatively easily.
There are problems, however, with seizing stored food. Peasants often
hide such supplies (not surprisingly) in order to thwart foraging sol-
diers: this is the theme of the European folk-tale known as "Stone
Soup" or "Nail Soup," in which a clever soldier tricks peasants into
turning over their hidden stores. Defenders could move stored food
into cities, which then had to be taken by siege. This situation faced
Aulus Gabinius, operating in Illyricum in 47 B.C.: beset by both a
bad harvest and storms which prevented the importation of food,
Gabinius was forced to take enemy strongholds by siege.[150] Locals,
or the enemy army, might also destroy or poison foodstuffs.[151]

The time of year in which military operations commenced deter-
mined the amount and variety of food available to a foraging army.
In 216 B.C., Hannibal waited until "the season was advanced
enough . . . to get supplies from the year's crops" to move out of
winter quarters.[152] Sallust notes that Marius had difficulty foraging
during his Numidian campaign of 107 B.C. because "the fields were
dry and stripped of their crops at that season, for it was the end of
summer."[153] Due to varying harvesting dates in different regions,
crops become accessible at different times. According to Greek sources,

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[147] Tac. *Ann.* 15.5.
[148] Borowski (1987) 71–83.
[149] Gallant (1989) 401. The capacity of excavated storage bins from one house
in Olynthos in northern Greece was 625–695 kg. Assuming a household of five
persons consuming on average 175 kg./person/year, the annual consumption needs
were 875 kg./year. Thus the household's permanent storage facilities would hold
enough for nine or ten months.
[150] [Caes.] *BAlex.* 43.
[151] Polyb. 18.20.2; Sall. *Iug.* 55.8.
[152] Polyb. 3.107.1.
[153] Sall. *Iug.* 90.1.

farmers sowed most of their grains in autumn, between October 20 and November 25; harvesting began in Greece in the middle of May and in southern Italy in late May.[154] In the eastern Mediterranean, farmers planted wheat and barley in November and December, harvested barley in April and wheat in May.[155] The Egyptian harvest took place during the months Pharmouthi and Pachon (March 27 to May 25).[156] A fast-growing "three-month wheat" was sown in the spring, sometime in early March,[157] and harvested in May or June; barley, millet, and panic could also be sown in the spring. Spring sowing had the advantage of furnishing a rapid early crop on fallow land, but could be used only on land rich enough to carry a crop every year.[158] In the eastern Mediterranean, grapes were picked through the summer, from June through September although sometimes as late as October. Legumes, such as lentils, peas and vetch were harvested in April and May, chickpeas as late as June; figs gathered in August and September, and olives between September and November.[159] The amount of food in a region would be steadily reduced, both by the consumption of the population and the army, as well as the destruction which naturally accompany military operations.[160]

A good commander tried to time the beginning of his campaign to correspond to the local ripening of grain. The ancients were well aware that different climates resulted in earlier, or later, harvests.[161] The calculations, however, of even the best ancient commanders as to the availability of crops were not always accurate: Licinius Lucullus was surprised to find that on entering the Taurus mountains, the grain in the fields was still unripe, although it was the height of summer.[162] Collection from the field was possible, of course, only in the short period between the ripening of the crops and the harvest.

It is theoretically possible for the modern researcher to calculate the resources available to a foraging army in a particular area.[163] In

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[154] White (1970) 173.

[155] Borowski (1987) 34, 36.

[156] Kissel (1995) 278.

[157] Mishnah *Menahoth* 8:2: sown forty days before Passover. This wheat was called *trimestre triticum* in Latin (Isid. *Etym.* 17.3.8). This "early" and "Syrian" wheat is attested in *P. Lond.* 2.256(a) (15 A.D.) and Tosefta *Menahoth* 9:2–3.

[158] White (1970) 180; Applebaum (1976) 650, 653.

[159] Borowski (1987) 37; personal correspondence from Israel Shatzman.

[160] Perjés (1970) 6.

[161] Livy 22.42.5.

[162] Plut. *Luc.* 30.1.

[163] Perjés (1970) 3–4; Bagnall (1985) 306; Le Roux (1994) 408ff.

practice, however, this is virtually never the case, as the relevant information is simply not available. One can, however, make some general estimates, given a number of constraints. First, one does not know the variability in, and the extent of, productivity within a given region and from farm to farm. Cultivable areas are generally pockets of agriculture, separated by uncultivated shrub or forested areas. Though one could use modern estimates of the cultivated areas of various regions in an attempt to establish general parameters of crop yields, one cannot reliably establish the percentage of land under cultivation or the percentage of cultivated land lying fallow in any particular region in any particularly time.[164] In addition, of course, not all agricultural land was devoted to wheat, and one does not know the proportion planted in other crops. The matter is further complicated by the fact that various crops give different yields per hectare, and others, olive trees, for example, bear fruit only in alternate years.[165] Another factor in the question of surplus production is the percentage of the population engaged in non-agricultural work or who lived off others' agricultural production through the extraction of rent, taxes or gifts. Given the variables in estimating agricultural production and surplus, one can only make general statements about a region being relatively fertile, or relatively poor agriculturally. One can make absolute statements about the availability of resources only in exceptional cases, for example, the complete lack of local agriculture in desert regions.

The most fruitful approach to calculating foraging needs utilizes the close correlation between the population density and the resources of a particular area: obviously an army could count on more food in a densely populated area than in a thinly populated one.[166] According to 19th-century calculations cited by Perjés, an army could operate without magazines only in areas whose population is over 35 persons per square kilometer (90 persons per square mile) and a given area could supply an army three or four times its own population for a few days.[167] Van Creveld estimated that in 17th-century Europe an army of 40,000 could be fed in a region with a

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[164] White (1970) 112–3, 118.
[165] White (1970) 227.
[166] Van Creveld (1989) 46.
[167] Perjés (1970) 4.

population density of around 18 persons per square kilometer (46 per square mile), again as long as it kept on the move.[168] Clearly, there are problems in applying these modern figures to ancient conditions: there are differences in agricultural production, local consumption and the needs of the army. In summary, there are many factors influencing agricultural production, and the calculation of logistical need is further complicated by the question of consumption rates in antiquity.[169]

Times of famine aside, any crop yield must at least have sufficed to support a subsistence farmer's family for a year. The harvest in the eastern Mediterranean was normally between March and May, around the time that the campaign season began, so that the consumption of agricultural produce would have affected the ability to forage only in areas of very low population density.[170] Following the estimates given above, an area with a density over the range of 18–35 persons per square kilometer (46–69 per sq. mile) could have supported a Roman army of 40,000 by foraging, and one with a figure under it could not.[171] Of course, estimating ancient population densities is almost as difficult as calculating harvest yields.

Military operations tend to decrease agricultural production by their very nature. Polybius notes that an army's destruction, particularly of trees and farm structures, could have a long-term effect on agriculture,[172] and the author of the Alexandrian War describes Illyricum as "exhausted and wasted" (*confecta et vastata*) by war.[173] Such descriptions might be considered rhetorical, but warfare does takes farm workers out of a region. Peasants often flee or are impressed by the army as drivers, porters or laborers and the lack of labor adversely affects planting or harvest. In 46 B.C., Caesar had to import grain into Africa, in part because:

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[168] Van Creveld (1977) 34. For a criticism of his calculations, see Lynn (1993).

[169] For which see Foxhall & Forbes (1982) *passim*.

[170] Perjés (1970) 6.

[171] There are some exceptions to this rule. Urban areas with large populations due to factors other than high agricultural production (such as Jerusalem, Antioch or Rome) would have had difficulty supporting large forces, even for short periods, on local production alone. In addition, an army staying in one place would quickly use up an area's resources.

[172] Polyb. 23.15.1.

[173] [Caes.] *BAlex.* 42.

... there had been no harvest the previous year on account of the
levies held by his opponents and the fact that the farmers, being trib-
utary subjects of Rome, had been called up for military service.[174]

Appian refers to Italian agriculture "ruined by the [civil] wars"[175]
and there are other references to land lying unsown due to pro-
tracted fighting.[176]

Army Discipline and Foraging

In general, the Romans maintained a high level of discipline in their
armies. Military training and culture instilled such discipline in the
soldiers.[177] Maintaining discipline was of the utmost importance dur-
ing foraging operations.[178] Covering troops not only protected for-
agers from the enemy, but also monitored their activity. Undisciplined
troops were very vulnerable to attack and destruction while forag-
ing. It was for this reason that Scipio Aemilianus, serving as mili-
tary tribune under Manilius at the siege of Carthage in 149 B.C.,
maintained strict discipline during foraging operations:

> Scipio always kept his foot soldiers in line and his horsemen on horse-
> back and in foraging never broke ranks until he had encircled the field
> where his harvesters were to work with cavalry and infantry. He then,
> in person, rode unceasingly round the circle with other squadrons of
> horse, and if any of the harvesters straggled away or passed outside
> of the circle, he punished them severely.[179]

As commander of the Roman forces in Spain in 134 B.C., Scipio
Aemilianus disciplined the notoriously lax Roman army there. Many
of his measures involved lapses of logistical discipline.: he banned
individual foraging, strictly regulated diet and eliminated superfluous
pack-animals and wagons. Apparently, things had gotten so bad that
soldiers were riding mules rather than marching.[180]

An undisciplined force could be a major military liability, as is
evidenced by several examples. The Pontic commander Archelaus

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[174] [Caes.] *BAfr.* 20.
[175] App. *BCiv.* 5.3,18.
[176] App. *Pun.* 6,36; Tac. *Ann.* 14.38.
[177] Horsmann (1991) 187–192.
[178] Lynn (1993) 18–9.
[179] App. *Pun.* 14,100.
[180] App. *Hisp.* 14,85.

greatly outnumbered Sulla during the Greek campaign of 88–86 B.C., but as Plutarch notes, the lack of discipline in Archelaus's army, which scattered widely in unauthorized foraging and pillaging, contributed to Sulla's victory.[181] When Pompey the Great was fighting the Younger Marius in Africa in 81 B.C., he was unable to prevent his army from digging after rumored Carthaginian buried treasures, and had to wait "many days" until they tired of the search.[182]

In contrast, Caesar's ability to live off the land in Gaul was due in large part to his army's discipline.[183] Josephus notes that discipline was an important element in Roman army logistical operations:

> All their fatigue duties are performed with the same discipline, the same regard for security: the procuring of wood, food-supplies, and water, as required—each party has its allotted task.[184]

It is noteworthy that Josephus, when in command of rebel forces in Galilee that were neither disciplined nor particularly loyal (at least to him), found it necessary to take his entire army along on a foraging expedition.[185]

Requisition

Requisition generally involved either an involuntary seizure (Latin *postulatio*, Greek *angaria*) or forced purchase (*frumentum emptum* or *coemptio*).[186] It was in antiquity, and remains today, a staple of military logistics.[187] Under the Roman Republic, the *imperium* bestowed on a commander by law gave him the right to compel civilians to support the army.[188] While at times indistinguishable from foraging, one characteristic of requisitioning is that, rather than sending out his troops, a commander might issue orders to local inhabitants to bring supplies to his camp. In such cases, supplies seem to have been

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[181] Plut. *Sulla* 16.4.
[182] Plut. *Pomp.* 11.4.
[183] Labisch (1975) 194.
[184] Jos. *BJ* 3.85–6.
[185] Jos. *BJ* 2.584.
[186] Adams (1995) 120. This section discusses requisition in the area of operations, for seizure and requisition in the strategic base, see Chapter 5, pp. 223, 226, 229, 239.
[187] Lynn (1993) 17; Kissel (1995) 251ff.
[188] Sall. *Cat.* 29.3.

trade (*commune pactum commercium*) had been recognized."[196] In 169 B.C., the consul Quintus Marcius Philippus wrote to the Senate requesting that it pay the Epirotes for the 20,000 *modii* of wheat and 10,000 of barley which he had requisitioned.[197]

Even when locals received some remuneration under the terms of a forced purchase, providing supplies for a Roman army was a tremendous financial burden. An invective, falsely attributed to Cicero, compares Sallust's requisition of provisions from Africa to pillaging and notes that "our allies never suffered . . . anything worse in time of war than they experienced during peace when [Sallust] was governor of lower Africa."[198] Wealthy citizens might take the burden of requisition on themselves, by providing food to the army free or below cost.[199] An inscription of the second century records that the *gymnasiarch* Manius Salarius Sabinus "furnished at a reduced price (*tês ouses teimês euônoteron*) 100 *medimnoi* of wheat, 100 *medimnoi* of barley, 60 *medimnoi* of beans and 50 amphorae of wine for the provisions (*annona*) of the expedition of our Lord the Emperor passing through [Thessalonica]."[200] Such contributions to a passing army were a major local event. The city of Smyrna, vying for the honor of a temple, recalled its enthusiastic support for Sulla's army more than 100 years earlier.[201]

Though the practice of military billeting (*hospitium*) is occasionally attested,[202] the Romans did not normally quarter their troops in individual houses, as was frequently done by armies in other periods.[203] Claudius Marcellus did quarter soldiers in houses (*sub tectis*) in the town of Venusia, although a tribune of the plebs made this action the basis of an indictment.[204] Sulla billeted his troops in Greece with individual families, who were forced to feed as well as house

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[196] Livy 34.19.8. These squads perhaps represent a *contubernium* of eight soldiers and two *calones*.
[197] Livy 44.16.2.
[198] [Cic.] *In Sall.* 19.
[199] Wierschowski (1984) 261 n. 601; Kissel (1995) 82–87.
[200] *AE* 1921.1 = *SEG* 1.276 (Thessalonica, 113 or 121/2): *Manion Salarion Sabeinon ton gumnasiarchon . . . kai tais tou kuriou Kaisaros tôn strateumatôn diodeiais paraschonta eis tas annônas seitou med. u' krithôon med. r' kuamou med. x' oinou metretas r' polu tês ouses teimês euônoteron.*
[201] Tac. *Ann.* 4.56.
[202] Kissel (1995) 257.
[203] Ael. Arist. *Rom.* 67. Note that the Third Amendment of the U.S. Constitution is entirely devoted to banning this practice.
[204] Livy 27.21.3–4.

them.[205] When Sertorius fled to Spain in 82 B.C., he found the gar-
rison there quartered in houses, but he ended the practice and had
them built a camp.[206] The practice of individual billeting tended to
become more common in Imperial times, particularly in the East.[207]

The Provision of Animals

The Romans routinely requisitioned the animals necessary to carry
supplies.[208] Livy claims that in 173 B.C. the consul Spurius Postumius
was the first Roman magistrate to requisition transport animals from
a Roman ally, in this case, Praeneste in Italy:

> Before his consulship no one had ever put the allies to any trouble or
> expense in any respect. Magistrates were supplied with mules (*muli*)
> and tents (*tabernacula*) and all other military equipment (*instrumentum*)
> precisely in order that they might not given any such command to
> the allies . . . Ambassadors who were sent on short notice to any place
> would call upon the towns through which their route took them for
> one pack animal (*iumentum*) each, no other expense did the allies incur
> in behalf of Roman officials."[209]

The practice of requisition continued and was expanded through the
Republic. Such requisitioning of animals could occur on a large or
small scale. For example, Caesar seized a single yoke of mules from
a bakery on his way to the Rubicon.[210] Conversely, Sulla requisi-
tioned over 20,000 mules during the siege of Athens in 87–86 B.C.[211]
The army usually requisitioned as many of these animals as possi-
ble in the immediate vicinity of the operational base, but animals
were also brought from long distances. Caesar, for example, gath-
ered great number of horses from Italy and Spain to supply his cav-
alry in Gaul.[212]

    Requistion might be done specifically to facilitate a *frumentatio*, dur-
ing his African campaign of 46 B.C., for example, Caesar left his
baggage train at Ruspina and:

[205] Plut. *Sulla* 25.2.
[206] Plut. *Sert.* 6.4.
[207] Isaac (1992) 297–304.
[208] Davis (1969) 429–459; Kissel (1995) 234–237.
[209] Livy 42.11.7–11.
[210] Suet. *Jul. Caes.* 31.2.
[211] Plut. *Sulla* 12.2.
[212] Caes. *BGall.* 7.55.

> . . . set out with a force in light order (*cum expedita manu*) to forage
> around (*frumentatum*) the farms, issuing instructions to the townsfolk
> (*oppidani*) that all their carts and draught animals (*plaustra iumentaque*)
> must go down with him.[213]

Requisitioning animals, even more than seizing food or fodder, was
sorely felt by the local population, as animals represented an impor-
tant part of a farmer's capital. The philosopher Epictetus counseled
cooperation when a soldier seized a donkey from a civilian,[214] and
his advice, like that of Jesus (see above, p. 110), was sound com-
mon sense for provincials wishing to avoid bodily injury. Rabbincal
literature also discusses the legal ramification of a donkey being seized
by *angaria*.[215] Conversely, the army's pack animals were a tempting
target for thievery, and even allies sometimes made off with army
mules.[216]

Requisition, like foraging, had the advantage of making provi-
sions directly available to the army from the area of operations.
Nevertheless it could be problematic, particularly when used to sup-
ply an entire army. Maximinus Thrax, moving his army into Northern
Italy in 238, to suppress the revolt of the Senate, relied on requisi-
tion rather than waiting for supply lines to be organized. As a result,
according to Herodian, the large number of private wagons bring-
ing provisions in an unorganized fashion blocked advance of Thrax's
army.[217]

Though it is not requisition *per se*, a normal part of any sur-
render to the Romans involved an agreement to turn over a stipu-
lated amount of supplies. Usually this was several months' worth,
that is, enough provisions to cover the time it would take to have
the surrender ratified by the Senate and people of Rome. During
the Galatian campaign of 189 B.C., the Pisidians gave the Romans
25 talents of silvers and 10,000 *medimnoi* of grain and "on these terms
they were received in surrender."[218] The treaty of Apamea, signed
in 188 B.C., which ended the war with Antiochus III, required the
Seleucids turned over an unstated amount of grain—it was probably

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[213] [Caes.] *BAfr.* 9.
[214] Epict. 4.1.79. Epictetus uses the term *angaria* in the same way as Matt. 5:41.
[215] Mishnah *Baba Mezia* 6.3, Tosefta *Baba Mezia* 7.8; Bab. *Baba Mezia* 78B; Sperber
(1969) 164. The word *angaria* is loaned into Aramaic.
[216] App. *Hisp.* 9,47.
[217] Hdn. 7.8.10−11.
[218] Livy 38.13.13.

very substantial as the indemnity was 2500 talents of silver.[219] Likewise, the surrender of Jugurtha to Calpurnius in 112 B.C. involved both large quantities of grain and "many cattle."[220]

Vectura

During the Republican period, the allies who provided grain for the Roman military also furnished transportation *(vectura)* for supplies until they reached the army. *Vectura* involved not only delivering the grain to the army storage facilities, but often all the transport of supplies within the entire area of operations.[221] During the war against Antiochus III, for example, the Roman consul Lucius Scipio ordered the Pergamenes to deliver grain to the Roman camp several miles outside the city.[222] In 170 B.C., a Carthaginians embassy to the Senate noted that they had transported their contribution for the Roman war effort in Macedonia, 1.5 million *modii* of grain, and promised to deliver it wherever the Romans ordered.[223] An inscription found at Larissa in Thessaly sets out the process of *vectura* in the context of a contribution of grain by Thessalian cities to Rome in 150 B.C.[224] Each city was responsible for transporting the grain to a specified harbor—failure to do so was punished by a considerable fine, calculated per unit of grain undelivered.

The practice of *vectura* continued in the Late Republic: Caesar ordered the Aedui to provide garrisons to protect his supply lines in the war against Vercingetorix (in 52 B.C.), commanded Spanish natives to gather transport animals and move grain into the Roman camp during the Ilerda campaign (49 B.C.), and imposed *vectura* on the local population of Dyrrachium, who transported grain and other provisions for the campaign (48 B.C.).[225] According to Aulus Gellius, Publius Ventidius provided "mules and vehicles" to Roman magistrates during this period. Since he seems to have become very wealthy doing so, it is quite possible that Ventidius was supplying these officials' armies during the Civil Wars rather than their individual

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[219] Livy 38.37.8–9.
[220] Sall. *Iug.* 29.5.
[221] Labisch (1975) 73.
[222] Livy 37.37.5.
[223] Livy 43.6.12.
[224] Garnsey, Gallant & Rathbone (1984) 36–7.
[225] Caes. *BGall.* 7.34; *BCiv.* 1.60.3; 3.42.3.

transportation needs.[226] It is not known whether he was leasing or
selling transportation, or was profiting through requistions.

In the Imperial period, land transportation for state purposes was
generally not handled by contract; rather drivers were hired or other-
wise procured directly by the authorities.[227] The military may have
made use of a permanent corps of drivers, but during campaigns,
most transportation was probably requisitioned.[228] As allied states
were eventually absorbed into the empire, the responsibility for *vec-
tura* fell on the provincials.[229] A papyrus dating to Caracalla's reign
notes that liturgists providing barley for the Syrian army had to pay
for its transport to Alexandria.[230] Presumably the army covered the
costs of transportation from that point to the army.

There is documentary evidence for animals being transported from
province to province in the Imperial period: third century papyri
attest camels and oxen being requisitioned in Egypt for the Syrian
army.[231] Individuals who were forced to provide transport service
may or may not have received any compensation from the army,
though they must have at least received sustenance.

Surrendered Provisions

After a surrender (*deditio*), a defeated state routinely was required to
provide the Roman army with provisions. This practice, a sort of
requisition on a large scale, allowed the Romans to shift the cost of
maintaining an army to the enemy. While the Carthaginians nego-
tiated their surrender in 203 B.C., Scipio required them to furnish
three months worth of provisions and pay for the Roman army.[232]
In his invasion of Galatia in 189 B.C., Manlius Vulso received grain
from a number of cities through surrender agreements.[233] The terms
of the Peace of Apamea, the formal capitulation of the Seleucid
Kingdom to the Romans in 188 B.C., required Antiochus III to

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[226] Gel. *NA* 15.4.3.
[227] Wolfe (1951) 94–5; Mitchell (1976) *passim*; Schlippschuh (1987) 87–8; Millar
(1993) 85–6.
[228] Isaac (1990) 291–293.
[229] Kissel (1995) 82–88.
[230] *P. Oxy.* 43.3091 (216/7?).
[231] *BGU* 266 (216); *P. Oxy.* 43.3109 (253–6); see Davies (1969) 430.
[232] Polyb. 15.1.1.
[233] Livy 38.13.13.

provide the Romans with 540,000 *modii* of grain,[234] enough to feed an army of 40,000 for three months.

Sometimes, such requirements came even before a formal treaty. When Jugurtha was negotiating a surrender to the Roman consul Calpurnius Bestia in 112 B.C., the quaestor Sextius went to the Numidian city of Vaga to receive the grain (*frumentum*) demanded by the Romans for observing an armistice until a surrender could be arranged.[235] In 65 B.C. when negotiating a peace with Pompey, Mithridates offered to furnish provisions to the Roman army.[236] A nation might offer to supply the Roman army in order to forestall a conflict, as Jugurtha did in 109 B.C. When Caecilius Metellus invaded Numidia:

> . . . the king's officers" (*praefecti*) came out to meet him from the towns and villages offering to furnish grain and transport provisions (*commeatus*)—in short to do everything that they were ordered.[237]

When war did break out, Metellus received supplies from Numidian cities and towns that surrendered to him.[238]

The practice of demanding provisions from an erstwhile enemy, in exchange for peace, continued under the Empire. In 170 A.D., the Quadi obtained a treaty from Marcus Aurelius only on the condition of providing of "many horses and cattle" for the Roman army.[239]

Pillaging

Like requisition, pillaging can be viewed as a category of foraging. Military Latin did distinguish the two: "to pillage" or "plunder" was *praedare, depopulare, dipilare* or *copiari*, the latter generally referring to the capture of booty after a battle or war, rather than foraging for provisions beforehand.[240] Unauthorized stealing by individual soldiers could have very negative effects on an army. If soldiers are allowed to plunder on an individual or small unit basis, very soon one will

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[234] Polyb. 21.43.19.
[235] Sall. *Iug.* 29.5.
[236] Dio Cass. 37.2.1.
[237] Sall. *Iug.* 46.5.
[238] Sall. *Iug.* 54.5–6.
[239] Dio Cass. 72.11.3.
[240] De Meo (1986) 192.

have a robber-band rather than an army.[241] Strict Roman regulations against unauthorized pillaging, are already found in writing on military law.[242] Naturally, theory and practice differ, but the view of Ziolkowski that "once a thing got lost under the legionary's cloak, there was no power on earth which could snatch it away"[243] shows a misapprehension of Roman discipline.

Frontinus quotes Cato in saying that soldiers caught stealing (*in furto*) could have their right hands cut off.[244] This apparently refers to stealing from civilians, because Polybius notes that the penalty for stealing in a military camp was to suffer the *fustuarium*, a beating, often to death, by his fellow soldiers.[245] Onasander stresses the importance of forbidding plundering by individual soldiers.[246] A description by Sallust of the undisciplined army of Postumius Albinus, shows that the Romans knew the dangers involved in allowing troops to plunder without authorization:

> . . . men absented themselves from duty whenever they pleased, camp-followers (*lixae*) and soldiers ranged about in company day and night, and in their forays laid waste the country, stormed farmhouses, and vied with one another in amassing booty in the form of cattle and slaves, which they bartered with the traders for foreign wine and other luxuries.[247]

The main point of banning individual soldiers from pillaging was not to protect the local population but to impose discipline and to control the gathering and storage of provisions. Tacitus remarks that before the siege of Vetera in 69 A.D., the Roman commanders:

> did not take sufficient care to have supplies collected; they allowed the troops to pillage (*rapi permissere*) so that in a few days time the soldiers' recklessness exhausted what would have met their needs for a long time.[248]

Soldiers have a natural tendency to hoard, which can interfere with the normal functioning of logistics. When Scipio Aemilianus disciplined his army in Spain in 134 B.C., he "forbade the bringing

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[241] Van Creveld (1989) 46.
[242] Cinc. *De Re Mil.* 5, quoted in Gell. *NA* 16.4.2; cf. Polyb. 10.15.4–16.
[243] Ziolkowski (1993) 90; see Horsmann (1991) 102–107, 187–197.
[244] Front. *Strat.* 4.1.6.
[245] Polyb. 6.37.9.
[246] Onas. *Strat.* 10.6.2.
[247] Sall. *Iug.* 44.5.
[248] Tac. *Hist.* 4.22.

in of anything not necessary, even a victim for purposes of divina-
tion."[249] Taruttienus Paternus (2nd century) advised that soldiers be
forbidden to privately hunt and fish.[250] In these cases, the point is
not necessarily to stop stealing, but to prevent unauthorized items,
whether plundered, purchased or hunted, from coming into the camp.

For the Romans, plundering was generally an organized activity,
undertaken by the army as a whole: the fruits of plunder were col-
lected and then shared out under the commander's supervision.[251]
Plundering expeditions were often commanded by high-ranking officers
such as legates or tribunes.[252] Polybius describes such a plundering
expedition undertaken in 256 B.C.:

> The Romans, after making themselves masters of Aspis . . . hastily
> advanced with their whole force and set about plundering the coun-
> try . . . they destroyed a number of handsome and luxuriously furnished
> dwelling houses, possessed themselves of a quantity of cattle, and cap-
> tured more than 20,000 slaves, taking them back to their ships.[253]

It seems to have been routine to set up a sort of operational base
in order to support the plundering of the surrounding countryside.[254]

Obviously one of the points of pillaging was to obtain provisions,
but destroying the enemy's supplies was as important or more impor-
tant.[255] Some raids focussed on military targets, as when, during the
2nd Macedonian War (200–196 B.C.), Gaius Claudius raided the
port of Chalcis, as described by Livy:

> Both the royal granaries (*horrea regia*) and the arsenal (*armamentorum*)
> were burned, with a great store of munitions (*apparatus*) and artillery.[256]

Generally, however, Roman pillaging was directed at the enemy's
economy as a whole. Appian describes the way in which Scipio
Aemilianus pillaged an enemy tribe in the Numantine campaign of
134–133 B.C.:

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[249] App. *Hisp.* 14,85.
[250] *Dig.* 49.16.12.
[251] Polyb. 10.15.4–16; see Shatzman (1976) 177–205. The counter-arguments of
Ziolkowski (1993) 87–88 are not convincing.
[252] Livy 31.27.1.
[253] Polyb. 1.29.5–7.
[254] Polyb. 1.30.15.
[255] Anderson (1970) 54.
[256] Livy 31.23.7.

He . . . advanced into the territory of the Vacaei, cutting down every-
thing, taking for himself what was useful as food, and piling the rest
in heaps and burning it.[257]

Naturally, the local population would do everything possible to pro-
tect their property and their lives, either hiding crops or fleeing with
their cattle. Sometimes the local population might destroy their own
property, in order to prevent the Romans from obtaining it, as the
Spanish did when threatened by L. Licinius Lucullus in 153 B.C.[258]

Since attacking unarmed civilians was less dangerous and more
profitable than assaulting an enemy military force, a Roman com-
mander might lead an inexperienced force on a pillaging expedition
to give it some experience in killing.[259] In other cases, experienced,
but demoralized, troops, might be allowed to pillage in order to raise
their spirits.[260] For example, after the widespread mutiny of the
Roman army in 14 A.D., Germanicus led an invasion of Germany,
at least in part to improve morale by letting his troops plunder.[261]
Soldiers clearly showed enthusiasm when given the opportunity to
pillage. Roman troops marching to Augustodunum, to put down the
revolt of Julius Sacrovir in 21 A.D., protested against stopping to
rest or sleep in their haste to sack the rich city.[262] The troops might
request that a particular town be pillaged, as Cerialis's troops did
in 69 A.D., asking that Colonia Trevirorum (Trier) be sacked in
revenge for their attacks on Roman camps during the revolt of Julius
Civilis. To illustrate their pure motives—of revenge and not greed—
the soldiers offered to turn all the plunder over to the state treas-
ury.[263] The opportunity to pillage might also be a reward. During
the Thracian revolt of 26 A.D., Thracians fighting on the Roman
side were given permission to plunder during the day, as long as
they reported back to duty at night.[264]

Of course, if the Romans wished to maintain the goodwill of the
populace, pillaging in friendly territory had to be held within cer-
tain limits. Troops marching in such areas were expected not to steal

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[257] App. *Hisp.* 14,87. Other examples: Livy 91.18 (frag. *ex cod. vaticano*); Hdn.
7.2.3.
[258] App. *Hisp.* 9,52.
[259] Sall. *Iug.* 87.1–3.
[260] Tac. *Hist.* 4.26.
[261] Tac. *Ann.* 1.51; Dio Cass. 57.6.1.
[262] Tac. *Ann.* 3.45.
[263] Tac. *Hist.* 4.72.
[264] Tac. *Ann.* 4.48.

from the inhabitants: on his arrival in Africa in 47 B.C., Caesar for-
bade looting by his troops in an unsuccessful attempt to win over
the sympathy of the locals.[265] Onasander is well aware of this; and
advised that:

> . . . . when the army is recruited to full strength, [the commander] must
> not . . . stay either in his own country or that of a subject nation, or
> that of an ally; for he will consume his own crops and do more dam-
> age to his friends than his enemies.[266]

Antiquity certainly did have unwritten laws of war concerning pil-
laging. Polybius criticizes King Philip V of Macedon saying:

> . . . it is one thing to seize on and destroy the enemy's forts, harbors,
> cities, men, ships, crops and other things of a like nature, by depriv-
> ing him of which we weaken him, while strengthening our own resources
> . . . all these indeed are measures forced on us by the usages and laws
> of war (*polemou nomoi*). But to do wanton damage to temples, statues
> and all such works with absolutely no prospect of any resulting advan-
> tage in the war . . . (is) the work of a frenzied mind. . . .[267]

Naturally such scruples were often ignored, as the army's needs took
precedence over public relations.

One of the *topoi* of ancient descriptions of civil war is that friendly
territory is treated like an enemy land. For example, Diodorus Siculus
says that during the mutiny of Gaius Flavius Fimbra in 86–85 B.C.:

> . . . in the interest of winning the affection of his troops [Fimbra] gave
> them license to plunder the territory of allies as if it were an enemy
> country. . . .[268]

It does seem that, during Civil Wars, Roman armies did routinely
plunder both Roman and allied territories. Tacitus graphically describes
Otho's troops burning, devastating and looting a peaceful Italy "as
if they were on foreign shores and in an enemy's cities."[269] The
Flavian army under Antonius Primus in 69 A.D. showed little more
consideration—Tacitus notes the fine line between foraging and plun-
dering in the conditions of civil war.[270] Conversely, Velleius Paterculus
praises Sulla for leading his army through Calabria, Apulia and

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[265] [Caes.] *BAfr.* 3; Ruge (1965) 1763.
[266] Onas. *Strat.* 6.13.
[267] Polyb. 5.11.3–4.
[268] Diod. Sic. 38.38.8.
[269] Tac. *Hist.* 2.12.
[270] Tac. *Hist.* 3.15.

Campania, during his invasion of Italy in 82 B.C. "taking unusual care not to inflict damage on crops, fields men or cities."[271]

The systematic destruction of enemy territory by plundering was also used by the Romans for political purposes: either for retribution or as a demonstration.[272] After the Gauls, who had raided into Italy, were crushed at the battle of Telamon in 225 B.C., the Roman consul allowed his troops to pillage of Boian territory in order to punish them.[273] In 190 B.C., Aemilius Regillus plundered Teos specifically to punish them for agreeing to supply the enemy (in this case the Seleucid fleet) with 5,000 *amphorae* of wine. He offered to recall his troops if the Teans gave the wine to his fleet—they did and the plundering ceased.[274]

The Romans might also pillage enemy territory in order to goad them into battle. Dio Cassius says that during his invasion of Armenia in 69–8 B.C., Lucullus "devastated part of their land, purposing to draw the barbarians imperceptibly into battle while defending it."[275] Sometimes commanders ordered supplies destroyed for military purposes: during the siege of Perusia in 41 B.C., Lucius Antonius (Marc Antony's brother) sent 4,000 cavalry to destroy Octavian's supplies trying to force him to raise the siege.[276]

Pillaging was done largely at the descretion, or even the whim, of the commander. Appian criticizes L. Licinius Lucullus for plundering the territory of the Spanish city of Intercatia merely because they had criticised his massacre of the Caucaei in 153 B.C.[277] It is true that in the Republican period, the Senate had the ultimate authority to decide whether pillaging was justified or legal, but since this was determined after the fact, it did not have much practical effect. In 170 B.C. an embassy from Abdera came to the Senate complaining that the city had been illegally plundered by Hortensius. It seems that the Roman general had demanded 100,000 *denarii* and

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[271] Vell. Pat. 2.25.1.
[272] Labisch (1975) 68–9.
[273] Polyb. 2.30.4; 34.15.
[274] Livy 37.28.1–3. App. *Hisp.* 12,68 notes that Fabius Servilianus plundered five towns in Baeturia specifically because they had sided with Viriathus in the Lusitanian revolt (147–139 B.C.) Similarly, Scipio Aemilianus pillaged the country of the Vacaei in 134 B.C., because the Numantines customarily bought food from them, and he apparently wished to cut off the supply (App. *Hisp.* 14,87).
[275] Dio Cass. 36.4.2; Livy 45.56.8–10.
[276] App. *BCiv.* 5.4,32.
[277] App. *Hisp.* 9,53.

50,000 modii of wheat, and the Abderans asked for a stay to appeal to the consul Hostilius and to the Senate. After the embassy had left, Hortensius went ahead and took the city, executing the magistrates and selling the population into slavery. The Senate ordered the population freed, but the damage already had been done.[278]

One of the features of Roman civil war was the breakdown of discipline that was the normal feature of the Roman army even when pillaging. Caesar criticized legionaries who had plundered individually, and did his best to restore discipline in this regard.[279] Of course, not all commanders were successful in controlling their troops.

Under the Empire, the Romans continued to use pillaging as a strategy for terrorizing a population into submission. During Nero's Parthian War (54–63 A.D.), Corbulo devastated regions which he found hostile and spared those which submitted.[280] Tacitus speaks of the plundering of the inhabitants as a routine procedure in Britain— used precisely in order to impose Roman power. After 78 A.D., Agricola is credited with changing this practice, and it is clear that the authorities abandoned the practice precisely because the province was becoming Romanized.[281]

Conclusion

Drawing supplies from the area of operations was always an important part of pre-modern logistics. "Living off the land" was not a haphazard activity: rather, it demanded a great deal of planning and organization. Provisions might be obtained through foraging, requisition or pillaging. Though each method differs, at least from the army's perspective, there is a great deal of overlap in the meaning of these terms. Foraging means the gathering of fodder, firewood, water and provisions by groups of soldiers on a regular basis. While the English term "forage" does not distinguish the particular item to be gathered, military Latin did: to gather fodder (*pabulari*), firewood (*lignari*), water (*aquari*) or food (*frumentari*). Cognate terms were also used in Greek: *chortologia, xuleia, hudreia* and *sitologia*.

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[278] Livy 43.4.13; another case is described in App. *Hisp.* 13,80–83.
[279] [Caes] BAfr. 54.
[280] Tac. *Ann.* 14.26; Dio Cass. 62.20.1.
[281] Tac. *Agr.* 19.4; Wierschowski (1984) 155.

Foraging for fodder, firewood and water was done frequently, often daily. These provisions were needed continuously and in great quantities. A constant supply of water was particularly vital to an army's well-being. An ancient army's fodder requirements were enormous, though they could be reduced by the use of grazing. The term "*frumentatio*" literally meant foraging for grain, but was used to included the gathering of all foodstuffs. Such *frumentationes* were less frequent than the routine gathering of water, fodder and firewood. Such *frumentationes* often involved significant numbers of troops and were major military operations.

Many different factors affected the amount of food present in the area of operations. Roman commanders generally lacked the information needed to accurately gauge the prospects for foraging. Nevertheless, campaigns were timed and planned to maximize the availability of local provisions for the army. Discipline was an important element in foraging and the Roman army's ability to control its soldiers was an important factor in its logistical success.

Requisition was the seizure or forced purchase of goods and often involved providers bringing food to the army to collection points. In some cases, locals might contribute goods voluntarily to an army, although with the implicit threat of military force. The tremendous financial burden of contributions, whether forced or not, was sometimes borne by wealthy citizens as a sort of civic duty. Throughout the Republican period, the Romans made providing grain for the army part of most formal surrenders (*deditiones*). This was consistent with their policy of shifting the cost of provisions away from the Roman state whenever possible.

Pillaging is distinguished from foraging and requisition in that the destruction of property, as well as its seizure, plays a role. Under normal circumstance, the Roman military strictly controlled pillaged by its soldiers, although in times of civil war or lax discipline, such controls were lessened or even non-existent.

The availability of local provisions was often unpredictable, seizure might interfere with military operations, or they might simply be unavailable. In such cases, there were great advantages to using supply lines, as is discussed in the next chapter.

SUPPLY LINES

Introduction

The Roman army routinely used supply lines to ship provisions to its armies in the field. The ancient sources do not support the view of some scholars that the Roman army relied primarily on foraging for provisions.[1] Cato the Elder's quip "let the war feed itself" (*bellum se ipsum alet*) does not mean that his soldiers lived off grain cut from the fields. Rather, Cato was expressing his intention to requisition provisions from Spanish granaries.[2] By the third century B.C., it was only in an extreme crisis, such as that of 216 B.C., that the Roman armies were expected to fend for themselves.[3]

Throughout the period discussed in this work, the use of supply lines characterizes the Roman army's logistics. There are numerous specific attestations of Roman supply lines in the sources discussed in this chapter. The Romans' routine use of supply lines is reflected in the technical expressions of Latin. In its most common usage the noun *commeatus* means food supplies in general,[4] and used together with the various permutations of the verbs *veho*[5] and *porto*[6] corresponds closely to the modern use of the term "supply line." Indeed,

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[1] Ruge (1965) 1763; van Creveld (1977) 38.

[2] Livy 34.9.12. Lynn (1993) 17 notes that "when European generals and statesmen of the period 1660–1789 spoke of making war feed war, they were primarily concerned with imposing contributions"; see Kissel (1995) 120.

[3] Livy 23.21.4.

[4] Sall. *Iug.* 28.7; 43.3; 86.1, 90.2; Aul. Hirt. *BGall.* 8.30; Livy 22.39.11; 26.9.5; 27.39.19; 32.15.7; 34.19.8; 35.44.7; 36.7.17; 37.7.9; 38.41.9; 42.31.8; 43.22.10; 44.6.12; Front. *Strat.* 2.6.1; 3.5.2; Tac. *Ann.* 2.6; 12.43; 12.50; 13.39; 14.38; 15.12; *Hist.* 1.22; 1.64; 3.13. *Commeatus* also means provisions other than grain (Caes. *BCiv.* 3.49.5; Tac. *Hist.* 4.58). Indeed, Caesar often refers to his supplies simply as *frumentum commeatusque* (Caes. *BGall.* 1.39; 48.2; 3.3; 4.30; 7.32; *BCiv.* 3.42; 3.78); see Labisch (1975) 37–8. Veg. *Epit.* 3.3 contrasts *commeatus* with both *pabulum* and *frumentum*. *Commeatus* also had the technical meaning of "leave of absence" Tac. *Hist.* 1.46; *P. Gen. Lat.* 1 (A.D. 90–96) *verso* 2m [= Fink (1970) no. 9, 2m].

[5] Livy 25.37.7; 44.9.11; 44.22.8; Tac. *Ann.* 2.5; 12.62; 13.39.

[6] Sall. *Iug.* 36.1; 46.5; Caes. *BGall.* 3.3; *BCiv.* 3.40; 3.47; [Caes.] *BAlex.* 12; 25; 43; *BAfr.* 21; *BHisp.* 11; Livy 22.11.6; 44.9.11; Tac. *Ann.* 12.43.

commeatus is sometimes used alone to mean "convoyed provisions" or
"supply line."[7] In one case Livy uses the expression "*commeatus frumenti*"
meaning "supplies of grain" particularly in reference to the grain
being brought by convoys to Rome from overseas.[8]

One must distinguish supply lines (*commeatus*) from an army's train
(*impedimenta*), that is, the equipment and supplies being transported
with the army itself. Every army, even a very primitive one, con-
tains a train of some sort. In contrast, a supply line, the continuous
connection between a supply source and an army, is the sign of a
relatively sophisticated military. One should not expect the presence
of supply lines always to be spelled out in ancient historical texts,
as even modern writers of military history often ignore details of
logistical support.[9] Recently, some military historians have noted the
routine use of supply lines by the Roman army—notably Isaac and
Kissel in their studies of the Imperial army in the East.[10]

Labisch's model of Caesarean supply lines oriented around strate-
gic, operational and tactical bases can be usefully applied to Roman
logistics in the entire period under discussion.[11] Each type of base
represented a different kind of logistical center, used to gather and
store supplies on different levels. This chapter will discuss operational
and tactical bases, strategic bases will be discussed in the next chapter.[12]

Labisch's operational base is where the army gathered supplies
within the area of operations. Usually located in a port, it contained
the warehouses and depots necessary to hold enough supplies to sup-
port the army for an entire campaigning season or longer. If an
army uses a supply line, it requires an operational base, for the lat-
ter functions as the supply line's anchor. After supplies were brought
up to the location of the army itself, they were stored in a tactical
base. This base might be located a short distance behind the army,
or even within the army's daily camp, which the Romans generally
fortified. Tactical bases usually moved along with the army, except
in the case of sieges.[13]

Republican Supply Lines

A clause in the treaty signed with the Carthaginians in 279 B.C.
says that Carthage would provide the transport ships for any joint
operation to be taken against Pyrrhus of Epirus.[14] This doubtless
included the movement of provisions as well as troops and implies
that before the First Punic War, Rome seems to have lacked the
necessary logistical infrastructure to organize such movement. Indeed,
when the Romans first operated outside of Italy, during their inva-
sion of Sicily during the First Punic War, they soon ran into logistical
difficulties. Polybius notes that in 263 B.C., the Romans readily ac-
cepted King Hiero II of Syracuse's offers of logistical assistance against
the Carthaginians:

> The Romans accepted his overtures, especially for the sake of their
> supplies (*chorêgia*); for since the Carthaginians commanded the sea, they
> were apprehensive lest they should be cut off on all sides from the
> necessities of life; in view of the fact that the [Roman] armies which
> had previously crossed to Sicily had run very short of provisions
> (*epitêdeia*).[15]

Even with King Hiero's assistance, the Romans had supply difficulties,
doubtless due to their inexperience in setting up a supply line. The
following example illustrates Roman inexperience and lack of sophis-
tication in logistical matters in this period. When the consuls Marius
Otacilius and Manius Valerius decided to attack Agrigentum, the
Carthaginian base, in 262 B.C., they tried to support their troops
by foraging, but the Carthaginians promptly attacked and defeated
the foragers. The Romans then set up an emergency operational
base at nearby Herbesus, to which the Sicilian allies brought provi-
sions and livestock.[16] This makeshift supply system provisioned the
Romans for five months. Given the size of the Roman force, two
consular armies, a total of four legions and their allies, it probably
would have proved impossible to support an army this size through
foraging alone, even had the Carthaginians not interfered.

In 249 B.C. the Senate assigned the consul Lucius Junius Pullus
the *provincia* of bringing grain and other provisions to the army besieg-

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[14] Polyb. 3.25.4.
[15] Polyb. 1.15.6–8; for Hiero's support of Rome see Eckstein (1980) 175–190.
[16] Polyb. 1.16–18.

ing Lilybaeum. Assigning one of the two consuls to this task sug-
gests that fifteen years into the First Punic War, no regular system
had been set up for providing overseas supply. Pullus' supply con-
voy was quite large: 800 transports and 120 warships to convoy
them. The consul set up an operational base in Syracuse, where he
began to supplement the supplies from Italy with grain from Sicilian
allies in the interior. The attempt, however, failed due to storms and
enemy action.[17]

By the beginning of the Second Punic War (218–202 B.C.) the
Romans were developing a sophisticated system of supply lines, as
seen in the routine movement of considerable quantities of provi-
sions and other war-materiel from one part of the Mediterranean in
a military context.[18] At the outbreak of the war in 218 B.C., the
Romans sent a fleet of merchant ships across half the Mediterranean
carrying grain from Ostia to their army to Spain.[19] This appears to
have been a regular practice and not a special measure. Nevertheless,
in the early stages of the war there continued to be logistical difficul-
ties in maintaining distant forces for long period of time. The brothers
Publius and Gnaeus Cornelius Scipio, operating against the Cartha-
ginian forces in Spain in 215 B.C., wrote to the Senate that:

> . . . money for pay, also clothing and grain, were lacking for the army,
> and for the crews everything. So far as pay was concerned, if the treas-
> ury (*aerarium*) were empty, they would find some way of getting it from
> the Spaniards. Everything else, they said, must in any case be sent
> from Rome. . . .[20]

In the event, the Senate took extraordinary measures to arrange for
the shipping of provisions and clothing.[21]

Livy's description of the siege of Capua (212–1 B.C.) gives a
remarkably detailed view of the Roman's logistical system the Romans
developed during the Second Punic War:

> Casilinum was the collection-point for grain (*frumentum convectum*). At
> the mouth of the Volturnus . . . a stronghold was fortified, and there
> and at Puteoli . . . a garrison was placed, that the sea in that neighbor-
> hood and the river might be in their power. To these two strongholds

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[17] Polyb. 15.2.5–8.
[18] Badian (1972) 218; Adams (1976) 217–8; Erdkamp (1995) 171–5.
[19] Livy 22.11.6.
[20] Livy 23.48.4–5.
[21] Livy 23.48.10–49.4.

by the sea the grain which had recently been sent from Sardinia and
that which the praetor Marcus Junius had purchased in Etruria, was
transported from Ostia, so that the army might have a supply through
the winter.[22]

The Romans set up two supply lines in this case because there were
two consular armies besieging Capua, one under Appius Claudius,
in the north, and a second under Fulvius Flaccus in the south. Clau-
dius's supply line ran to a town a few miles north of Capua, Casi-
linum, which had been captured in 214 B.C., probably so it could
serve as a base against Capua. The second supply line, that of Fulvius,
went from Puteoli, which had been established as a supply base as
early as 215 B.C., to some point south of Capua.[23] The Romans
could not use Neapolis, a natural operational base, because the road
from Neapolis to Capua ran through Atella, which was in Carthaginian
hands.[24] A third and smaller force at Capua, under the praetor
Claudius Nero possibly was supplied through the Puteoli route: after
the fall of Capua, Nero embarked for Spain from that city.[25]

During the Second Punic War, the Romans obtained their sup-
plies from a number of strategic bases. The grain shipped from
Sardinia was tribute, imposed by Titus Manlius when he conquered
the island in 215 B.C.[26] In contrast, the Romans purchased grain
from their Etruscans allies. It is interesting to note that the grain
from Etruria was collected by the praetor for that region, and not
by the legate Gaius Servilius, who had been sent by Publius Cornelius
Sulla, the *praetor urbanus*, in that year to purchase grain in Etruria.
Servilius's grain went to supply the Roman army besieging Syracuse
(213–211 B.C.).[27] The indications are that supply lines were admin-
istered separately according to the destination, and not their source.
The army originally used Ostia (near Rome) as a transshipment point
for grain, but later the operational base was moved closer to Capua.
Livy relates that:

> Appius Claudius, the consul, placed Decimus Junius in command at
> the mouth of the Volturnus and Marcus Aurelius Cotta at Puteoli, in

[22] Livy 25.20.1–2; see Rowland (1990) 14–20; Seibert (1993) 287.
[23] Livy 24.7.10, 19.10.
[24] Livy 23.46.9.
[25] Livy 26.17.2; for Puteoli as a base during the Second Punic War, see Marasco
(1988) 205–216.
[26] Livy 23.41.6; Seibert (1993) 248.
[27] Livy 25.15.5; Polyb. 8.7.10–11.

order that as fast as ships came in from Etruria and Sardinia, they should send the grain at once to the camps.[28]

As the principal port of the western coast of Italy, Puteoli made an ideal operational base.[29] During the siege of Tarentum (210–209 B.C.) the Romans shipped grain directly from Etruria to Tarentum to sustain the Roman besieging force.[30]

Livy also records the extensive preparations of Scipio Africanus before the opening of his campaign against the Carthaginians in Spain. As the entire operation was undertaken on a "voluntary" basis (i.e. without state funds), various communities in Italy offered supplies for ships. In addition to crews, sails, fittings and weapons, enormous amounts of grain were contributed: one city alone, Arretium, furnished 120,000 *modii* of wheat, enough to feed 10,000 men for three months.[31] When Scipio invaded Africa in 204 B.C. the same fleet which carried his army also transported "a plentiful supply of provisions."[32] The Romans continued to supply their forces besieging Carthage in 203–202 B.C. by sea, bringing provisions from Sicily and Sardinia.[33] Scipio accumulated a considerable store of grain in Africa, that was shipped to Rome at the end of the war and sold as surplus to the people.[34] These references show that a sophisticated logistical system had developed during the Second Punic War.[35]

It was this logistical infrastructure that made posssible the supply of Roman armies during their dramatic overseas conquests of the second century B.C. The amounts of provisions collected and shipped grew enormously. In 196 B.C., after the Second Macedonian War (200–196 B.C.) the aediles sold off 1,000,000 *modii* (6,700 metric tons) of *surplus* grain, that had been collected for, but not used by, the army.[36] The Romans used grain shipped from Sicily, Sardinia, Carthage and Numidia to Greece to provision their army operating

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[28] Livy 25.22.5–6; Seibert (1993) 334 n. 49.
[29] Polyb. 3.91.4; Diod. Sic. 5.13.2.
[30] Polyb. 8.34.3–5; Livy 27.3.9.
[31] Livy 28.45.13–21. It is noteworthy that the city also provided hand-mills (*molae*) for forty ships; Seibert (1993) 419 n. 35.
[32] App. *Pun.* 3,13; Seibert (1993) 430–1, with nn. 35, 36.
[33] App. *Pun.* 4,25; Dio Cass. 17.37.70; Seibert (1993) 472.
[34] Livy 31.4.6.
[35] Nicolet (1976) 69–79.
[36] Livy 33.42.8; cf. Livy 32.15.5–7.

against the Seleucid king Antiochus III (192–189 B.C.).[37] In addition grain, and probably also wine, came from Italy.[38]

Livy's description of Aulus Manlius Vulso's campaign against the Istrians in 178 B.C. provides a rare look at the establishment of the Middle Republican Roman army's supply lines. The consul had marched from Aquileia to a position near Lacus Timavi, where he was joined by the *duumvir navalis*, Gaius Furius:

> The [Roman] ships were sent to the nearest harbor in Istrian territory with transports (*onerariae*) and a large quantity of supplies (*commeatus*), and . . . the legions encamped about 5 miles from the sea. In a short time a market (*emporium*) . . . was established by the harbor, and from there everything was transported to the camp.[39]

Livy only mentions these logistical details because a Istrian surprise attack took the camp and drove the Romans, temporarily, from their supply base. Livy also relates that two brothers, Gnaeus and Lucius Gavillius Novellus (otherwise unknown) stumbled on the battle while coming with provisions (*cum commeatu venientes*) from Aquileia, about ten miles away.[40] Here we have a clear picture of a supply line running from an (unknown) strategic base to the operational base at Aquilea and then to a tactical base (*emporium*) at the harbor and five miles up to the camp.

For the Third Macedonian War (172–167 B.C.), the Romans obtained food supplies for the army from strategic bases in Italy, Thessaly, Sardinia, Sicily, Numidia and probably Egypt.[41] Livy mentions that transport ships bringing these provisions to the operational base at Cephallenia off the Aetolian coast of Greece.[42] From Aetolia the army marched over the mountainous region of Athamania 40 miles overland from Ambracia, to what was probably a Roman tactical base at Gomphi. Once there the consul Publius Licinius Crassus "distributed grain to the soldiers" (*frumento dato militibus*), This probably means that he transferred the grain from the army train to the troop train and the soldiers' packs. After a few days delay to rest his pack animals (*iumenta*) and men, Crassus marched another 50

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[37] Livy 36.2.12–13, 3.1; 37.2.12, 50.9–10; see Herz (1988) 30 n. 31.
[38] Livy 37.27.2.
[39] Livy 41.1.4–6.
[40] Livy 41.5.1–2.
[41] Livy 42.27.8, 29.7–8, 31.8; App. *Mac.* 19; see Garnsey, Gallant & Rathbone (1984) 35.
[42] Livy 42.48.9–10.

miles to Larissa in Thessaly.[43] This sequence of events only makes sense if the Romans were bringing supplies from Aetolia overland to Thessaly, a distance of at least 100 miles over rough and mountainous terrain. Subsequently, the Romans established a naval base on Chalcis in Euboea, and then probably supplied their army from the Gulf of Pagasae to the south, through Pherae, a Roman ally.[44] This still involved an overland supply line of some 30 miles. In the last years of the war, 169 and 168 B.C., the Roman force invading Macedonia was still using two supply lines: one overland from Thessaly, and another using transport ships in the Aegean.[45] When Aemilius Paullus took over the army in Macedonia in 168 B.C., he sent legates to investigate the army's logistical situation, including its overland and sea-borne supply lines.[46]

Without the narratives of Polybius and Livy, our knowledge of Republican Roman military history becomes less detailed. Nevertheless, we can trace the common use of supply lines into the Late Republican period. Unfortunately, such references tend only to attest the mere existence of supply lines, without detailing how they functioned. For the Spanish campaigns of the late second century B.C. Appian refers to supply convoys, that ferried supplies from the coast to the operational bases, such as Ocilis (which was used in the Numantine campaign), and then forward to the army's tactical base.[47] Similarly, when the consul Spurius Postumius Albinus took over the army in Numidia in 110 B.C., he "hastened to transport to Africa provisions (*commeatus*), money for paying the soldiers and other apparatus of war."[48] Plutarch notes that during the siege of Athens (87–86 B.C.) Sulla supplied his forces by sea, drawing provisions from Aetolia and Thessaly.[49] Cicero refers to the obtaining of "enormous quantities of grain" in order to carry on the war with Sertorius in Spain (82–72 B.C).[50]

The use of the provinces as strategic bases continued during the Civil Wars of the Late Republic. At various times, Pompey drew supplies for his armies from Gaul, Asia, Illyria and Greece.[51] Caesar

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[43] Livy 42.55.5.
[44] Livy 42.55.7, 56.1–7, 56.10, 57.4.
[45] Livy 44.6.5–6,7.10.
[46] Livy 44.18.2–4.
[47] App. *Hisp.* 13,77.
[48] Sall. *Iug.* 36.1.
[49] Plut. *Luc.* 2.2; *Sulla* 15.1–2; App. *Mith.* 5,30.
[50] Cic. *Font.* 6.13.
[51] Sall. *Hist.* 2.47.5; 2.98.3; Caes. *BCiv.* 3.42; App. *BCiv.* 2.8,54–55.

used Gallia Narbonensis and Italy to supply his army during his campaigns in Gaul 58–51 B.C.),[52] and in his war against the Pompeians (50–45 B.C.), exploited Italy, Sicily and Sardinia as supply bases.[53] Before Caesar's campaign in and around Ilerda in Spain (49 B.C.), he made plans to bring to supplies for his troops from Italy and Gaul, but their transport was blocked by the Pompeians.[54] During the Greek campaign of the Civil War, Caesar tried to conquer strategic bases from which the Pompeians invade Italy.[55] Cicero called Greece a "rampart" (*agger*) "from which to attack Italy."[56]

In this period Roman generals routinely used the provinces under their personal control as strategic bases. In the Civil War of 44–42 B.C., the Republicans occupied the provinces of Asia Minor and Syria and drew supplies from these regions.[57] Velleius Paterculus says that in 43 B.C., the Republican faction leaders Brutus and Cassius:

> . . . without government sanction . . . had taken possession of provinces and armies and under the pretence that the republic existed wherever they were, they had gone so far as to receive from the quaestors . . . the moneys which these men were conveying to Rome from the provinces across the sea.[58]

During the campaign of Philippi in 42 B.C., the triumviral forces drew their supplies from Macedonia and Thessaly, while the Republicans got theirs from Western Asia.[59] These notices do show that by the Late Republic, the Roman logistical system was quite sophisticated. The use of supply lines, even lengthy ones, was routine.

The Roman Republic had no standing army, at least in theory, and therefore Republican armies were supplied only during campaigns— although in practice warfare was virtually constant.[60] At the beginning of each war, the Senate voted to give the commander (whether consul or praetor) the authority to enroll the army and authorize the soldiers' pay "and other necessaries of war," which certainly included provisions.[61] These provisions then would be moved to the army as

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[52] Caes. *BGall.* 7.65.
[53] [Caes.] *BAfr.* 24; Labisch (1975) 86.
[54] Caes. *BCiv.* 1.48.
[55] Labisch (1975) 86.
[56] Cic. *Phil.* 10.4.9.
[57] App. *BCiv.* 4.12,100.
[58] Vell. Pat. 2.62.3–4.
[59] App. *BCiv.* 4.12,100.
[60] Harris (1979) 9–10.
[61] Livy 33.43.3–9; 36.1.6–8; Sall. *Jug.* 27.5.

needed. The Roman military system was organized around the fiction of every campaign lasting only a single year, though in fact, wars frequently lasted for more than one, and often for many years. In order to replace losses, the Romans would send a *supplementum*, or reinforcement to a theater of operations.[62] The Senate would generally arrange to send the year's provisions at the same time.[63] It was not always possible, however, to predict whether the war would continue or not. For example, in 180 B.C. the consul Aulus Postumius Albinus claimed victory over the Celtiberians and told the Senate that:

> ...there was no need of the pay (*stipendium*) which was customarily sent or of the transportation of grain (*frumentum*) for the army for that year.[64]

As it turned out, this declaration of victory was somewhat premature: the suppression of the Celtiberian revolt took the Romans another year and logistical support for the army was necessary.

To summarize, the Roman military supply system, practically absent in the early third century B.C., had become quite sophisticated by the end of the Republic. The Roman army routinely used supply lines throughout the Middle and Late Republican periods.

Imperial Supply Lines

After Augustus's reconstruction of the Roman state, the nature of the army and its logistics changed dramatically.[65] Previously, armies had been raised for specific offensive military operations, but now the Roman army became a widely dispersed standing army. The Republican system of supply was ill-suited for the Imperial military regime. The army under the Principate, with garrisons spread out throughout the Roman Empire, had to be fed both in war and peace.[66] Since it was not practical under ancient conditions to move the supplies for the Imperial army of nearly half a million men to a central location and then redistribute them, the provinces supplied and paid for the provisions needed by the armies that occupied them.[67]

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[62] Livy 32.8.2–3, 28.9–11; 35.20.6; 36.2.9; 37.2.2, 50.3,12; 42.18.6; 44.1.1.
[63] Livy 37.2.12; App. *Hisp.* 3,17.
[64] Livy 40.35.3–4.
[65] Kissel (1995) 121ff.
[66] Mitchell (1976) 129.
[67] Millar (1993) 48–53.

Tacitus makes this point in a speech to the Treviri and the Lingones, two restive Gallic tribes, put in the mouth of Petilius Cerialis:

> The only use we have made of our rights as victors has been to impose on you the necessary costs of maintaining peace; for you cannot secure tranquillity among nations without armies, nor maintain armies without pay (*stipendium*), nor provide pay without taxes (*tributum*).[68]

Indeed, in peacetime, as Bérard points out, the Roman Imperial army was the sum of the provincial armies.[69] Each governor, whether senatorial or imperial, was ultimately responsible for the maintenance of the army stationed in his province.[70] Dio Cassius notes that Quinctilius Varus, the ill-fated governor of Lower Germany in 9 A.D., was responsible for the movement and guarding of provision trains within his province.[71] The governors also took care of supply facilities: a third-century inscription from Britain records the repair of a granary (*horreum*) by soldiers of an auxiliary cohort under the orders of the provincial governor.[72]

Local resources were used as much as possible to support provincial garrisons. Nevertheless, ample evidence shows that the Romans moved food supplies across considerable distances during the Imperial period.[73] Large amounts of provisions, particularly grain, were moved from grain-producing provinces, such as Egypt and Africa, to the legions in the East and from northern Gaul to the Rhineland.[74] For example, in the mid-first century, the governor of Baetica in southern Spain was responsible for sending grain to the army stationed in Mauretania, across the strait of Gibraltar.[75] A *pridianum* (annual strength report) of the *Cohors I Hispanorum Veterana* reports that soldiers had been seconded to Gaul (or Greece, the reading is unsure) to collect (or arrange for the shipping of) grain.[76] Carbonized grain found in the military *horrea* in the fortress of South Shields in north-

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[68] Tac. *Hist.* 4.74.1.

[69] Bérard (1984) 303.

[70] *AE* 1976.653 (Sagalassus, c. 13–15); see Mitchell (1976) 106–31; Adams (1976) 217–8; Wierschowski (1984) 151–2.

[71] Dio Cass. 56.19.1.

[72] *CIL* 7.732 (Greatchesters, 231–233); see Rickman (1971) 273.

[73] The large scale movement of grain from Egypt and of olive oil from Spain to the city of Rome is instructive, Rickman (1980); Herz (1988); Blázquez (1992).

[74] Adams (1976) 229; Middleton (1983) 81.

[75] Dio Cass. 60.24.5.

[76] *BM* 2851 (100 to 105), ll. 18–9: *in gallia* (*or graecia*) . . . *f[r]umintat[u]m* (sic) [= Fink (1970) no. 63].

eastern Britain strongly suggests that it was grown across the chan-
nel in the Netherlands.[77] The long-distance collection of provisions
was not restricted to grain. An analysis of *amphorae* used in shipping
shows the supply of wine from Italy to the Roman forces stationed
in Gaul. Middleton goes so far as to argue that the need to supply
the military drove peace-time long-distance trade in the Roman
Empire.[78]

It is clear that the Roman Imperial army moved provisions from
one province to another during peacetime. This activity, however, does
not represent supply lines *per se*, that is, the movement of provisions
during war. Since the Roman army was widely dispersed, the routine
system for supplying garrison troops was clearly not sufficient for
campaigning armies. The concentration of large armies necessary for
offensive operations presented a completely different supply problem
for the Imperial government.[79] In some respects the frontiers of the
empire were more or less continually in a state of war.[80]

For offensive operations and the suppression of revolts, the Romans
did retain some basic elements of the Republican logistical system.
The Imperial Roman state routinely assigned one or more provinces
the task of collecting provisions for a particular expedition or cam-
paign.[81] The provinces normally chosen to support an army in the
field would be, for obvious reasons, as close as possible to the area
of operations. Four examples illustrate this point. First, Gaul, Spain
and Italy all provided supplies for Germanicus's campaign against
the Cherusci in 16 A.D.[82] Second, a speech attributed to Suetonius
Paulinus by Tacitus, in his description of an Othonian war council
in 69 A.D., notes that the Vitellian forces in northern Italy could
not bring in supplies (*copia*), presumably from the Vitellian controlled
regimes in Spain and Gaul, because Otho's navy ruled the sea.[83]
Indeed, Tacitus presents the entire history of the struggles of the
Othonians, Vitellians and Flavians as dependent on the need to con-
trol supply lines.[84] Third, Josephus states that provisions for the

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[77] Anderson (1992) 60.
[78] Middleton (1983) 75–81.
[79] Kissel (1995) 134.
[80] As suggested by Dennis Kehoe (personal correspondence).
[81] Kissel (1995) 38–53.
[82] Tac. *Ann.* 1.71; for the logistical importance of Gaul, see Herz (1992) 42–93.
[83] Tac. *Hist.* 2.32.
[84] Tac. *Hist.* 2.83; 3.2,13,48,52.

Roman army at siege of Jerusalem (70 A.D.) were brought in from
"Syria and the adjoining provinces."[85] Since Cilicia and Commagene
both belonged to the province of Syria at the time of the war,
Josephus, if taken literally, must mean that Cappadocia, Galatia and
Pamphylia contributed to the support of the armies in Judaea. Since
Judaea was technically part of Syria at the time, Egypt was also an
"adjoining province." Josephus was probably referring to provisions
imported from that province as well. Fourth, when Albinus crossed
from Britain to Gaul to confront Septimius Severus during the Civil
War of 196 A.D., Herodian writes that he:

> dispatched messages to the neighboring provinces ordering the gover-
> nors to send money and supplies (*trophai*) for his army.[86]

Unfortunately, he lost the war and the governors who complied with
his order lost their lives.

Just as in the Republic, the Imperial government often shipped
supplies by sea to the army. Velleius Paterculus reports that during
Tiberius's German campaign in 5 A.D., a fleet sailed up the Elbe and
along the North Sea coast, and met the army, bringing with it abun-
dant supplies.[87] Supplies were also moved overland to the army in
the field. Dio Cassius says the Romans used supply trains (*sitopompia*)
to provision their troops at the siege of Andretium in Dalmatia in
9 A.D.[88]

One incident illustrates well the Imperial Roman state's ability to
supply armies over considerable distances. During Domitius Corbulo's
campaign in Armenia (56–58 A.D.), supply (*commeatus*) was shipped
over the Euxine Sea and through their operational base at Trapezus,
and then convoyed over the anti-Taurus mountains to the Erzerum
plateau.[89] The distance from Trapezus to the Araxes river is some
200 km. (125 miles), over mountainous terrain. The Roman army
depended up to this point completely on supplies brought overland.
The Roman supply line then continued another 200 miles to the
area of operations around Artaxarta utilizing the Araxes river.

The Roman army clear had the ability to organize long and sophis-
ticated supply lines. Referring to a practice of the Roman army in

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[85] Jos. *BJ* 5.520.
[86] Hdn. 3.7.1.
[87] Vell. Pat. 2.106.3.
[88] Dio Cass. 56.12.4–5.
[89] Tac. *Ann.* 13.39; cf. Plut. *Luc.* 32.

an earlier time, Vegetius says supply convoys of grain (*subvectio frumenti*) bought provisions to the army in the field.[90] Though Vegetius is writing in the late fourth or early fifth century, this reference probably refers to the normal practice of the Principate.

Operational Bases

The Romans used the term *stativa*[91] or, less commonly, *sedes belli*,[92] (Greek *tamieion*)[93] for a base that supplied the Roman army in the area of operations. This "operational base" provided a place to gather both the army and its provisions.[94] When sufficient preparations had been made, the army would leave this operational base and seek out the enemy.[95] The operational base might be changed during the campaign to better supply the army as the strategic or tactical situation changed. An operational base generally linked water-borne supply lines, which brought provisions from the army's strategic base or bases, to one or more supply lines, moving food by river or road to the army.[96] When a city became an operational base, the Romans would requisition all locally available foodstuffs.[97] The army also stored the food gathered in foraging at such bases. Thus operational bases might be present even when an army used no supply lines. Livy describes such a case during Sulpicius Galba's campaign against Macedonia in 200–199 B.C.:

> [Galba] established a base (*stativa*) near Lyncus ... from there he sent troops to forage (*frumentatum*) among the granaries (*horrea*) of the Das-seretii.[98]

Normally, supplies were sent from the operational base to the army in the field, but when fighting had ceased, the commander might order troops to go to the base in order to receive their provisions.[99]

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[90] Veg. *Epit.* 3.8.
[91] Livy 31.22.6; 34.28.1; 37.37.5; 38.39.4; 42.56.8.
[92] Tac. *Ann.* 14.33.
[93] App. *Ill.* 4,22; *BCiv.* 4.13.106.
[94] Onas. *Strat.* 6.14; Polyb. 1.17.5; Labisch (1975) 89ff.
[95] Livy 34.28.1.
[96] Kromayer-Veith (1928) 433ff.; Labisch (1975) 88, 121–4.
[97] Livy 31.22.6; App. *Ill.* 4,22.
[98] Livy 31.22.6.
[99] App. *Hisp.* 7,35.

As early as the third century B.C., operational bases had become routine in Roman warfare. In 242 B.C., the consul Lucius Junius Pullus made Syracuse the operational base for the siege of Lilybaeum. Provisions both from Italy and from the allies in the Sicilian countryside were collected there and forwarded to the besieging army.[100] By the time of the Second Punic War, most armies were supplied through such a base of supply.[101] The island of Chios, off the coast of Asia Minor, served as the operational base for the Romans' war against Antiochus III.[102] When the Romans moved into Illyria in 178 B.C., they used Aquileia, a Roman colony which stood on the border, as an operational base.[103]

The Roman operations during the second and first centuries B.C. illustrate the use of operational bases. In North Africa, Utica served as an operational base for the siege of Carthage (149–146 B.C.).[104] For their series of campaigns against Numantia (143–133 B.C.), the Romans made Ocilis on the Ebro river their operational base,[105] from there supplies were transferred overland to Numantia. Segesta, a town in the Balkans, served as an operational base—Appian calls it a "*tamieion*"—for Augustus's campaign against the Pannonians in 35–34 B.C.[106] An operational base with sufficient supplies gave the army greater flexibility, both strategic and tactical. This point was well understood by the ancients. In describing Marius's operations against the Germans in 102 B.C., Plutarch says:

> Marius rapidly crossed the Alsos, and built a fortified camp along the river Rhône. Into this he brought together an abundance of stores, that he might never be forced by lack of provisions to give battle contrary to his better judgment.[107]

The operational base had to store considerable amounts of provisions. In 210 B.C., the Romans captured two Punic supply bases in Samnium (Meles and Marmoreae, sites unknown) that together contained 240,000 *modii* of wheat and 110,000 of barley.[108] During the

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[100] Polyb. 1.52.6–8.
[101] Polyb. 3.75.7–8; Livy 21.57.6; Plut. *Fab. Max.* 17.2; App. *Pun.* 3,18.
[102] Livy 37.27.1.
[103] Livy 41.5.1–2; for Aquileia as a "*portus expeditionalis*" see Kissel (1995) 139 n. 65.
[104] App. *Pun.* 11,75.
[105] App. *Hisp.* 9,47.
[106] App. *Ill.* 4,22.
[107] Plut. *Mar.* 15.1.
[108] Livy 27.1.1–2.

African war (46 B.C.), the city of Thysdrae alone stored 300,000 *modii* of grain, enough to feed 40,000 men for 60 days.[109] Conversely, sometimes one sees the supplies of an operational base falling dangerously low. When Hannibal was forced to forage too long around his operational base at Geronium food supplies fell to "barely enough for ten days," clearly an insufficient period. Hannibal's Spanish troops were threatening to desert, but he managed to slip away to Apulia, where the victory at Cannae (216 B.C.) changed his logistical situation dramatically.[110]

The operational base served not only as a place to collect foodstuffs, but other equipment needed by the army. Livy, in a speech attributed to Scipio Africanus, refers to Nova Carthago, the Punic operational base in Spain, as the "citadel, granary, treasury, arsenal and storehouse for everything."[111] This was not merely rhetoric: when the city was taken, Livy reports that the Romans captured, in addition to 400,000 *modii* of wheat and 270,000 of barley, 476 artillery pieces, 18,300 Roman pounds of silver coin and bullion, as well as 63 cargo vessels loaded with grain, weapons, bronze, iron, linen, ship timber and esparto, a local product for making rope.[112] Caesar used cities to store his headquarters' baggage, which included the army's money (*pecunia publica*) and documents (*litterae publicae*), the commander's personal baggage (which could be considerable), the army's train (*impedimenta*), hostages, remounts and provisions (*frumentum*).[113] Additionally, extra weapons and armor were kept in such bases.[114]

An operational base also functioned as a secure location to gather forces before the campaign; as winter quarters during protracted wars and were particularly important during sieges. When the army was forced to remain immobile, local resources were quickly used up and everything had to be brought in by way of supply lines. An early example is noted by Polybius during the siege of Agrigentum in 262 B.C.:

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[109] [Caes.] *BAfr.* 36.
[110] Livy 22.40.8.
[111] Livy 26.43.8.
[112] Livy 26.47.5–10: he says that he found varying accounts of the amounts of materiel captured in his sources.
[113] Caes. *BGall.* 7.10,55.
[114] [Caes.] *BAfr.* 89.

> [Roman] supplies and other materials were collected by [the allies]
> and brought to Herbesus and [the Romans] themselves constantly
> fetching in livestock and provisions from this city which was at no
> great distance, kept themselves abundantly supplied with whatever they
> required.[115]

When the Romans besieged Syracuse in 213–211 B.C., they used the
city of Murgantia, about 50 miles to the northwest as their opera-
tional base. Livy says "there a great quantity of grain and supplies
of every kind (*commeatus . . . omnis generis*) had been accumulated for
the Romans."[116] After Murgantia was betrayed to the Carthaginians,
Marcellus collected supplies at a camp near Leontini, about 20 miles
from Syracuse, to support the siege.[117] Appian reports that the Roman
army of 84,000 besieging Carthage in 149–146 B.C. had supply
difficulties and had to use Hadrumentum, Leptis, Thapsus, Utica and
Acholla as bases.[118]

When possible, the Romans used seaports as operational bases.[119]
In 169 B.C., during the Third Macedonian War, the praetor in charge
of the Roman fleet, Gaius Marcius Figulus sent part of his fleet to
Oreus, a port on the northern coast of Euboea. Figulus made this
decision:

> . . . thinking that this city was most suitable for the forwarding of sup-
> plies (*commeatus*) to the armies in Macedonia and Thessaly.[120]

Oreus was, indeed, well placed from a logistical point of view. It lay
across the Gulf of Volo from the Thessalian port of Pagasae on a
major road to Larissa with the Magnesian and Macedonian coastlines
in easy reach. If one controlled the seas, islands made ideal opera-
tional bases: the island of Thasos served as a base for the Republican
forces at Philippi (42 B.C.) some 100 *stadia* (about 12 miles) distant.[121]

Well-situated cities might repeatedly served as operational bases.
Utica, the main port of North Africa at the time, served as a base
for Roman operations in 149–146 B.C. and again in 47 B.C.[122]
Plutarch describes the latter case as follows:

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[115] Polyb. 1.18.5.
[116] Livy 24.37.10.
[117] Livy 24.39.11.
[118] App. *Pun.* 13,94.
[119] App. *BCiv.* 5.12,116; Tac. *Ann.* 13.39; Kissel (1995) 67ff.
[120] Livy 44.13.11.
[121] App. *BCiv.* 4.13,106.
[122] App. *Pun.* 11,75; Plut. *Cato Min.* 55.1.

> [Cato] brought in a great abundance of grain, and perfected the walls
> by building towers and running formidable trenches and palisades in
> front of the city. To the men of Uticia of military age he assigned the
> palisades for quarters, and made them give up their arms to him. . . .
> Moreover he sent out great quantities of arms and stores (*chremata*) and
> grain to the Romans in their camp, and in a word, made the city a
> store-house for the war.[123]

Byzantium was the base for a series of Roman wars from the 2nd
century B.C. onwards. Indeed, the Byzantines complained to the
emperor Nero about the burden caused by armies and their supply
lines passing through their territory because of its strategic location.[124]
Seleucia of Pieria, the port of Antioch, served as one for a whole
series of expeditions against the Parthians.[125]

   Operational bases often received improvements to their port facil-
ities in order to serve better as supply conduits. Polybius describes
the work that had been done on New Carthage, the Carthaginian
base in Spain during the Second Punic War:

> . . . an artificial communication had been opened between the lagoon
> and the neighboring sea for the convenience of shipping, and over the
> channel thus cut thought the tongue of land that separates lagoon and
> sea a bridge has been built for the passage of beasts of burden and
> carts bringing in supplies.[126]

Octavian built port facilities at Forum Julii (Fréjus) to support his
operations against Sextus Pompeius, and on the Bay of Naples, the
Portus Julius. After his victory at Actium, permanent port facilities
were built at Misenum on the Bay of Naples and at Ravenna on
the Adriatic. These remained the major bases for the Roman fleet
for the entire Imperial period.[127] Arrian, in his inspection tour of
the eastern Black Sea coast, paid special attention to ports.[128] The
Roman emperors put considerable resources into improving trans-
portation facilities certainly with an eye to military supply. A mile-
stone of 75 A.D., found near the hippodrome of Antioch, records
the construction by various military units of a three-mile stretch of

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[123] Plut. *Cato Min.* 58.3.
[124] Tac. *Ann.* 12.62; cf. Dio Cass. 75.14.4.
[125] Heichelheim (1944) 114; Rougé (1975) 182; van Berchem (1985) 47–87; Kissel
(1995) 72–74; cf. Polyb. 5.58.8.
[126] Polyb. 10.10.12–13.
[127] Keppie (1984) 152–3; Starr (1989) 68–69.
[128] Arr. *Peripl. M. Eux.* 3.1, 4.1; Isaac (1992) 48.

what is probably a canal connecting the Orontes and the Kara Su.[129] This and a similar project at Seleucia in Pieria were certainly undertaken by Vespasian to improve military supply.[130] This construction may be connected to the creation of the Syrian fleet (*classis Syriaca*), although this is first directly attested under Hadrian.[131]

Operational bases could also be placed at river ports.[132] The city of Ambracia, about 10 miles upriver from the Gulf of Actium, almost certainly served as the Roman operational base during the first phases of the Third Macedonian War. From there an overland supply line stretched another 90 miles through Gomphi to Larissa in Thessaly.[133] Caesar made frequent use of river ports to support his military campaigns, as he often operated far inland.[134] Appian notes the attraction of Segesta on the Danube to Augustus, campaigning in the region in 35 B.C.:

> [Segesta is] a city strongly fortified by the [Danube] river and by a large ditch encircling it. . . . For this reason Augustus greatly desired to possess it as a magazine (*tamieion*) convenient for a war against the Dacians and the Bastarnae on the other side of the Ister, which is there called the Danube . . . the Save flows into it and Augustus caused the ships to the built on the latter stream to bring provisions to the Danube for him.[135]

Under the Empire all the legionary bases were on major rivers (with one exception: Leon in Spain) and served as operational bases.[136]

Many factors were important in choosing an operational base.[137] Of Utica, Appian says it had:

> . . . good anchorage and numerous landing places for disembarking armies, at a distance of 60 stadia (8.5 miles) from Carthage and well-situated as a base of operation against it.[138]

The presence of a large number of Italian merchants at Vaga in Numidia was one factor, according to Sallust, in Metellus's decision

[129] *AE* 1983.927; van Berchem (1985) 70–1, 85–7; Kissel (1995) 72–74.
[130] Millar (1993) 86–8.
[131] Van Berchem (1985) 62–3.
[132] Anderson (1992) 82–3.
[133] Livy 42.48.9–10,55.5.
[134] Caes. *BGall.* 1.38.3–4; 7.55; Labisch (1975) 77–8, 91, 121–4.
[135] App. *Ill.* 4,22.
[136] Rickman (1971) 235–6; Richmond (1982) 33; Isaac (1992) 102.
[137] Polyb. 1.56.1–10 lists them for Hamilcar Barca's operational base in Sicily in 247 B.C.
[138] App. *Pun.* 11,75.

to choose it as an operational base.[139] In preparation for the siege
of Jerusalem in 70 A.D., Titus ordered his troops to concentrate at
Caesarea, rather than at Joppa or Jamnia, cities closer to Jerusalem.[140]
Caesarea provides a good example of the factors the Romans con-
sidered when selecting an operational base. Though the Romans
could, and did, unload cargo directly onto beaches,[141] they preferred
to use ports whenever possible.[142] The vast amounts of grain that
the army transported required the proximity of storage-facilities, and
the availability of a trained work force.[143] Caesarea had the advan-
tage of good harbor facilities and boasted a sizable Roman com-
munity, including numerous merchants, who could be counted on
for enthusiastic support of the war effort.[144] As Caesarea was the
procuratorial seat and center of Roman administration in Judaea,
trained personnel, such as accountants and scribes, were available to
help handle logistical matters. In addition, the territory of Caesarea
produced a wide variety of foodstuffs and industrial items, and was
an emporium for the entire province in its trade with the rest of the
Empire.[145] As Fergus Millar points out, the fact that Caesarea had
been Vespasian's primary operational base throughout the Jewish
War is certainly connected to its receiving the status of Roman colony
soon afterwards as *Colonia Prima Flavia Augusta Caesarea*.[146] While
Caesarea was an excellent base, it was not the only one. The Romans
also used the port of Ptolemais (later the Crusader city of Acre) for
their operations in Palestine.[147]

Clearly, in order to be used effectively, an operational base had
to be free from enemy harassment let alone control. For the Spanish
campaign of 214 B.C., Gnaeus and Publius Scipio established Cas-
trum Album (Alicante) on the coast as an operational base; when it
became untenable due to enemy activity the base had to be moved
to Mons Victoria (site unknown).[148] Thus, one important element of
maintaining an operational base was sufficient fortification.

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[139] Sall. *Iug.* 47.2.
[140] Jos. *BJ* 4.659–63.
[141] Livy 41.3.1.
[142] Kissel (1995) 67.
[143] Houston (1988) 553, 561–2; Rougé (1975) 178–184.
[144] Levine (1975) 16, 31; Beebe (1983) 204–5.
[145] Levine (1975) 19–20, 49.
[146] Millar (1993) 73, 84–5.
[147] Isaac (1992) 322–3.
[148] Livy 24.41.3–4.

Generally, the Romans used cities as operational bases; but when campaigning in a region with few suitable urban areas, they would construct a base from scratch. In 215 B.C. Q. Fabius Maximus established the Claudian Camp near Suesulla as an operational base for the fighting in Campania. By 212 B.C., it had become so important that a praetor, C. Claudius Nero, was assigned to administer its operation.[149] Second-century B.C. Spain did not have enough cities to serve as operational bases for sieges, particularly in the region beyond Numantia and the Ebro River route, so Aemilius Lepidus built and fortified an operational base when he besieged the Vacaeian capital of Pallantia in 136 B.C.[150] Caesar sometimes transformed legionary camps into operational bases,[151] a practice that was increasingly followed under the Empire. An abandoned fortification from a previous campaign also might be reoccupied in order to provide an operational base. For example, during his campaign against the Chatti in 15 A.D. Germanicus "erected a fort over the remains of his father [Tiberius's] works on Mount Taunus [the Höhe between the Rhine and the Nidda]."[152]

In the first century the army assigned more and more legionary and auxiliary units to permanent camps.[153] Such camps normally stored sufficient supplies to support their garrisons for a considerable period. Assuming a daily ration of 850 grams a wheat a day, 4,800 legionaries needed about 1,500 metric tons of wheat a year, an amount that would require about 2,000 m^3 of granary space (plus the additional space needed for other foodstuffs). A timber granary at the legionary fort of Inchtuthil had an estimated capacity of 6,367 m^3: this supports Tacitus's statement that forts in Britain held at least year's supply of grain.[154] Such garrisons could easily be transformed into bases for offensive operations. Archaeological evidence can indicate when the Romans transformed a garrison fort into an operational base. In his study of British military granaries, Gentry calculated the proportion of the granary floor space to the entire ground area of British forts. In the case of six timber granaries, this proportion ranged from 0.4 to 2.8 percent, with an average of around 1.9 per-

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[149] Livy 23.48.1–2; 25.3.2.
[150] App. *Hisp.* 13,81.
[151] Caes. *BGall.* 6.32.
[152] Tac. *Ann.* 1.56.
[153] Kromayer-Veith (1928) 528–9, 540; Johnson (1981) 2–3.
[154] Tac. *Agr.* 22.2; Rickman (1971) 238; Gentry (1976) 34.

cent. In thirty-eight stone granaries (from both auxiliary and legionary forts) the proportion ranged from 0.7 to 3.8 percent, averaging around 1.8 percent.[155] At South Shields in the Severan period (193–235), however, the proportion of granary to total floor space dramatically rose to 14.5 percent.[156] This strongly suggests that South Shields served as a supply base for a force much larger than the garrison. South Shields's use as an operational base might well date to Septimius Severus's campaigns in northern Britain (206–211).[157] At Rödgen, a fortress site in Germany, the relatively large dimensions and the number of the granaries are even more striking. Within a space of 3.3 hectares the large, oval-shaped fort contained three large granaries, totaling almost 3,300 m^2 of floor space, a headquarters building, and barracks. Even if these three granaries were the only ones at Rödgen, and each had only a single story of 5 m, they could represent 16,500 m^3 of storage space, almost three times Inchthuthil's capacity. As there were probably more than three granaries present at Rödgen, and all were probably over one story, the actual storage capacity was doubtless larger. The excavators postulate Rödgen was a "depot and communications center" built around 11 B.C. and associate it with Drusus's campaigns across the Rhine.[158] It is more likely that Rödgen was an operational base, rather than merely a depot or a supply dump.

Winter Quarters

The Roman army, like others in antiquity, generally did not campaign during the winter months—December, January and February.[159] If a war had not ended by this time, the army would retire into winter quarters (*hiberna*), primarily due to the lack of fodder available for animals.[160] Livy notes that during the 2nd Punic War, the consul Marcellus "set out from winter quarters as soon as there was

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[155] Gentry (1976) 30, Table 1 and 3.

[156] Rickman (1971) 290. Note that under Hadrian (117–138 A.D.) the proportion was only 1.5 percent.

[157] Anderson (1992) 31–2.

[158] Rickman (1971) 239–40; Keppie (1984) 166; Gentry (1976) 30, Table 1. Horreum A at Rödgen measured some 47.25 × 29.25 m., Horreum B 29.5 × 30 m., and Horreum C 33.5 × 30.7 m.

[159] Lynn (1993) 12.

[160] Le Bohec (1994) 155ff.

abundance of pasture in the fields."[161] The onset of the winter months
also made it difficult to transport supplies from a distance.[162] Armies
would generally leave their winter quarters at the beginning of spring
(*primum ver*), that is, March 1st.[163]

Winter quarters were often placed in towns and cities. For example,
in the winter of 200–199 B.C. and 188–187 B.C. the Roman army
campaigning in Macedonia quartered in the city of Apollonia,[164] in
168 B.C. in Amphipolis.[165] In the circumstances, troops quartered in
houses, in contrast to the normal Roman practice of keeping their
troops in camps during campaigns. This explains the complaint of
an embassy from Chalcis that the Roman navy was billeting its sailors
in private houses in summer, as if they were in winter quarters.[166]
Onasander, writing in the time of Claudius, says the army wintered
in buildings, not tents,[167] and Tacitus notes that when, in the winter
of 69–70 A.D. the Third Legion was stationed in Capua, "its nobler
houses were ruined" by troops living in them.[168]

Winter quarters were sometimes established in villages and towns.
During his campaign in Nearer Spain in 193 B.C., Gaius Flaminius
put his troops in "small winter stations (*hibernacula*)."[169] Caesar, oper-
ating in Gaul, in which there were few cities, wintered his army
either in specially-built camps (*castra hiberna*) or dispersed in Gallic
villages and towns.[170] For various reasons an army might spend the
winter "under canvas (*sub pellibus*)," i.e., in tents. During the Pyrrhic
Wars (280–275 B.C.), for example, the Senate ordered the consul
Publius Valerius to spend the winter of 280–279 B.C. in tents as a
punishment for his defeat at the battle of the Siris River.[171] In 190
B.C. the consul Lucius Scipio, seeing that Antiochus III was not anx-
ious to fight, called a council to discuss the alternative of keeping
the troops in tents or withdrawing to winter quarters.[172] The decisive

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[161] Livy 27.12.7.
[162] Livy 34.34.2–6.
[163] Livy 39.30.1.
[164] Livy 31.18.9; 38.41.10.
[165] Livy 45.8.8–9.1.
[166] Livy 43.7.11.
[167] Onas. *Strat.* 9.1.
[168] Tac. *Hist.* 4.3.
[169] Livy 35.7.7.
[170] Caes. *BGall.* 1.54; 2.35; 3.28; 4.38; 5.53; 6.44; 7.90.
[171] Front. *Strat.* 4.1.24.
[172] Livy 37.39.1–2.

victory at Magnesia (190 or 189 B.C.) made this a moot question. During Tiberius's German campaign of 4 A.D. the Roman army wintered at the source of the river Lippe, almost certainly in tents.[173] Domitius Corbulo had his army winter in tents over a winter during the Armenian War, in 55–57, possibly due to the lack of cities in Armenia Minor.[174]

Winter quarters and operational bases had very similar functions. Indeed such bases often served as winter quarters: Aquileia, for example, served as both an operational base and as winter quarters for the Roman armies during the Istrian War (178–177 B.C.).[175] One city might not be large enough for the entire army to winter, in which case the commander assigned the troops to several locations. As Dio Cassius puts it, this dispersion also allowed the army to:

> . . . keep guard over the strategic points and secure an abundance of provisions.[176]

Livy says that during the winter of 198–197 B.C., Flamininus distributed his army in winter quarters through the Greek regions of Phocis and Locris.[177] Similarly, after his victory at Magnesia in 190 B.C., Lucius Scipio dispersed his army to winter in three cities: Magnesia itself, Tralles and Ephesus.[178] In the winter of 171–170 B.C., the consul Licinius Crassus sent part of his army "throughout all Thessaly in such a way that all had comfortable winter quarters and formed a protection for the cities," other troops went into winter throughout Boeotia in central Greece, and about 2,000 in Ambracia, the Roman operational base.[179] As Caesar's army in Gaul grew in size, he also dispersed it over a larger and larger area of that country.[180] Too wide a dispersal of troops, however, left the army vulnerable to attack in detail: a good commander balanced logistical and security considerations. Velleius Paterculus praises the emperor Tiberius for his skill in placing his troops in winter quarters.[181]

The Romans seem normally to have imported provisions for the

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[173] Vell. Pat. 2.105.3.
[174] Tac. *Ann.* 13.35; see Wheeler (1997) 396.
[175] Livy 41.5.1–2; 41.10.1–2.
[176] Dio Cass. 50.9.3.
[177] Livy 32.32.1.
[178] Livy 37.45.19.
[179] Livy 42.67.8–9.
[180] Caes. *BGall.* 6.44; 7.90; Keppie (1984) 87.
[181] Vell. Pat. 2.111.4

army in winter quarters, as they did during the campaign itself. Livy
has the Roman commander Quinctius Flamininus consider the impor-
tance of access to the sea in his choice of winter quarters after the
unsuccessful siege of Atrax in 198 B.C.:

> The consul [Flamininus] . . . realized that there was no . . . way to win-
> ter his troops far from the sea and in a region wasted by the calami-
> ties of war . . . and because there was no harbor on the whole coast
> of Acarnania and Aetolia which could both accomodate the fleet which
> brought supplies (*commeatus*) to the army and at the same time provide
> shelter for wintering the troops, Anticyra in Phocis, facing the Gulf of
> Corinth, seemed the most suitable place for this purpose, because it
> was not far from Thessaly and the enemy's country. . . .[182]

Of course, strategic considerations might outweigh the ease of supply.
Later in the campaign, Flamininus moved his *hiberna* forward, to
Elatea in Locris, a position which allowed him to cover the passes
into central Greece, and stayed there over three winters.[183] In 107 B.C.,
Sallust notes that Marius "proceeded . . . into his winter quarters, for
he had decided to winter in the coastal towns for the sake of sup-
plies (*commeatus*)."[184] In 113–4 Trajan's troops wintered in Galatia, and
an inscription from Ancyra records that Ti. Julius Severus, grandson
of King Deiotarus and clearly the most powerful person in Galatia,
"supplied the army wintering in the city and accompanied them on
their way to the Parthian War."[185]

   In certain circumstances the army might go into "winter" quarters
before the onset of winter. After his campaign against the Galatians
in 189 B.C., for example, Manlius Vulso went into winter quarters
in "mid-autumn (*medium autumni*)" probably October, because of the
cold weather in central Anatolia.[186] Germanicus moved his forces
into winter quarters "when the summer was at the full (*aetate iam
adulta*)" (probably July), for disciplinary reasons.[187] An army might
also go into winter quarters due to supply problems. In 153 B.C.,

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[182] Livy 32.18.1–4.
[183] Livy 33.27.5; 34.25.2, 48.2.
[184] Sall. *Iug.* 100.1.
[185] *IGRR* 3.173 (Ancyra, early 2nd c.): *[Ti. Iou]l(iou) Seouêrou . . . apodexamen[o]n te strateumata ta paracheimêsanta en têi polei kai propempsanta [ta] parodeuonta epi [to]n pros Pa[r]thous polemon. . . .*
[186] Livy 38.27.9.
[187] Tac. *Ann.* 2.23. The Romans divided the summer, like the other seasons, into three months: the first was *nova*, the second *adulta* and the third *praeceps* (Serv. *ad Georg.* 1.43). Thus, Germanicus is moving into winter quarters in July.

Nobilior's supply base at Ocilis, which provisioned the attack on Numantia, joined the Celtiberian revolt, which forced him into early winter quarters.[188]

Preparing winter quarters properly—making sure they were secure and had adequate provisions—was an important part of the organization for war. Armies sometimes did not store up enough grain for the whole winter in such quarters. For example, when Perseus made a surprise attack on the Romans besieging Uscana, in the winter of 169 B.C. the latter were forced to surrender, in part because "there was no supply even of grain or of anything else in the city, as was natural when the siege was unexpected."[189] In discussing the disastrous Parthian campaign of Caesennius Paetus in 62 A.D., Tacitus notes that the Roman commander began the campaign, although his "winter quarters [were] still inadequately protected, and no provision [had been] made for the supply of grain (*res frumentaria*)."[190]

Going into winter quarters did not always mean the end of operations for the year. Indeed, there are numerous examples of fighting after the onset of winter. During the siege of Carthage, Scipio took the city of Nepheris "at the beginning of winter."[191] Gaius Flamininus fought several battles in Hither Spain during the winter of 193 B.C.[192] In January, 110 B.C., Aulus Postumius Albinus, left in command of the Roman forces in winter quarters while his brother, the consul Spurius Postumius, returned to Rome, made a raid on the Numidian town of Suthul.[193] Over the winter of 107–106 B.C.:

> Marius having settled his army in winter quarters, went with his light-armed cohorts (*expeditae cohortes*) and a part of the cavalry into the desert, in order to besiege a stronghold of the king, which Jugurtha had garrisoned with deserters only.[194]

Of course, winter quarters in Africa must have been quite different from those in colder climes.[195] Dio Cassius says that since his army wintered in 46–45 B.C. in Spain in "miserable little huts," Caesar

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[188] App. *Hisp.* 9,47.
[189] Livy 43.18.9.
[190] Tac. *Ann.* 15.8.
[191] App. *Pun.* 18,120.
[192] Livy 35.7.7.
[193] Sall. *Iug.* 37.3.
[194] Sall. *Iug.* 103.1.
[195] As suggested by Dennis Kehoe (personal correspondence).

was compelled to keep fighting despite the season.[196] Agrippa in-
vaded Pannonia in 12 B.C. "in spite of the fact that winter had
begun."[197]

Tactical Bases

The tactical base served a function similar to the operational base,
but it was set up in the direct vicinity of the enemy. At the outset
of a military operation, the Roman army advanced from the oper-
ational base and established a tactical base.[198] As the army moved
forward, so did the tactical base and previous tactical bases were
converted to depots, forming a supply line back to the operational
base. The tactical base served as a collection point both for supplies
transported from the operational base and food and fodder gathered
in the army's vicinity. Polybius describes this in the context of
Hannibal's campaign in southern Italy in 216 B.C.[199] The tactical
base was also used to store various type of materiel such as siege
equipment, which might be left secured for a particular operation,
leaving the army freer to maneuver.[200]

Cities in the area of operations occasionally served as tactical bases.
During Vespasian's campaign in western Galilee in 68 A.D., Sep-
phoris probably functioned as such tactical base, supporting Placidus's
raids throughout the region.[201] The Romans took Gabara before
attacking Jotapata and built a road from the former to the latter.
Very likely Gabara, a toparchal capital, had large storage facilities
and probably served as the tactical base for the siege.[202]

The Roman army built and fortified a marching camp each and
every day it moved on campaign and this camp normally served as
its tactical base.[203] The standardization and delegation of labor that
allowed the Romans to set it up and fortify it rapidly were impor-
tant elements in the success of their army from the 3rd century B.C.

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[196] Dio Cass. 43.32.7.
[197] Dio Cass. 54.28.2.
[198] Le Bohec (1994) 131–7.
[199] Polyb. 3.107.3–4.
[200] Caes. *BGall.* 6.5.6; 6.32.5.
[201] Jos. *BJ* 3.59.
[202] Avi-Yonah (1976) 30.
[203] Kromayer-Veith (1928) 590; Goldsworthy (1996) 111–113.

onwards.[204] In the imperial period soldiers might go long periods without active campaigning, thus building temporary or practice camps became a regular part of training.[205]

The practice of building a fortified camp on a daily basis made a deep impression on Rome's friends and enemies alike. Livy says that Philip V, on seeing Sulpicius Galba's camp near Athacus during the 2nd Macedonian War:

> admired its whole arrangement and each section allotted its own place, with the rows of tents and also the well-spaced streets between, and that he remarked that no one could believe that that camp belonged to barbarians.[206]

Polybius and Josephus both describe the daily Roman camp in detail, and express admiration for the practice.[207]

Logistical considerations were important elements in the siting and organization of Roman camps. Such a camp ought not be placed too close to an enemy: before the battle of Ottolobum in 200 B.C. Sulpicius Galba at first built a camp only one mile from the Macedonian lines, but the difficulty in foraging led him to move it to a site eight miles away.[208] Polybius notes many logistical details in his description of a Middle Republican camp: the legionary soldiers are placed, he writes, "in the direction which seems to give the greatest facilities for obtaining water (*hudreia*) and foraging (*pronoma*),"[209] and room was allotted behind the tribunes' tents for their horses, mules and baggage.[210] Polybius also indicates where the Romans stored military supplies (*chorêgia*), but their exact nature is not entirely clear. Polybius writes:

> The spaces . . . to the right and left of the *praetorium* are used in the one case for the *agora* and in the other for the *quaestorium* (*tamieion*) and the supplies (*choregia*) of which [the quaestor] is in charge.[211]

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[204] Front. *Strat.* 4.1.15 claims the Romans got the idea from King Pyrrhus, but Plut. *Pyrr.* 16 has that king admiring the Roman camp.

[205] Horsmann (1991) 66–70, 77–81, 164–171.

[206] Livy 31.34.8.

[207] Polyb. 6.40.1–14; Jos. *BJ* 3.76–88.

[208] Livy 31.36.5–6.

[209] Polyb. 6.27.3.

[210] Polyb. 6.27.5.

[211] Polyb. 6.31.1–2; also 6.31.5, 32.4,8.

Since the Roman soldier did not normally buy his provisions (as did Greek troops), Polybius is obviously not using *agora* in its primary meaning of "marketplace." Appian, for one, frequently uses the word *agora* to refer to military supplies.[212] So it is likely that Polybius's *agora* is a *horreum* or granary, from which provisions were issued to the individual units. Of course, this leaves open the question of what stores the Romans kept in the *quaestorium*. In discussing the place-ment of guards, Polybius says that three pickets were placed at the *quaestorium*, but does not mention any guards for the *agora*.[213] Since the supplies clearly needed to be guarded, it is probable that the quaestor was also in charge of the *agora* and that the pickets guarded both areas. Polybius notes that a 200-foot area behind the wall of the camp was kept empty for security reasons. It was here that cattle and other booty were stored.[214]

Excavations at Numantia, dating to 134–133 B.C., confirm the existence of *horrea* in Roman siege camps of the Republican period. According to Rickman, they are "startlingly close" in layout and construction to Imperial examples of garrison *horrea*.[215] Appian stresses the importance of camps as tactical bases in his description of the battle of Philippi in 42 B.C.:

> [There are] two . . . hills at a distance of 18 *stadia* from Philippi itself and 8 *stadia* from each other. On these hills Cassius and Brutus were encamped . . . between these hills. lay the main pass from Europe to Asia. . . . Across this space they built a fortification from camp to camp . . . so that the two camps became virtually one. Alongside this fortifi-cation flowed a river . . . and behind it was the sea where they could keep their supplies (*ta tamieia*) and shipping (*enormisma*) in safety. The depot (*tamieion*) was at Thasos, 100 *stadia* distant.[216]

This is an excellent illustration of an operational base (in this case Thasos) funnelling supplies to the tactical base (Cassius's and Brutus's camp).

Oddly enough, Ps.-Hyginus's plan of an Imperial Roman military camp does indicate any place for *horrea* or storage facilities. Ps.-Hyginus does say that the baggage animals belonging to units, and

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[212] App. *Pun.* 4,25; 10,72; 14,99; *Syr.* 4,20; *Mith.* 11,72; 15,99; *Hisp.* 13,81; *BCiv.* 1.8,69; 2.8,53; 4.8,60; 5.6,53.
[213] Polyb. 6.35.5.
[214] Polyb. 6.31.13.
[215] Rickman (1971) 251.
[216] App. *BCiv.* 4.13,106.

presumably their packs, were housed with the men,[217] but there must have been space for provisions and animals belonging to the army as a whole. This omission may be due to the fragmentary nature of this text, but perhaps the type of marching camp described actually lacked such storage facilities.

Storage

The large-scale storage of grain, as well as other foodstuffs, in state granaries was common in antiquity, and the Romans had state *horrea*.[218] The army needed to store its provisions at many points between the farm and the soldiers' mess, and there is ample evidence, written and archaeological for the Roman army's expertise as storing provisions.[219] Proper storage of supplies was vital: grain and other supplies had to be secured from loss through theft, destruction by the elements and spoilage. The lack of proper storage facilities in Caesar's camp during the African campaign (46 B.C.), for example, led to the destruction of a large amount of provisions in a thunderous hail-storm.[220]

The ancients had the technology to store grain for as long as ten years.[221] The Romans understood that in order to preserve grain for the longest possible period, the temperature and moisture content of the grain had to be kept as low as possible. This minimized the amount of oxygen (which retarded germination) and discouraged the presence of vermin.[222] Granaries were built with great care and ingenuity: in order to keep the grain as cool as possible, sometimes with raised floors and built-in ventilators.[223] If suitable storage facilities were not available, the army would build them.[224]

Computing the amount of grain that could be stored in Roman granaries is problematic. Various types of grain take up different

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[217] [Hyg.] *De met. castr.* 1.
[218] Herz (1988) 115–117.
[219] Junkelmann (1997) 66–72.
[220] [Caes.] *BAfr.* 47.
[221] Livy 42.12.8; Front. *Strat.* 3.5.2.
[222] Columella *RR* 2.20.6; Gentry (1976) 2; Le Bohec (1994) 160.
[223] Varro *Rust.* 1.57.3; Vitr. *Arch.* 6.6.4; Plin. *HN* 18.301–3; White (1970) 196–7; Gentry (1976) 9–11.
[224] Livy 44.9.10–11.

amounts of storage space and one can usually not say how tall granaries were, or to what level the grain was stored.[225] Nevertheless, Gentry's estimate that each metric ton of wheat or barley took up between 1.3 and 1.4 cubic meters, when stored in bulk, is reasonable.[226]

Under ancient conditions, grain could be stored in three ways: (1) piling it directly onto the floor, (2) confining it in bins, or (3) stacking it in bags or sacks.[227] Heaping up the grain used all the space in the granary, but made it difficult to rotate the old and new stock. If one stored the grain in timber bins, the loss of storage area is quite significant, around 30 percent, and no evidence of such bins is found in excavated sites. Storing grain in sacks would have been the most practical and convenient method, particularly from the army's perspective. Although there is about a 15 percent loss of storage space if grain is stored in sacks, the turnover of stock is much easier. In addition, the space between the sacks facilitates the dissipation of water vapor and heat, and keeps the grain cooler and dryer. Using sacks also makes it more convenient to issue a measured quantity of grain to army units. Since each Roman soldier received 850 grams of grain per day, two sacks could easily have carried the 70 kg. (150 lbs.) necessary for an 80-man century. It is interesting to note, in this regard, that the majority of excavated granaries show no traces of a loading platform, although many had porticoes.[228] This lack of a loading platform suggests that the Romans used sacks to transport and store grain, as sacks can be lifted directly from the cart to floor level without a loading platform. A portico enables grain to be off-loaded in relatively sheltered conditions, but has no impact on the method of loading. Trajan's Column illustrates what appear to be sacks of grain in use by the Roman army.[229]

A granary or *horreum* did not only store grain: the low temperature and ventilation in granaries helped to preserve fresh and salted meat, cheese, lard, vegetables, olive oil and wine. Frontinus refers to the "food supplies" (*alimenta*) stored in the *horrea* of the Roman army after the battle of Teutoburgerwald in 9 A.D.[230] Several *horrea*, such as those at Balbuildy and Ilkley in Britain, have revealed

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[225] Rickman (1971) 238; see Gentry (1976) 25–6.
[226] Gentry (1976) 25.
[227] Rickman (1971) 220, 248; Gentry (1976) 18–20.
[228] Gentry (1976) 12.
[229] Scenes XLVII, XVII [= Lepper & Frere (1988) plates XXXIV, LXXIX].
[230] Front. *Strat.* 3.15.4.

amphora fragments.[231] The author of the *African War* refers to a camp storing, in addition to grain, wine and oil, "other necessary items which had been gathered as provisions."[232] Storing all provisions used by the army in one place was more convenient, from an administrative viewpoint, as well as more secure.

Depots

A major constraint on the carrying capacity of a military force is the size of the train: wagons and pack animals take an enormous amount of space.[233] The tens of thousands of wagons or pack animals necessary to supply an army for the length of a campaign could not possibly have accompanied the soldiers, as the train would have been much too long.[234] The only possible solution to this difficulty is the use of convoys between depots or supply dumps.[235] Since supplies could be shuttled forward to the army over a series of intermediate storage depots, far fewer wagons and pack animals were necessary. Ancient armies routinely used depots when long-distance land transport was needed, due to the limitations of overland travel. This practice reduced the distance traveled by individual convoys, consequently reducing the strain on the animals and the amount of fodder needed, by allowing more time for grazing.[236]

Operational bases differ from supply depots, dumps or *étapes*; at the operational base provisions and other equipment are gathered, often from different sources, stockpiled and accounted for, and then sent onward to the army. Depots or *étapes*, in contrast, are used as intermediary bases, connecting the strategic with the operational and the tactical base.[237]

Armies with very primitive logistics might collect supplies in a single spot, but the use of a chain of depots forming a supply line

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[231] Gentry (1976) 26.

[232] [Caes.] *BAfr.* 43.

[233] Breeze (1986/87) 12–3.

[234] Engels (1978) 19–20.

[235] Goldsworthy (1996) 288; Kissel (1995) 61 n. 30.

[236] Lynn (1993) 17–8.

[237] Depots are called *étapes* in French and *Etappen* in German. In the original *étapes* used by early modern European armies soldiers purchased their own provisions, but by the mid-17th century, the French were setting up true depots along supply routes, which provisioned the army without payment.

indicates a sophisticated logistical system. The Achaemenid Persian
military used supply depots, for example, but the less developed clas-
sical Greek armies seldom did.[238] The Romans established supply
depots as part of their logistical system from at least the Middle
Republican period onward, although they are seldom mentioned in
the sources.[239] During the Second Punic War Hannibal captured a
granary (*horreum*) located at the village of Clastidium, which lay about
five miles south of the Po, on the road between Placentia and Tortona.
This was clearly a Roman depot storing supplies brought forward
from the operational base at Placentia.[240] Similarly, the "granaries"
(*horrea*) which Marcius Philippus ordered built along the supply route
from Thessaly to Macedonia were depots: the installations included
barracks (*tecta*) for the personnel transporting the supplies (*portantes
commeatus*).[241] The use of depots continued, and indeed expanded, in
the Imperial period.[242] A camp depicted on Trajan's Column is prob-
ably meant to represent such a storage depot, as indicated by two
parked wagons that are carrying barrels.[243]

Obviously, depots needed protection. Thus, references to "forts"
(Latin *castella*, Greek *phrouria*) in military sources often refer to places
where supplies were stored. Similarly, when sources mention a "gar-
rison" (*praedisium*), the term sometimes represents those soldiers sta-
tioned to protect depots: for example the troops who were ordered
distributed (*disponere*) in garrisons (*praesidia*) by the Senate in 168
B.C.[244] Dio Cassius mentions a *phrourion* where the Romans kept their
baggage (*skeue*), which was attacked by Mithridates in 68 B.C.[245] A
series of camps of the Augustan period—Holsterhausen, Haltern,
Oberaden and Anreppen—ran along the Lippe river, a tributary of
the Rhine.[246] As Keppie suggests, this may well represent a series
of depots supporting Drusus's and Tiberius's operations along the
Elbe. Indeed, the Roman base on the Aliso river, mentioned by both

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[238] Anderson (1970) 53.
[239] Gentry (1976) 27; Anderson (1992) 13.
[240] Livy 21.48.8–10.
[241] Livy 44.9.10–11.
[242] Kissel (1995) 60ff.
[243] Scene CXXIX [= Lepper & Frere (1988) plate XCVI]; Richmond (1982)
28–30, pl. 9.
[244] Livy 44.21.9.
[245] Dio Cass. 36.12.2.
[246] Schönberger (1985).

Dio Cassius and Velleius Paterculus, may well be Haltern.[247] When
Caesennius Paetus negotiated the withdrawl of besieged legions at
Rhandeia in 62 A.D., he agreed to turn over to the Parthians his
"forts and supplies" (*castella . . . et commeatus*), almost certainly his supply
depots in Armenia.[248] Describing the Jewish War of 66–70 A.D.,
Josephus refers to *phrouria* in a number of passages that may well
represent such depots.[249]

Depots could also be used along a water-borne supply line whether
a river or sea was being utilized. A series of shore depots discovered
along the south coast of England are probably connected with
Vespasian's campaigns in 43–44 A.D.[250] These would have been used
by small ships bringing supplies up the coast.

The Operation of Supply Lines

The Romans certainly used supply lines from the Middle Republican
period onward. These supply lines went over water—the Mediterra-
nean, other seas and rivers—as well as overland. The manner in
which the supply lines operated provide important information on
Roman military capabilities.

Sea Transport

Provisions for the army at war were routinely carried by sea.[251] When
possible a fleet would follow an army marching along the coast,
carrying its supplies.[252] Ships, of course, not only moved grain, but
transported many other types of foodstuffs, such as meat, fish, veg-
etables, oil, wine and salt.[253] It was the geography of their empire

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[247] Dio Cass. 54.33.4; Vell. Pat. 2.120.4.
[248] Tac. *Ann.* 15.14; Dio Cass. 62.21.
[249] Jos. *BJ* 4.446, 7.275.
[250] Middleton (1979) 91.
[251] Polyb. 8.34.3; Livy 26.39.19; 27.1–3; 32.14.7; 37.14.3; 41.1.3; 42.48.10; 44.7.10,
13.11, 29.3; Caes. *BCiv.* 3.47; [Caes.] *BAlex.* 43; Onas. *Strat.* 6.14; Plut. *Pomp.* 11.2;
Jos. *BJ* 3.416–7; Tac. *Ann.* 13.53; Dio Cass. 52.25.7; App. *Hann.* 6,34; *Pun.* 6,37;
14,99; *BCiv.* 2.8,49,54; 4.11,86; 5.11,98; *CIL* 8.14854 = *ILS* 2764 [= Dobson (1978)
no. 205] (Taccabor, 3rd c.): *C. Sulgio L. F. Pap Caeciliano . . . praeposito reliquationi clas-
sis praetoriae Misenatum piae vindicis et Thensaurus Dominicis et bastagis copiarum devehen-
dar(um)*; Kissel (1995) 282–289.
[252] Polyb. 3.97.6; Livy 38.41.8–10; Rougé (1975) 131; Casson (1989) 76–6.
[253] Rougé (1975) 79; Peacock & Williams (1986) 31; Anderson (1992) 59. Trajan's

that determined the Romans would moved most military supplies by
water. In both the Republican and Imperial periods, most Roman
provinces touched on the Mediterranean, the Black Sea or the Atlantic
Ocean. These interconnected seas provided a system of communica-
tions, giving the Romans a tremendous advantage in moving supplies
and troops from one part of the Empire to another. Indeed, only
Pannonia, Noricum, Raetia and Germania Inferior lacked direct
access to a sea or ocean. Major rivers, such as the Rhine, Danube and
Nile, also provided water access into areas distant from the sea.[254]

   Clearly there were benefits to sea-borne supply. Describing the
campaign of Philippi in 42 B.C., Appian invents the following speech
for Cassius:

> Provisions (*trophai*), the supply of which is the chief difficulty in large
> armies, they can obtain only from Macedonia, a mountainous region
> and the narrow country of Thessaly, and these must be carried to
> them overland with severe labor. . . . We have abundance, brought to
> us daily by sea without labor from all the islands and mainlands which
> lie between Thrace and the river Euphrates, and without hindrance,
> since we have no enemy in our rear.[255]

The Romans were well aware that moving supplies by ship was far
less expensive and much faster than conveying them by land.[256]

   On the other hand, sea transportation had its disadvantages from
the army's perspective. Seafaring was dangerous and required that
a large investment in money and in military assets be placed at sub-
stantial risk.[257] The ancients were well aware of these risks. In his
description of the 3rd Macedonian War, Livy makes King Perseus
say in encouraging his troops:

> Provisions for the enemy would come not only from a long distance,
> but subject to all the accidents of seafaring.[258]

Ancient ships were in fact quite vulnerable to storms: a sudden swell
could, and often did, destroy entire fleets. Among many sea disas-

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Column scenes II, III show river boats carrying barrels [= Lepper & Frere (1988)
plates V, VI].
   [254] Casson (1971) 226–227; Starr (1989) 75–76; Höckmann (1997) 239–247.
   [255] App. *BCiv.* 4.12,100.
   [256] The extent of the difference is controversial: Hopkins (1982) 84, 86 (Table 2)
estimates it at around 50 to 1.
   [257] Sippel (1987a) 42–3; Rougé (1975) 18–19.
   [258] Livy 42.52.12.

ters of the First Punic War, 800 merchant ships and their convoy
of 120 warships were entirely lost in a storm near Cape Pachynus
in Sicily in 242 B.C.[259] Not only could bad weather sink or dam-
age ships, but contact with sea water could spoil foodstuffs, espe-
cially grain.[260] Moreover, the threat of storms often prevented the
shipment of needed supplies, as happened to Aulus Gabinius, cam-
paigning in Illyricum in 47 B.C.[261] Despite the risks, dangers and
problems, the Romans used sea transport whenever possible.

   According to Vegetius, sea transport in the Mediterranean was
normally limited to between 10 March and 11 November and really
only safe between 27 May and 14 September.[262] The military gener-
ally observed these limits. When Antiochus III heard reports of
Romans sailing to Greece in 191 B.C. "this rumor was rendered
plausible by the fact that the season of the year was now suitable
for navigation."[263] In cases of extreme need, however, or in order to
gain surprise or advantage, the Romans did undertake sea transport
during the winter. During the siege of Athens in 87–86 B.C., Lucullus
set out with six ships in the dead of winter to try to reestablish
Sulla's supply lines.[264] Julius Caesar was renowned for his risk-taking,
including winter crossings: in 48 B.C., he shipped five legions from
Brundisium to Greece at the winter solstice,[265] and the next year
transported six legions and 2,000 cavalry from Lilybaeum in Sicily
to North Africa, embarking on 25 December.[266] Of course, these
crossings were undertaken in the extreme conditions of civil war. Not
everyone had Caesar's good fortune: when Crassus, in haste to begin
his eastern campaign in 54 B.C., transported his army from Brundi-
sium during the winter, he lost a large number of ships.[267]

   It is not surprising that Polybius, in his discussion of "The Art of
the Commander," recommends a thorough knowledge of how far
ships can travel by day or night, and the seasons in which sea travel
is possible.[268] Not only weather, but also enemy action threatened

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[259] Polyb. 1.54.7–8.
[260] Rickman (1980) 126–7; Anderson (1992) 65.
[261] [Caes.] *BAlex.* 43.
[262] Veg. *Epit.* 4.40.
[263] Livy 36.7.11.
[264] Plut. *Luc.* 2.2.
[265] Plut. *Caes.* 37.2; App. *BCiv.* 2.8,49.
[266] [Caes.] *BAfr.* 2.
[267] Plut. *Crass.* 17.1.
[268] Polyb. 9.13.6–7.

sea-borne supplies.[269] Another problem facing ancient commanders was the need to coordinate between his supply ships and land forces. In 198 B.C., for example, Flamininus had to send scouts to discover where his supply ships had landed.[270] The Roman army in Macedonia in 169 B.C. almost ran out of supplies because the transport ships were sent to the wrong port.[271]

Units moving by sea travelled along with their baggage trains. When Pompey transported seven legions from Sicily to Africa in 800 transports in 81 B.C., they traveled with provisions, ammunitions, money and siege-engines.[272] When Caesar ordered the XXXVIIth legion from Asia Minor to Alexandria by sea in 48 B.C., it shipped along with provisions (*frumentum*), weapons (*arma* and *tela*) and torsion artillery (*tormenta*).[273] Both Livy and Dio Cassius note that sea travel was deletorious for the animals of the train, who might need several days to recover.[274]

The Romans routinely carried supplies for the army in merchantmen or transport ships, called *onerariae naves* in Latin,[275] and *phortegoi, hokladai* or *skeuophorai neai* in Greek.[276] By the first century, ships could carry well over 900 metric tons (tonnes) of grain; vessels of 360 to 450 tonnes were not uncommon.[277] Rougé notes the difficulty of estimating the tonnage of ancient vessels, but estimates that average Roman merchant ships ran from 90 to 150 tonnes.[278] Houston's analysis shows that though the Chinese built 1000-tonne ships in the 13th and 14th century A.D., 80 percent of their seagoing craft were under 40 tonnes. Similarly, 16th century port manifests from London show that 56 percent were of 40 tonnes or less, 82 percent of 60 tonnes or less and only 4.7 percent were of 100 tonnes or more.[279] This suggests that the average Roman merchant ship probably weighed no more than 30 to 40 tonnes, and almost certainly less than 60 tonnes.[280]

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[269] See Chapter Seven, pp. 281–2.
[270] Livy 32.15.5–7.
[271] Livy 44.7.10–12.
[272] Plut. *Pomp.* 11.2.
[273] [Caes.] *BAlex.* 9.
[274] Livy 36.14.10; Dio Cass. 43.2.2.
[275] Livy 26.39.19; 27.15.4–5; 32.14.7; 36.7.17; 37.14.3; 41.1.4; 44.7.10.
[276] Polyb. 15.1.1; App. *BCiv.* 2.8,49; 3.8,63; 5.11,98.
[277] Casson (1971) 171–2; Landels (1978) 164; Houston (1988) 558–9.
[278] Rougé (1975) 74–78.
[279] Houston (1988) 553–60.
[280] Livy 35.37.7 refers to "light cargo vessels" (*onerariae leves*) in a military context.

In some cases, the military built vessels specifically to transport and supply the army. Tacitus describes the building of a fleet for Germanicus's invasion of Germany in 16 A.D.:

> Silius and Caecina were made responsible for the construction of a fleet. A thousand vessels were considered enough and were built for speed. Some were short craft with very little poop or prow, and broad-bellied, the more easily to withstand a heavy sea: others had flat bottoms, enabling them to run aground without damage; while still more were fitted with rudders to each end, so as to head either way the moment the oarsmen reversed their stroke. Many had a deck-flooring to carry military engines, though they were equally useful for transporting horses or supplies (*commeatus*).[281]

The authorities might also order the refit of older ships for military service: Livy cites the practice in the preparations for the Third Macedonian War in 172 B.C., although the ships in question were quinqueremes, not transports.[282]

A six months' supply of grain for a Roman army of 40,000 (912,500 *modii*) would have weighed some 6,320 tonnes, and could have been transported in approximately 200 30-tonne ships. This is a conservative estimate as our sources attest to supply fleets much larger than 200 ships. For example, when the consul Lucius Junius Pullus was sent to Sicily to transport supplies for the siege of Lilybaeum in 242 B.C., he shipped them in 800 transports protected by 120 warships—a fleet of close to a thousand sail. A fleet of 1200 ships took Sulla's army, and its supplies, from Greece to Italy in 83 B.C.[283] Even given the fact that these fleets carried much more than grain, the large numbers suggests that they were, on average, quite small.

Such large fleets carried more than just supplies, they transported troops and other equipment as well.[284] Scipio Africanus invaded Africa in 204 B.C. with 16,000 infantry and 1,600 cavalry in 400 transports and "a great number of smaller craft," along with a convoy of 52 warships. Appian specifically notes that in addition to "a plentiful supply of provisions (*agora*)" the fleet carried weapons and siege equipment.[285]

A supply fleet did not have to transport all the provisions for the

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[281] Tac. *Ann.* 2.6.
[282] Livy 42.27.1.
[283] Plut. *Sulla* 27.1. Other examples: Tac. *Ann.* 2.6; Plut. *Pomp.* 11.2.
[284] But see Casson (1989) 74 for the difficulties involved.
[285] App. *Pun.* 3,13.

entire campaign at once. Ships could easily make several round-trips in order to supply troops. When the sources refer to small supply fleets, they were probably involved in such ferrying of provisions. For example, the grain fleet of around 20 ships that was destroyed by Perseus near Oreus during the Third Macedonian War was certainly resupplying the Roman forces there.[286] Appian notes that Pompey's army in Greece drew its supplies from overseas, probably in a similar way.[287] In 47 B.C., Quintus Cassius Longinus gathered a fleet of 100 ships in Spain, with the intention of transporting an army to Africa supplying it there.[288] When the Caesarian army passed over to Macedonia during the Civil War of 42 B.C., Appian notes:

> . . . as the triumvirs did not have a plentiful supply of provisions (*trophas*) it was deemed important to cut off their convoys from Italy.[289]

This fleet also was probably ferrying supplies to a base in order to build up a sufficient amount of provisions. In order to support Antonius Primus's advance into Italy in 69 A.D., the Flavians, proposed to "fill the Po and the sea with convoys of provisions (*commeatus*)."[290] The Romans transported supplies by sea from Gaul to support the army fighting Julius Civilis's revolt of 69 A.D.[291]

When necessary, the Romans transported even water and firewood by sea, although such transport was expensive and inefficient. During the Dyrrachium campaign, Caesar prevented the Pompeian fleet under Bibulus from obtaining water or firewood ashore, forcing the latter to bring both items from Corcyra (Corfu) in merchant ships.[292] Later in the same campaign, the Pompeian Decimus Laelius blockaded Brundisium by placing a force on the waterless island of Pharos (Barra), supplying it with water brought by ship from Dyrrachium and Corcyra.[293]

Since supplying an army over water usually involved multiple trips, the speed of vessels is as important as their capacity in logistical planning. Many factors, however, preclude calculating the average

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[286] Plut. *Aem. Paul.* 8.2.
[287] App. *BCiv.* 2.10,66.
[288] [Caes.] *BAlex.* 51. The convoy never actually sailed.
[289] App. *BCiv.* 4.11,86.
[290] Tac. *Hist.* 3.52.
[291] Tac. *Hist.* 5.23.
[292] Caes. *BCiv.* 3.15.
[293] Caes. *BCiv.* 3.100.

speed of sailing vessels in antiquity: differing loads and rigging, changes in prevailing winds and circuitous routes resulting from the ancient preference for hugging the coastline. Sippel computes the average speed of an ancient ship as between 4.5 and 6 knots (8.3 to 11 k.p.h.) in favorable winds and 2 to 2.5 knots (3.7 to 4.6 k.p.h.) in unfavorable ones.[294] Casson argues that the average speed of a merchant vessel was as low as 2 knots, but admits this speed could be substantially increased if circumstances were favorable.[295] Even if one uses the lowest estimates of ancient ships' capacity and speed, the Romans certainly had the technology and the ships to support a large army by sea. A trip from Byzantium (an important depot for military supplies), to Gaza is recorded as taking 10 days in favorable winds, and 20 days in unfavorable winds.[296] Using the slowest figure, six months grain for 40,000 men, 6,320 tonnes, could have been transported by 70 30-tonne ships requiring three trips over that 120 day period.

Naval forces, often made up of tens of thousands of sailors, also had to be supplied—an element of logistics usually ignored by ancient and modern historians alike.[297] Livy notes that just before the decisive battle of Myonnesus in 190 B.C., the Romans' fleet was short of supplies and left the island of Samos to sail to Chios, the Romans' operational base.[298] Shortly thereafter, the Roman admiral Aemilius Regillus requisitioned 5,000 amphorae of wine from the island of Teos for the use of the fleet.[299] Livy mentions the purchase of supplies for the fleet during the 3rd Macedonian War.[300] Navies could provision sailors by accompanying supply ships or by periodically laying into port.[301] The Roman army normally used merchant ships under contract to carry supplies, although the possibility of a Roman state fleet of supply ships cannot be ruled out.[302] The "merchant marine" in these fleets normally is not counted as part of the logistical system; however, they would also had to have been fed.

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[294] Sippel (1987a) 41–42 n. 48.
[295] Casson (1951) 140–3.
[296] Casson (1951) 142–3.
[297] Lynn (1993) 13; Rougé (1975) 5.
[298] Livy 37.27.1–3.
[299] Livy 37.28.1–3.
[300] Livy 42.27.8.
[301] Polyb. 1.29.1.
[302] Erdkamp (1995) 187.

River Transport

When transporting commercial goods, the Romans always preferred rivers to roads, and the same principle applied to the movement of military provisions.[303] As noted above, large navigable rivers furnished access to inland regions: the Rhône into Gaul, the Rhine into Germany, the Danube into Pannonia, Dacia and Noricum, the Tigris and the Euphrates into Mesopotamia and the Nile into Ethiopia.[304] Millar points out, for the Romans in the Near East during Imperial times "all major military movements followed the rivers—the Euphrates, or Euphrates and Chabur, or the Tigris."[305]

As early as 218 B.C., Publius Cornelius Scipio used the Rhône to transport the baggage, and presumably the supplies, of his army.[306] In the same year Tannetum withstood a siege of Gauls in part by means of river borne supplies (*commeatibus fluminis*).[307] After Hannibal's victory at Trebia, Livy says:

> . . . The Numidian cavalry ranged far and wide, and any ground that was too rough . . . was covered by the Celtiberians and Lusitani. The result was the cutting off of all supplies (*commeatus*) from every quarter save such as were brought up the Po in ships.[308]

Livy reports that the Epirotes advised the consul Marcus Fulvius to besiege Ambracia in 189 B.C., in part because of the presence of "a navigable river, the Aretho [Aratthus], suitable for the transportation of the necessary supplies."[309] This allowed the Romans to move supplies brought by sea to the Gulf of Actium. Similarly, Cassius advised Crassus to advance along the Euphrates during his Parthian campaign of 54–53 B.C.:

> . . . for in this way the transports would keep them abundantly supplied with provisions by putting into their successive encampments.[310]

Augustus had ships built to carry provisions down the Save River to the Danube in order to support his campaign against the Pannonians

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[303] Middleton (1979) 82; Schlippschuh (1987) 87–8; Kissel (1995) 264ff.
[304] Strabo 4.12; 4.1.11; De Saint-Denis (1980) 564ff.; Höckmann (1997) 186.
[305] Millar (1993) 297.
[306] Polyb. 3.45.4.
[307] Livy 21.25.14.
[308] Livy 21.57.5; cf. Polyb. 3.75.3.
[309] Livy 38.3.11.
[310] Plut. *Crass.* 20.2; Dio Cass. 40.20.3.

in 35–34 B.C. and Arrian noted the navigibility of rivers in his inspection tour of the military posts of the Black Sea.[311]

River transport, however, was not without its problems. River level could be affected either by too much, or too little, rainfall. A dry spell lowered the water level of the Rhine River in 69 A.D., restricting the capacity of the supply lines, and leading to a shortage of provisions. Tacitus describes an incident during the drought:

> . . . The Germans started to drag to their bank a ship loaded with grain which had grounded on a bar. . . . Gallus did not wish to allow this and sent a cohort to rescue the ship . . . the two sides engaged in a pitched battle.[312]

Germanicus halved the number of troops in his fleet during his invasion of Germany in order to lighten his boats "in case it should have to navigate shallow water or should find itself grounded at ebbtide."[313] The navigability of low rivers was improved by the use of inflated animals skins attached to the boats' gunwales.[314] Conversely, heavy autumn rains caused the Rhine to overflow during the campaign against Julius Civilis's revolt of 69 A.D., causing supply problems for the Romans.[315] Even under normal conditions, hidden shoals and swift currents could ground or sink a riverboat.[316] Despite these problems, however, there were certainly less dangers associated with river travel than that over open seas.

The Romans built riverboats with a capacity of up to 34 metric tons. Most, however, were probably much smaller: a riverboat from the Roman period, recovered at Hasholme in Britain, had an estimated capacity of slightly under 9 tons.[317] Even a 9-ton ship, however, could carry the same load as about 18 wagons or 72 pack animals, so the advantage over land transport is obvious. The speed of riverboats, dependent on poling or being hauled by men or animals, was below that of ships, but certainly faster than overland travel. Relatively little power is necessary to move a riverboat—a single horse hitched to a barge can pull 250 times the load it could carry on its back.[318]

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[311] App. *Ill.* 4,22; Arr. *Peripl. M. Eux.* 8.1; 10.1; Isaac (1992) 48.
[312] Tac. *Hist.* 4.26–27.
[313] Tac. *Ann.* 1.70.
[314] Anderson (1992) 86.
[315] Tac. *Hist.* 5.23.
[316] Anderson (1992) 84.
[317] White (1984) 153; Anderson (1992) 83.
[318] Anderson (1992) 3.

Overland Transport

As the Romans expanded, defended and fought over their empire, they often found it necessary to operate away from the convenience of water-borne supply. In discussions of ancient supply lines, much has been made of the inferiority of ancient land transportation, particularly in comparison to that of the Middle Ages and later times. The major limiting factor in ancient land transportation, however, was not technology. It is true that there serious problems in ancient technology, particularly in long-distance land transportation, and that these difficulties were never really overcome until the development of the railroads in the nineteenth century.

Some historians claim that ancient armies could operate only 80–100 km. (50–60 miles) from a base supplying fodder.[319] This claim, however, is exaggerated. It is based on the assumption that fodder for the animals had to be transported with the pack animals themselves, thus making these animals a drain upon the army's supply, as well as its conveyors.[320] There is no question that ancient armies sometimes transported grain (particularly barley) for the use of animals, especially cavalry horses.[321] But the Romans did not, as has been argued, need to carry a daily ration of 4.5 kg. (10 lbs.) of hard fodder for every animal in service.[322] As discussed above, most pack animals would have needed no more than 2.5 kg. (5.5 lbs.) of grain, and even this amount could have been reduced by the use of grazing.[323]

The Romans certainly were capable of moving large amounts of grain for long distances. Pack-trains travelled over extensive stretches in a commercial context, and played an important part in the ancient economy.[324] For example, a regular caravan went from Pelusium, on the border of Egypt, through Palestine to Bostra in Arabia, around 480 km. (300 miles) overland.[325] Pack-trains carried British tin through Gaul to the Mediterranean, a distance of approximately 640 km. (400 miles)—a trip Diodorus Siculus says took 30 days.[326] Long dis-

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[319] Huston (1966) 215; Engels (1978) 121; van Creveld (1989) 46.

[320] Adams (1976) 245 n. 67; see Perjés (1970) 10–11.

[321] Caes. *BCiv.* 3.58.4–5; Plin. *HN* 18.74; *P. Hamb.* 39 [= Fink no. 76 (179)]; *P. Lond.* 482 [= Fink no. 80 (May 130)].

[322] Engels (1978) 126–7.

[323] See pp. 64–5.

[324] White (1984) 131–2.

[325] Adams (1976) 152; Isaac (1992) 120–122; Millar (1993) 93–4. It was 300 km. from Pelusium to Petra and another 260 km. to Bostra.

[326] Diod. Sic. 5.22.4; Cary (1949) 251 n. 3.

tance pack-trains were present in Italy according to Varro and Pliny.[327]

It is true that the relative slowness of movement by land clearly increased the price of goods transported, but the major limitation on the ancients' use of land transportation was not technological but financial. Although land transportation was 40 to 50 times more expensive than sea transport,[328] the Roman state certainly had the capability to transport army supplies for distances far beyond those that were commercially viable. The higher expense involved in land transportation would not have been the deciding factor in the military's logistical planning. Provisions for the army had to be moved overland from the operational base both to and along with the army. Romans would have been willing to transport food items at a financial loss for military and strategic purposes.

There are certainly disadvantages to overland supply: in addition to the expense, it is slow. At times, it was faster to move the army to the supplies rather than vice versa: when the Romans captured a Macedonian supply depot at Phila, Marcius Philippus marched his troops there because the transportation (*subvectio*) of the provisions would have taken too long.[329] Overland supply, however, does have several important military advantages. It was not limited to the summer months, as most major roads could remain passable even in rainy periods, and grain transported by land was safe from water spoilage or loss in storms. The major advantages, of course, were strategic and tactical. In most military situations, bringing supplies overland gave the army more flexibility in maneuver. Appian makes this point in discussing Pompey's invasion of Pontus in 65 B.C. during the 3th Mithridatic War:

> [Mithridates], being distressed by a lack of provisions, retreated reluctantly and allowed Pompey to enter his territory, expecting that he would suffer from scarcity when encamped in the devastated region. But Pompey had arranged to have his supplies (*agora*) sent after him.[330]

Indeed, in spite of any advantages of water transport, it was often necessary for the army to move provisions overland, simply because the required waterways were blocked or unusable. Tacitus explicitly makes this point in describing the revolt of Julius Civilis: Dillius

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[327] Varro *Rust.* 1.16; 2.6; Plin. *Ep.* 10.41.2.
[328] Hopkins (1982) 86, Table 2; Sippel (1987a) 38; cf. Anderson (1992) 15–16.
[329] Livy 44.8.1.
[330] App. *Mith.* 15,99.

Aponianus Vocula was forced to bring supplies overland in wagons from Novaesium (near Düsseldorf) to Vetera (Xanten) because Civilis controlled the Rhine.[331] Of course, in some situations land transport had to be used because suitable waterways did not exist.

In the context of Marcius Philippus's campaign in 169 B.C., Livy describes the organization of overland supply line from Thessaly into Macedonia:

> . . . he ordered the roads from Thessaly to be repaired for the transport of provisions (*commeatibus subvehendis*) and suitable sites for granaries (*horrea*) to be chosen and houses (*tecta*) built where those transporting the provisions (*portantes commeatus*) could lodge.[332]

Philippus's repair of the roads points to the use of wagons. The *tecta* (literally roofs, but in the sense of shelters) and *horrea*, in the sense of storage facilities, are clearly intermediate depots linking the operational base (perhaps Pherae) to the army.

In practice, the Romans did supply armies overland for well over 100 km. (60 miles)—and occasionally up to 320 km. (200 miles). There are a number of example of this attested in the sources. In 169 B.C., in the Third Macedonian War, the consul Marcius Philipus supplied his force fighting near the Ascordus river in Macedonia overland from some point in Thessaly, certainly over 100 km.[333] Tacitus describes Domitius Corbulo's march from Syria through Commegene to Armenia, a distance of more than 160 km. (100 miles) overland, during the Parthian War of 54–63 A.D. Tacitus says Domitius Corbulo took "the shortest route not destitute of supplies"; but the provisions he obtained en route, whether foraged or requisitioned, were apparently not sufficient. Corbulo's army was "accompanied by a large train of camels loaded with grain."[334] During the Third Macedonian War, the Romans operated a supply line overland from Ambracia, on the Gulf of Actium, across the Balkan peninsula to Larissa in Thessaly, a distance of 160 km. (100 miles) over mountainous terrain.[335] When Lucullus was besieging Cyzicus in 71 B.C., he drew provisions from Cappadocia, over 320 km. (200 miles) away. These supplies are explicitly said by Appian to have come overland—indeed

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[331] Tac. *Hist.* 4.35.
[332] Livy 44.9.10–11.
[333] Livy 44.7.10–12.
[334] Tac. *Ann.* 15.12.
[335] Livy 42.48.9–10, 55.5.

no other route is conceivable.[336] Of course, the movement of supplies over such long distances was never a "straight shot." They worked using operational and tactical bases, as well as intermediary depots.

The greatest challenge to the Roman logistical system was desert campaigns. In such situations, the army's needs were greater than normal, particularly for water, and all transport had to be done by pack animal or wagon. There are a remarkable number of occasions attested in which all Roman army's water needs, and other supplies, were transported overland by pack-animals. In 108 B.C., in order to supply the siege of Thala in Numidia, Caecilius Metellus brought all the army's provisions and water to the site on pack animals, a distance, according to Sallust of 50 Roman miles.[337] The next year (107 B.C.) Gaius Marius had all of the army's water needs loaded into specially made water-skins (*utres*) and transported by pack-animal, in order to besiege the desert town of Capsa.[338] During the war against Sertorius (82–72 B.C.), Metellus was besieging the town of Langobritae in the Spanish mountains. The city had only one well and the streams that normally supplied it were in the hands of the Roman government forces. Sertorius sent in volunteers who snuck in 2,000 skins full of water; this allowed the city to hold out long enough for Sertorius to relieve the siege.[339] Pompey, campaigning against the Albanians in the Caspian Sea region during the 3rd Mithridatic War (65–4 B.C.), ordered water for his troops to be carried in ten thousand water-skins so they could traverse a waterless waste,[340] and when operating in Libya during the Civil Wars, Cato the Younger transported water on the backs of "a large number of donkeys."[341] In order to flank a Caesarian force at the Sapaean gorge, the army of Brutus and Cassius crossed a waterless mountain, carrying with them three-days worth of water.[342] Herod supplied water for Roman troops on their march across the Sinai desert during Octavian's march on

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[336] App. *Mith.* 12,80–81. Although outside the time period covered in this book, it is noteworthy that for the Persian campaign of 363, the emperor Julian moved enough supplies to fill 1,000 ships (probably 10–20,000 tonnes) overland from Antioch to Carrhae, a distance of 200 km. (125 miles), Amm. Marc. 23.3.9; Hopkins (1982) 83.

[337] Sall. *Iug.* 75.2–3.

[338] Sall. *Iug.* 91.1–3.

[339] Plut. *Sert.* 13.5–6.

[340] Plut. *Pomp.* 35.2; Dio Cass. 37.3.6.

[341] Plut. *Cato Min.* 56.3.

[342] App. *BCiv.* 4.13,103ff.

Egypt in 30 B.C., presumably on camels or donkeys,[343] and during his invasion of Arabia during 26–5 B.C., Aelius Gallus carried his water supply on camels.[344] Of course, these are all exceptional circumstances, which is exactly why our sources mention them. Nevertheless, they are a tribute to Roman logistical skill.

In antiquity, there were two main categories of land transport: load-bearers (pack-animals) and load-pullers (draft animals). Latin does not distinguish between pack-animals and draft-animals, both being called *iumenta*.[345] In Greek, however, pack-animals were called *skeuphora* and draft-animals *zeugê* or *hupozugia*, the latter term sometimes being used generically for both.[346]

Pack-Animals

Pack-animals possess several advantages, though they have less carrying capacity than wagons, either ox-drawn or mule-drawn, even when reckoned per animal. Pack animals can move both on and off prepared roads, go farther per day, and travel faster and for longer periods than wagons.[347] They also are less expensive and take up less space than wagons either on the march or in camp: two major advantages from a military perspective. Therefore, mules and donkeys were the normal mode of transporting the baggage of officials using the *cursus publicus*.[348]

The loads of pack animals were carried in pack saddles (*clitellae* or *sagmae*), panniers (*bisaccii*) and wooden frames.[349] Frontinus refers to "grain-sacks" (*sacci frumentarii*) loaded on mules.[350] An anecdote about Pompey illustrates the large number of such packs in a camp: when he heard of Mithridates's death, a tribunal had not yet been erected in his new camp, so the soldiers piled up the pack-animals' saddles, in order for Pompey to climb atop them and give the good news to his men.[351] Livy describes how Cn. Cornelius Scipio, sur-

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[343] Jos. *BJ* 1.395.
[344] Strabo 16.4.24.
[345] Caes. *BGall.* 5.1; *BCiv.* 1.40; Aul. Hirt. 8.10; [Caes.] *BAfr.* 9; Sall. *Iug.* 75.3; 91.2; Livy 26.6.10; 36.14.10; 42.11.7; Tac. *Ann.* 1.70; 15.15; Front. *Strat.* 2.4.6; 3.2.8; White (1984) 128.
[346] Polyb. 6.49.7,11; 10.10.13; Onas. *Strat.* 6.6; Jos. *BJ* 3.90; 5.47; Dio Cass. 37.3.4; 49.30.1; App. *Mith.* 10,69; *BCiv.* 1.14,109; Hammond (1980) 256–7.
[347] Sippel (1987a) 37.
[348] Mitchell (1976) 123.
[349] White (1984) 129; cf. Livy 25.36.5; Petr. *Sat.* 31.
[350] Front. *Strat.* 3.2.8.
[351] Plut. *Pomp.* 41.4–5.

rounded by Carthaginians on rocky ground unsuitable for building earthworks, heightened the camp wall by piling loaded pack saddles (*clitellae inligatae*) on top of them. When the wall still lacked height, soldiers' *sarcinae* were stacked on top of the saddles.[352]

Pack animals probably transported grain in sacks; water was certainly carried in leather bottles.[353] Bulkier items, such as *amphorae*, could be managed by balancing one on either side of the animal.[354] The correct distribution of loads on pack animals was vital, in order to avoid losing too many animals to overwork and lameness. Thus skilled handlers are necessary in order to make efficient use of pack-animals.[355]

Damaged hooves are a major source of lameness in pack animals. Although true horse shoes did not exist in antiquity, the ancients used so-called "hipposandals" in order to protect the hooves of pack animals.[356] Their use, however, does not seem to have been widespread. The Romans also practiced a process of hoof-hardening, which mitigated the damage done by long-distance travel.[357] Although there is no direct evidence that the army used hipposandals or practiced hoof-hardening on its pack animals, it is certainly possible that it did so. It is also important to provide pack animals with sufficient rest:[358] in camp, the Romans secured animals with halters or chains (*vincula*) to prevent them straying.[359]

Modern field manuals contain regulation maximum loads for pack animals.[360] Historians generally use such numbers to estimate the carrying capacity of ancient armies, but such military calculations are generally too conservative: in practice pack animals carried much larger loads than are recommended by recent field manuals. Army muleteers are more likely to overload donkeys than their civilian owners, as they are less concerned about maintaining the animals over a long period of time. During wartime, animals are often worked to death by armies, which then requisition new ones.[361]

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[352] Livy 25.36.5.
[353] Sall. *Iug.* 91.1.
[354] Varro *Rust.* 2.6. White (1970) 299; Sippel (1987a) 37.
[355] U.S. Army (1917) 154; Thompson (1991) 73–4.
[356] Suet. *Vesp.* 23; Suet. *Nero* 30.3; Mishnah *Kelim* 14:5; Hyland (1990) 124, 259.
[357] White (1970) 295 citing Varro *RR* 2.8.5.
[358] U.S. Army (1917) 140.
[359] Livy 26.6.10.
[360] See below pp. 205–6.
[361] Hammond (1980) 256–7.

Naturally, travel in deserts, mountains or in marshes reduces the maximum load and speed of any pack- or draft-animal.[362] During the Spanish-American War, bad roads in Cuba decreased the load of pack-mules used by the U.S. Army by more than 50 percent.[363] Polybius notes the difficulty of using pack-animals in the mountains in the context of an attack by an Alpine tribe on Hannibal's forces in 218 B.C.:

> The Carthaginians suffered great loss, chiefly in horses and pack animals (*hupozugia*), not so much at the hand of the barbarians as owing to the ground. For the road up the pass being not only narrow and uneven, but precipitous, the least . . . disturbance caused many of the animals to be pushed over the precipice with their packs.[364]

Similar problems certainly faced Roman armies operating under such conditions. Of course, there would have been variation in the amounts carried by each animal, but from a logistical perspective, it is the average weight carried by the train or supply column that is significant.

Horses

The horse (*equus, hippos*) was ubiquitous in the Graeco-Roman world.[365] Most historians of transportation downplay the use of draft horses by the ancients,[366] but the Romans may have used horses to pull wagons more commonly than has been thought. Varro discusses the use of horses for the *vectura* or road service, apparently to pull wagons.[367] Nevertheless, in military contexts horses seem to have been used almost exclusively as cavalry mounts. Appian notes that Scipio Aemilianus ordered the cavalry to give up their mounts to carry sick soldiers, but this was clearly an extraordinary measure.[368] Obtaining not only sufficient horses, but those suitable for combat was of great interest to the Roman military throughout the period under discussion.[369]

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[362] U.S. Army (1917) 144; Badian (1979) 54.
[363] Risch (1982) 537.
[364] Polyb. 3.51.3–4.
[365] For a full treatment of the subject see Hyland (1990).
[366] Burford (1960) 3; Sippel (1987a) 35; Hyland (1990), 232.
[367] Varro *Rust.* 2.7.15.
[368] App. *Hisp.* 14,86.
[369] Hyland (1990) 72–86.

Asses

The donkey or ass (*asinus, onos*) was a major element in ancient commerce: it was the most common transporter of goods at every level of the economy.[370] Donkeys were generally used as pack-animals, but they also pulled wagons and served as riding mounts.[371] Armies preferred mules over donkeys, as the former have many advantages over the latter (see below p. 206). Nevertheless, since pack animals were usually requisitioned locally, one cannot rule out the frequent use of donkeys by the army. Availability is an important factor in requisitioning, and surveys taken in nineteenth-century Greece, Italy, and Spain indicate that the ratio of asses to mules kept by farmers at that time was four to one. The proportion was probably the same, or even greater, in antiquity.[372] Josephus specifically refers to asses being captured by the Romans during the Jewish War (66–70 A.D.); the army almost certainly used them for military transportation.[373]

Modern studies estimate that a donkey can carry between 70 and 90 kg. (150–200 lbs.),[374] and Diocletian's Price Edict bases its prices for a donkey load on a figure of 200 Roman pounds (65.5 kg.)[375] As noted above, however, modern estimates tend to be overly conservative and the figure in the Edict does not represent a maximum load, but rather a figure on which to calculate prices. A recent survey of donkey loads recorded in Egyptian papyri of the Hellenistic and Roman periods reports that 41% of the animals carried three *artabae* of grain, 35% carried four *artabae* and 9.3% carried even more (up to six *artabae*).[376] Assuming 3 1/2 *artabae* per donkey, with each *artaba* containing 38.79 liters (1 bushel) of wheat weighing 29.5 kg. (65 lbs.),[377] the estimated "average" donkey load is 103.25 kg. (225 lbs.). The papyri, however, record that some of the donkeys carried 6 *artabae*, in excess of 175 kg. (385 lbs.), double the estimate of some modern studies. In this study, we will take the average donkey load to be 100 kg. (220 lbs.), though one should keep in mind that this figure

[370] Dent (1972); Hyland (1990) 231–5.
[371] White (1970) 301. For a list of papyri mentioning donkeys see Leone (1988) 9–46.
[372] Olck (1907) 626–7.
[373] Jos. *BJ* 4.436.
[374] White (1984) 129; Goldsworthy (1996) 293.
[375] Dioc. *EP* 4.11.
[376] Habermann (1990) 63.
[377] As estimated in Duncan-Jones (1974) 371–2 and Habermann (1990) 83.

does not represent the maximum load, which the muleteer could
have increased considerably if necessary.[378]

Mules

As pack-animals, mules (*muli, hemionoi*) have several advantages over
asses and horses, being stronger than the former, and more sure-
footed and cheaper to feed than the latter.[379] Mules were expensive
and, thus, were not as commonly used as donkeys by farmers,[380] but
the military preference for the animal makes sense, as the army was
less concerned with cost than with carrying capacity. In military con-
texts, mules are usually specified when the nature of a pack animal
is made explicit.[381] The use of the nickname "*Muli Mariani*" (Marius'
Mules) to refer to the heavily loaded Roman infantryman is also
suggestive.[382]

   Modern estimates of a mule's carrying capacity vary widely, from
72 kg. (160 lbs.) to 135 kg. (300 lbs.)[383] and even as high as 180 kg.
(400 lbs.) under certain circumstances.[384] The only direct ancient evi-
dence for the carrying capacity of mules is Diocletian's Price Edict,
which gives a figure of 300 Roman lbs. (98 kg., 215 lbs.) for the
load of a mule.[385] This, again, probably represents a notional, rather
than a maximum, load. The evidence from Egypt discussed above,
gives the normal capacity of a donkey as 100 kg. (220 lbs.), which
suggests that the higher estimate for the mule, 135 kg. (300 lbs.), is
a more realistic in practice.[386]

   The mule travels relatively slowly, from 7.2–8 k.p.h. (4.5–5 m.p.h.),
but this is compensated for by its ability to march continuously for
ten to twelve hours.[387] Estimates of daily travel rate vary from 40
km. (25 miles) to 80 km. (50 miles) per day.[388] Forced marches were
possible: 19th century U.S. Army mule trains sometimes traveled

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[378] Anderson (1992) 15.
[379] Savory (1970) 103; Hyland (1990) 71–2.
[380] Hanson & Sijpesteijn (1991) 273.
[381] Livy 42.11.9; Polyb. 6.27.5; 9.4.3; Front. *Strat.* 1.8.9; 2.4.5; Jos. *BJ* 3.89; Plut.
Mar. 13.1–2; App. *Hisp.* 4,86, 88.
[382] Front. *Strat.* 4.1.7; Fest. *apud. Diac.* (ed. Lindsay) 24M, 148M.
[383] Risch (1982) 270; Huston (1966) 142; Dent (1972) 159; Labisch (1975) 83;
Badian (1979) 55; White (1984) 129; Sippel (1987a) 37; Goldsworthy (1996) 293.
[384] U.S. Army (1917) 145.
[385] Dioc. *EP* 14.11.
[386] Habermann (1990).
[387] U.S. Army (1917) 144; White (1984) 132.
[388] Risch (1982) 280; White (1984) 132.

130 to 165 km. (80–100 miles) in a day.[389] The average mule's carrying capacity can be reasonably estimated at 135 kg. (300 lbs.) for a distance of 50 km. (30 miles) per day, dropping to 20 km. (12 miles) per day in mountainous country.[390]

Camels

The camel was first domesticated around 1000 B.C. in the Arabian peninsula and its use gradually spread through the Near East. The Assyrians, Persians, and Hellenistic Greeks all used the camel militarily, both as a mount and as a beast of burden. Plutarch discusses the Roman army's first use of the camel in his *Life of Lucullus*:

> Sallust says, to my amazement, that camels were then [72 B.C.] seen by the Romans for the first time. He must have thought that the soldiers of Scipio who conquered Antiochus [192–189 B.C.] before this, and those who has lately fought Archelaus at Orchomenos and Chaeroneia [87–6 B.C.], were unacquainted with the camel.[391]

By Imperial times, the Romans were commonly using the camel both in the Near East and North Africa.[392] The military certainly employed them as pack-animals. In his invasion of Arabia Felix in 26–25 B.C., Aelius Gallus carried his water supply on camels and Tacitus says that "a large train of camels loaded with grain" accompanied Domitius Corbulo's army during the Parthian War of 54–63 A.D.[393] This latter is an interesting case, for the army was moving from Commagene (Northwest Syria) to Armenia, a mountanous, not a desert, region. Domitius Corbulo probably used camels because of their superior carrying capacity and speed relative to mules and donkeys. Corbulo was racing to rescue the forces of Caesennius Paetus, and speed was important. The Romans took camels as booty during Vespasian's campaign in the Transjordan (Peraea) in 68 A.D., and presumably used them subsequently for transport purposes.[394]

Engels underestimates a camel's maximum load as approximately 135 kg. (300 lbs.): Goldsworthy gives a more realistic figure of 188–269 kg. (420–600 lbs.).[395] In 91% of cases attested in Egyptian papyri

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[389] Essin (1970) 54.
[390] U.S. Army (1917) 144–5; Dent (1972) 164; Badian (1979) 54.
[391] Plut. *Luc*. 11.4.
[392] See Leone (1988) 47–85 for list of papyri mentioning camels.
[393] Strabo 16.4.24; Tac. *Ann*. 15.12.
[394] Jos. *BJ* 4.436.
[395] Engels (1978) 14; Goldsworthy (1996) 293.

camels carried a load of 6 *artabae*, the equivalent of about 175 kg.
(385 lbs.), and they attest a much greater load.[396] As with the don-
key and the mule, the camel carried its load on panniers, but fur-
ther gear could be packed on the camel's back, between the panniers.

Despite their greater carrying capacity, camels had the disadvan-
tage of being more difficult to handle than mules and less able to
live off the land. The mule was also preferable in mountainous or
rocky terrain, where the camel, with its soft feet was less unsuitable.
Of course, the ability of camels to go long periods without water
made them ideal for desert warfare.

Wagons

In Latin, wagons or carts were collectively called *vehicula*.[397] The
Romans used a number of different types of wheeled vehicles: the
plaustrum, a two-wheeled wagon drawn by oxen, the *carpentum*, a two-
wheeler drawn by mules, and the *carrus*, a mule-drawn four-wheeler.[398]
Many modern writers discount the use of wheeled transport in ancient
times and consider it marginal in importance for several reasons.[399]
First, pack-animals have many advantages over draft-animals, prin-
cipally that they can carry loads over roads and tracks impassable
by wagons.[400] In addition, wagons require more investment and are
less flexible in use than pack-animals, which explains the more com-
mon use of load-bearers by farmers and merchants. As Burford notes,
however, the discussion of this problem should not begin with the
theoretical limitations of transportation, but rather with "what was
actually transported."[401] As will be seen, wagons were in quite com-
mon use. The main argument, though, against the widespread use
of wagons is that the harness used for horses was far less efficient
than that adopted in the Middle Ages.[402] Some historians argue that
the (alleged) lack of a pivoted front axle and effective braking sys-
tem in Roman wagons reduced their efficiency significantly.[403] In

[396] Habermann (1990) 61, 83.
[397] Livy 42.65.3; Front. *Strat.* 4.1.6; Tac. *Hist.* 4.35; Chevallier (1976) 178–181;
White (1984) 128.
[398] Sartorio (1988) 51–69.
[399] Burford (1960) 3; Sippel (1987a) 35; Hyland (1990) 232.
[400] White (1984) 132.
[401] Burford (1960) 1.
[402] Lefebvre des Noëttes (1931); Langdon (1986) 4–7.
[403] White (1984) 140; van Creveld (1989) 45.

antiquity, however, wagons were not generally hauled by horses, as in later times, but by mules or oxen,[404] and even if the ancient horse harness was as inefficient as some argue, this would not have affected transport by ox-wagon.[405] At least some Roman wagons did have a front axle; in any case, the importance of front axles and braking systems was not significant in long-distance hauling, as sharp turns and sudden stops were not common in overland transportation.[406]

There is no question that very heavy and bulky items, such as building stone and timber, were routinely transported by wagon,[407] but the ancients also used wagons commonly used to carry staple food-stuffs in antiquity. While under proscription, the Younger Marius escaped capture by being hidden in a ox-drawn wagon loaded with beans,[408] and Caesar reports that the Helvetii used carts to carry large amounts of grain.[409] Galen refers to "peasants . . . bringing grain from the country into the city in wagons"[410] and Varro mentions wagons being used to carry beans.[411] Finally, Pliny reports the remarkable strength of a praetorian centurion who could lift a wagon along with its leather bags (*cullei*), which were presumably filled with wine or oil.[412]

Our sources also attest to the military use of wagons by several ancient armies. Polybius says that during the Second Punic War, Carthaginians used carts (*hamaxai*) to transport supplies.[413] Some incidents described by Livy is instructive: in order to resupply the city of Capua, Hanno, the Carthaginian general, ordered the inhabitants to come to his camp with wagons to pick up grain before the Romans were able to completely cut it off. The Capuans originally came with 400 wagons, and when censured by Hanno for bringing too few, they returned with 2000.[414] During the Third Macedonian War King Perseus used wagons (*vehicula*) to carry weapons and other military equipment.[415] Caesar mentions to the use of wagons by Gallic

[404] Hdt. 1.188; Cato *Agr.* 62; Varro *Rust.* 2.8.5; Burford (1960) 3; Mitchell (1976) 123.
[405] Burford (1960) 3; White (1984) 137; Sippel (1987a) 35.
[406] Langdon (1986) 7; Anderson (1992) 12–3; Goldsworthy (1996) 294.
[407] E.g. Sippel (1987a) 36.
[408] Plut. *Mar.* 35.6.
[409] Caes. *BGall.* 1.3.
[410] Gal. *Nat. Fac.* 1.14 (56).
[411] Varro, *Ling.* 5.140.
[412] Plin. *HN* 7.82.
[413] Polyb. 10.10.13.
[414] Livy 25.13.5–10.
[415] Livy 42.53.3–4.

auxiliaries.[416] Livy often refers to the capture of Gallic and German wagons when these people were defeated by the Romans.[417]

Historians have underestimated the Roman military use of wagons primarily because Caesar, a major source for Roman military practice, did not normally use them. This, however, seems to have been an idiosyncrasy on his part.[418] In point of fact, the Roman military routinely used wagons.[419] In 171 B.C. Perseus fell upon a group of Roman foragers and captured one thousand "wagons with their teams (*iuncta vehicula*), many of them loaded (*onusta*)."[420] Even after Scipio Aemilianus, disciplining the army in Spain in 134, "ordered all wagons and their superfluous contents to be sold,"[421] his army continued to use wagons to carry provisions.[422] In this case, Scipio was ridding the army of privately owned wagons, particularly those which carried the "superfluous" gear of officers. In another instance, during the Third Mithridatic War, one of Lucullus's officers, Adrianus, returning from a *frumentatio*, "marched pompously past [Mithridates's] camp, convoying many wagons laden with grain and booty. . . ."[423] When Pompey raised three legions in to fight Sulla, he provided them with baggage wagons, and when operating in Libya, Cato the Younger used carriages (*harmaxa*) to carry supplies.[424]

The Imperial army used wagons as routinely as the Republican military had. Suetonius, Tacitus, Dio Cassius and Herodian all mention the army using wagons on campaign. Dio Cassius and Seutonius both say the Roman forces had wagons in Germany in 9 A.D.[425] Tacitus refers to wagons being used during several incidents of the Civil War of 69–70 A.D.[426] Dio Cassius notes the use of wagons by Trajan during the Parthian War of 114–7,[427] and Herodian attests to the use of mule-carts by Maximinus Thrax's army during his 480 km. (300 mile) march from Sirmium to Aquilea in 238.[428]

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[416] Caes. *BCiv*. 1.51.1.
[417] Livy 31.21.17; 32.30.12–13; 35.5.14; 36.38.6.
[418] Kromayer-Veith (1928) 395, 422; Labisch (1975) 82–3.
[419] Goldsworthy (1996) 289.
[420] Livy 42.65.1–3.
[421] App. *Hisp*. 4,87.
[422] Plut. *Mar*. 13.2.
[423] Plut. *Luc*. 17.2.
[424] Plut. *Pomp*. 6.4; *Cato Min*. 56.3.
[425] Dio Cass. 56.20.2, 21.1; Suet. *Tib*. 18.
[426] Tac. *Hist*. 1.70; 2.41,60; 3.25; 4.35.
[427] Dio Cass. 68.26.1.
[428] Hdn. 7.8.10.

Non-literary sources also attest the routine use of wagons by the Roman army to carry supplies. Trajan's column shows both oxen- and mule-drawn military wagons with sacks and barrels,[429] and there are illustrations of soldiers driving four-wheeled mule carts on tomb- stone reliefs.[430] A newly-discovered writing tablet from Vindolanda mentions a "British wagon" (*carrus Brittonum*) carrying grain to the Roman army.[431]

Ox-drawn wagons can carry more than mule-drawn ones, but the oxen's slow rate of travel is a disadvantage. Precisely how slow oxen travel is a matter of debate. Estimates based on Cato and Diocletian's Price Edict are too low.[432] Bachrach says that oxen can travel "no more than fifteen kilometers [9 miles] per day,"[433] but oxen trains in the American West traveled at a rate of 19 to 24 km. (12–15 miles) per day.[434] According to one source, South African oxcarts could cover 32 km. (20 miles) in a 10 hour day.[435] Mule carts are lighter and faster. They can routinely cover 30 kilometers (19 miles) a day.[436]

Estimating the capacity of wagons is also problematic. It is usu- ally not clear if the army is using oxen or mules and even within each category wagons can vary greatly in size. The Theodosian Code set a limit of 1075 Roman lbs., or 352 kg. (775 lbs.) on wagons.[437] Diocletian's Price Edict attests a wagon-load of 1,200 Roman lbs. (393 kg., 865 lbs.).[438] Neither figure, however, ought to be taken as a reliable guide to the maximum capacity of wagons.[439] As with the amounts given for donkeys and mules, the figures given in laws were probably meant not as *maxima*, but rather as typical cases.

Basing his estimate on the prices for requisitioned wagons and mules on the Salagassus Edict,[440] Mitchell estimated the capacity of the cart (*carrum*) mentioned in this inscription as 2 1/2 to 3 times

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[429] Trajan's Column scenes LXI–II, CVII [= Lepper & Frere (1988) plates XLII–III, LXXIX].

[430] Sander (1963) pl. 6a, b.

[431] Birley & Birley (1994) 431–2.

[432] Cato *De Agr.* 20.3.3; Diocl. *EP* 1.1; Yeo (1946).

[433] Bachrach (1993) 717; a figure supported by Breeze (1986/87) 18 with reference to the Zulu War.

[434] Walker (1966), 125; cf. Sippel (1987a), 36.

[435] Anderson (1992) 10.

[436] Bachrach (1993) 717.

[437] *Cod. Theod.* 8.5.8; Bishop (1985) 21 n. 45.

[438] Dioc. *EP* 17.

[439] Mitchell (1976) 122.

[440] *AE* 1976.653.

that of a mule, producing a capacity of between 285 and 430 kg. (650−950 lbs.).[441] This, however, seems too low. A tariff from Palmyra, dated 137 A.D. equates one wagon load with 4 camel loads,[442] and using the estimate given above, of 175 kg. per camel load, this would translate into a wagon load of approximately 700 kg. (1540 lbs.). This latter figure is considerably higher than most studies allow: they calculate the average load of a Roman wagon with a range from 500 to 550 kg. (1100−1200 lbs.).[443]

A fundamental question, from a logistical standpoint, is the number of draft-animals used for such wagons. Bachrach notes the difference between a two-wheeled cart, which could carry 500 kg. (1100 lbs.), and a four-wheeled cart, which had a capacity of 650 kg. (1430 lbs.).[444] These figures seem to be the most reasonable. Pictorial evidence indicates that wagons were commonly hauled by two animals, even if they had four wheels.[445]

If oxen were employed to haul wagons, they had to be broken in before they could be hitched, a process which took about five days.[446] In order to avoid any delay, one would expect the army to have requisitioned oxen along with their wagon. However, there is no mention of wagons when the army requisitioned 36 ploughing oxen in Egypt sometime between 253 and 256 A.D. It is noteworthy that the Egyptians providing the oxen are expected to deliver the oxen to "wherever it may be commanded" in Syria. These oxen are almost certainly intended for Valerian's campaign against the Parthians.[447]

Porters

In antiquity, human beings carried both commercial goods and military supplies.[448] The Romans called such porters "*baiuli*." In many ancient armies, personal servants carried the equipment and provisions of soldiers. The Roman army, from the Middle Republic onwards, suppressed this practice, although its recurrence was a

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[441] Mitchell (1976) 123, note 100.
[442] *CISem.* 2.3.1.3913 = OGIS 2.629 (Palmyra, 137 A.D.).
[443] Stolle (1914) 30; Labisch (1975) 43; White (1984) 132; Langdon (1986) 8; Sippel (1987a) 36.
[444] Bachrach (1993) 717.
[445] White (1984) 137−9.
[446] White (1970) 280−1.
[447] *P. Oxy.* 43.3109; Millar (1993) 163.
[448] White (1984) 127.

constant problem.[449] The elimination of personal servants reduced the number of non-combatants, but it was not without consequence: when soldiers become overburdened, their fighting ability decreases.[450]

With some notable exceptions, human porters did not play a significant role in Roman logistics. In 72–71 B.C., L. Licinius Lucullus used 30,000 Galatians, each carrying a *medimnos* of wheat (about 11 kg. or 25 lbs.) on his back.[451] One of Plutarch's forebears, Nicarchus, served as a porter for Antony's forces during the campaign of Actium in 31 B.C.:

> My great-grandfather used to tell how in Antony's last war the whole of the citizens of Chaeronea were put in requisition to bring down grain to the coast at Anticyra, each man carrying a certain load, and soldiers standing by to urge them on with whips.[452]

Furthermore, Dio Cassius refers to "water carriers" (*hudreumenoi*) used in the siege of Jerusalem in 70 A.D.,[453] and Jews were also pressed into service to carry both food and water to Masada from En Gedi 12 kilometers away during the siege of 73 A.D.[454]

Porters have the advantage of being "self-loading and self-unloading," as well as not being road-bound.[455] Porters, however, also have the distinct disadvantage of being more likely, and more able, to run away from the army. As with all load-bearers, there is some question as to the carrying capacity of porters. Modern estimates indicate that a porter with a back load can carry 45 kg. (100 lbs.),[456] but most porters will have carried less. During the Korean War, porters using A-frames carried 20 kgs. (50 lbs.) for 16 km. (10 miles) daily.[457]

Cattle on the Hoof
At least one form of provisions—meat—can at times be self-transporting. Large cattle can be driven with an army to provide it with a source of fresh meat. The ancients recognized this and often drove herds

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[449] Sall. *Iug.* 45.2.
[450] Watson (1969) 62.
[451] Plut. *Luc.* 14.1.
[452] Plut. *Ant.* 68.
[453] Dio Cass. 65.4.5.
[454] Jos. *BJ* 7.277–8; see Roth (1995) 93–4.
[455] White (1984) 127; Thompson (1991) 150.
[456] Kromayer-Veith (1928) 423; White (1984) 129.
[457] Thompson (1991) 90.

of animals with their armies.[458] In 217 B.C., Hannibal is reported
to have had considerably more than two thousand cattle with an
army of around 30,000 men.[459] Polybius mentions cattle "following
the army" during Scipio Africanus' campaign against the Andobales
in Spain in 206 B.C.[460] Polybius, in his portrayal of a Middle
Republican Roman camp, describes an area of 200 feet behind the
wall in which were kept "cattle and other booty taken from the
enemy."[461] During the Civil War of 49–45 B.C., Cato the Younger
took "many cattle" with his army when operating in Libya.[462] The
Romans also kept cattle with the army while it was in garrison:
Tacitus refers to land in Lower Germany reserved for the grazing
of the army's cattle in the 50s A.D.[463]

   During Gaius Marius's campaign against the city of Capsa in
Numidia (107 B.C.), the auxiliary cavalry drove the cattle and then
they were "distributed to the individual centuries and *turmae*."[464] It
certainly made sense for all the army's cattle to be driven together
while on the march. This was the practice of the U.S. Army dur-
ing the Mexican War.[465]

<center>*Logistical Infrastructure*</center>

The movement of armies and supplies often need more than con-
veyance, whether pack animal, wagon or boat. The construction of
roads, bridges and canals often facilitated—and at times made pos-
sible—the tranportation of the army's needs from place to place.
Early on in their imperial expansion, the Romans understood the
need such logistical infrastructure and put a enormous amount of
energy and resources into it.

Roads
By the end of the 3rd century B.C., the Romans had already con-
structed a network of roads throughout Italy. As the Roman Republic

[458] Goldsworthy (1996) 292.
[459] Livy 22.16.7; Polyb. 3.92.5.
[460] Polyb. 11.32.2–3.
[461] Polyb. 31.13.
[462] Plut. *Cato Min.* 56.3.
[463] Tac. *Ann.* 13.54–55.
[464] Sall. *Iug.* 90.2–91.1.
[465] Frazer (1983) 2.

expanded, so did their road system, until ultimately, roads criss-crossed the entire Mediterranean region.[466] Although most Roman roads were not paved, except near towns, they certainly helped develop overland trade and communication.[467] The Romans built their road system primarily for military reasons: indeed, commercial travel was only an indirect beneficiary of the *viae*.[468]

During the Republic, building was often a *munus* laid upon local communities,[469] although we also read of the Roman state bearing the costs.[470] Occasionally the military built its own roads.[471] Early in the Empire, the maintenance of roads was the responsibility of the provincial governor during peacetime.[472] Actual construction was often done by the military particularly in wartime.[473] Although there were many military specialists (*immunes*) in the army who could, and certainly did, aid in roadbuilding, the Roman army had no separate engineering units, or sub-units.[474] It should be noted that the term *via militaris* refers to a road's strategic importance—such a road was not necessarily built by the army.[475] Since the units of the Imperial army were garrisoned mainly around the frontier, however, construction of military roads focussed in these areas in imperial times. The term *limes*, which ultimately took on the meaning of "frontier" or "border" originally referred to these military roads.[476] Even considering that much of the labor was military, the Imperial Roman state put an enormous amount of money and energy into building and improving the extensive network of roads throughout the Empire.[477] By the time of Diocletian, over 56,000 miles of roads had been built.[478] Augustus developed an empire-wide postal system (*cursus publicus*) with an elaborate system of road-houses (*mansiones, tabernae, stationes*) located

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[466] Chevallier (1976) 131–179; O'Connor (1995) 8–34.
[467] Le Bohec (1994) 131.
[468] Schlippschuh (1987) 87; Kissel (1995) 54ff.
[469] Livy 37.7.12; 44.9.10–11; App. *Mac.* 9,6; *Syr.* 5,23.
[470] Livy 9.29,43; 10.23,47; 38.28; 39.44; 41.32.
[471] Livy 39.2.
[472] Tac. *Ann.* 13.53; *CIL* 7.732; Rickman (1971) 273; Chevallier (1976) 65; O'Connor (1993) 35–8.
[473] Tac. *Ann.* 1.56; 4.73; Jos. *BJ* 3.141–2; *ILS* 5835; 5865; Trajan's column, scenes XIII, XCI, XCII [= Lepper & Frere (1988) plates XVII, LXVI, LXVII; Chevallier (1976) 84–86]; O'Connor (1993) 35–8.
[474] O'Connor (1993) 42.
[475] Chevallier (1976) 65.
[476] Isaac (1992) 103.
[477] Isaac (1992) 107–160.
[478] Chevallier (1976) 205.

approximately a day's journey apart.[479] Ultimately, this postal system was taken over by the military and became part of the Late Roman logistical system.[480]

Certainly, the Romans used their road-network to facilitate the movement of troops and trains. When, in 171 B.C., the consul Gaius Cassius planned a march through Illyricum to Macedonia, he sought out guides "who knew the roads from Italy into Macedonia."[481] Similarly, in 77 B.C., during the war against Sertorius, friendly Spanish tribes sent guides "to show the Roman army the roads."[482] Dio Cassius, discussing Augustus's acts of 27 B.C., notes:

> . . . he himself looked after the Flaminian Way, since he was going to lead an army out by that route.[483]

The Romans' carefully built roads, however, were not necessary simply to move the army from place to place, as soldiers and pack-animals could travel as well, if not better, along unimproved dirt roads. There were of course exceptions: during the Roman attempt to force the pass at Lake Ascuris (Nezeros) near Mount Olympus, the Q. Marcius Philippus had a road constructed through "pathless ground" to send forward his troops and baggage train.[484] Roman roads were intended primarily for wagon travel, in order to facilitate supply.[485] Indeed, the same campaign of Philippus illustrates this point: Livy says the consul "ordered the roads from Thessaly to be repaired for the transport of provisions (*commeatibus subvehendis*)."[486] The building and repair of roads is commonly associated with military campaigns. There is epigraphical evidence for Vespasian building and repairing roads in Syria, Cappadocia and Asia Minor during the mid-70s A.D.[487] This may well have been connected to Vespasian's experience with supply problems during the Jewish War. Due to the ongoing warfare on the Empire's eastern frontier, this region had a particularly thick network of military roads.[488]

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[479] *AE* 1912.193; *AE* 1916.17; Mitchell (1978) 93–96.
[480] Chevallier (1976) 184–5; Aubert (1994) 373–385.
[481] Livy 43.1.8.
[482] Livy 91.18 (*frag. ex codice Vaticano*).
[483] Dio Cass. 53.22.2.
[484] Livy 44.4.11–12.
[485] Chevallier (1976) *passim*; Mitchell (1976) 123; White (1984) 97; Sippel (1987a) 37.
[486] Livy 44.9.10–11.
[487] Isaac (1992) 34–6; Kissel (1995) 22–28.
[488] Adams (1976) 11–63.

The Romans also built roads during campaigns for strategic and tactical purposes. During the war against Antiochus III (192–189 B.C.), Philip V of Macedon aided the Romans in crossing the Balkan peninsula by repairing roads and building bridges.[489] Appian emphasizes the importance of roads in tactical situations, noting that Brutus stationed part of his army at the battle of Philippi (42 B.C.) in order to "guard the road by which his supplies were conveyed."[490] The construction of roads during campaigns continued to be routine under the Empire. Tacitus notes that when Germanicus campaigned against the Chatti in 15 A.D., "Lucius Apronius was left behind to construct roads and bridges."[491] This experience came in handy: when the same Apronius was governor of Lower Germany in 28 A.D., he responded to the revolt of the Frisians by "provid[ing] a solid road of causeways and bridges through the neighboring estuaries [of the Rhine] to facilitate transit of his heavy column."[492]

In Josephus we find a good example of the Roman Imperial army constructing a road for the purposed of tactical supply. During the seige of Jotapata (67 A.D.) Vespasian had built an access road from Gabara to Jotapata, a distance of approximately 9.5 km. (6 miles).[493] It is unlikely that the Romans would build such a road merely to bring up battering rams and towers. Man-handling the siege equipment through the local terrain would have been easier than building a road from scratch. Gabara was probably set up as a supply depot: it was a toparchal capital, and would have had sufficient storage facilities. The road would have been needed for wagons shuttling back and forth with provisions. The Romans normally used the daily camp as a tactical base, but during a siege the tactical base would have been placed further back. This was to prevent it being attacked during sorties from the besieged city. Therefore, a road, if not already present, was necessary to move provisions.

Bridges
Bridges were an integral part of the Roman transportation system.[494] These were built of stone and were so well constructed that

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[489] Livy 37.7.12; App. *Mac.* 9,6, *Syr.* 5,23.
[490] App. *BCiv.* 4.16,121.
[491] Tac. *Ann.* 1.56.
[492] Tac. *Ann.* 4.73.
[493] Jos. *BJ* 3.141–2; *Vit.* 23–4.
[494] Chevallier (1976) 93–106; O'Connor (1993) 63–131.

hundreds of them survive and some are even in use today. Such bridges made possible the rapid movement of the army through imperial lands. The army built timber bridges to facilitate military movement and supply on campaign.[495] In his *Gallic War*, Caesar describes in great detail the building of a bridge over the Rhine, a work that was completed by the army in only ten days.[496] Dio Cassius notes that Trajan built a bridge over the Danube "to facilitate access to [Dacia] by this means."[497] Dio Cassius goes on to say:

> Rivers are bridged by the Romans with the greatest ease since the soldiers are always practising bridge-building, which is carried on like any other warlike exercise on the Ister (Danube), Rhine and the Euphrates.

Such wooden bridges are illustrated on Trajan's and Marcus Aurelius' columns, most notably the great timber bridge built to span the Danube.[498] Both Dio Cassius and Arrian describe the Roman procedure for building pontoon-bridges, which enabled rapid construction.[499] Such bridges of boats also feature prominently on Trajan's and Marcus' Aurelius' columns.[500]

Canals

The Romans used their engineering skill to build canals in order to bring in supplies to the army.[501] In his description of Gaius Marius's campaign against the Cimbri in 101 B.C.:

> The conveyance of (supplies), which had previously been a long and costly process where it was by sea, [Marius] rendered easy and speedy. [T]he mouths of the Rhône . . . took up great quantities of mud and sand packed close with clay . . . and made the entrance of the river difficult, laborious, and slow for vessels carrying supplies. So Marius brought his army to the place . . . and ran a great canal. Into this he diverted a great part of the river and brought it round to a suitable place on the coast, a deep bay where large ships could float. . . . This canal, indeed, still bears the name of Marius.[502]

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[495] O'Connor (1993) 132–149.
[496] Caes. *BGall.* 4.17–18.
[497] Dio Cass. 68.136.
[498] Trajan's column scenes XXI, XCVIII, CXIX; CXXXI; Marcus Aurelius' column: Caprino (1955) fig. 108.
[499] Dio Cass. 73.1; Arr. *Anab.* 5.7; see O'Connor (1993) 134–8.
[500] Trajan's column scenes IV, XXXIV, XXXV; Marcus Aurelius' column, Caprino (1955) figs. 9, 104.
[501] Isaac (1992) 102–3.
[502] Plut. *Mar.* 15.1–3.

The Marian Canal (*Fossa Mariana*) was still operating a century later, although it had suffered from silting.[503] Drusus built the *Fossa Drusiana* in 16 A.D., linking the Rhine to the Yssel for the same purpose.[504] Similarly, in 47 A.D., Domitius Corbulo had his troops dig a canal from the Meuse to the Rhine, "thus making it possible to evade the hazards of the North Sea."[505] According to Tacitus, Nero's governor of Upper Germany, Lucius Antistius Vetus, planned an ambitious canal-building program in order to:

> . . . connect the Moselle and the Arar (Saone) by running a canal between the two; so that supplies (*copiae*) shipped by sea and then up the Rhône and Arar could make their way up the canal, and subsequently by the Moselle, into the Rhine, and in due course, into the [Atlantic] Ocean; a method which would remove the natural difficulties of the route and create a navigable highway between the shores of the West and the North.[506]

This bold scheme, which would have connected the Mediterranean with the Atlantic by canal, might have paid considerable economic, as well as military, dividends. Antistius Vetus abandoned it, however, due to the opposition of the governor of Belgica, who threatened to present the project in a bad light to the emperor Nero. Under the Julio-Claudian dynasty, governors did not wish to appear too capable, or worse, too ambitious. Later emperors did sponsor canal-building. Vespasian had a canal dug at Antioch to improve shipping—certainly with military logistics at least partially in mind.[507] Trajan planned to dig a canal from the Euphrates to the Tigris during his Parthian campaign of 116, but was thwarted by the different elevations in the rivers.[508]

Conclusion

The evidence for the routine and sophisticated use of supply lines by the Roman army is compelling. Labisch's model of Caesarian logistics can be applied to the Roman army for the entire period

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[503] Strabo 4.1.8.
[504] Tac. *Ann.* 2.8.
[505] Tac. *Ann.* 11.20.
[506] Tac. *Ann.* 13.53.
[507] Paus. 8.29.3; *AE* 1983.297; Millar (1993) 86–7.
[508] Dio Cass. 68.28.1.

covered by this book. This reconstruction views supply lines in three interconnected parts: the strategic base from which supplies were drawn (discussed in the next chapter), the operational base, where supplies were collected in the area of operations, and finally the tactically base, where supplies were kept in the army's immediate vicinity. In the case of the Roman Republican army, this tactical base was usually the marching camp set up each day while on campaign.

Until the First Punic War, Roman military operations were confined to Italy, and there was little need for a sophisticated logistical structure. The Romans supply capabilities advanced enormously, however, over the course of the first two major struggles with the Carthaginians. By the end of the third century B.C., the Roman state could move enormous amounts of supplies for long distances over land and sea. While some ancient historians, like modern ones, often ignore logistics, there is ample description in Livy and Polybius on how the Roman Republic's logistics operated. Even when this narrative history breaks off, there are often anecdotes preserved in Sallust, Suetonius, Plutarch and Appian to follow the development of Roman logistics into and through the Late Republic.

Augustus drastically changed the nature of the Roman state and its army. This is reflected also in its logistics. The Romans now kept a standing army made up of hundreds of thousands of men. This basic fact dramatically changed the nature of Roman logistics in peacetime. Nevertheless, in general, the Imperial Roman state retained the successful elements of their logistical system developed in Republican times. Supplies were still shipped overseas to operational bases, and then taken to the army's tactical base: usually its marching camp. Imperial campaigns, however, often operated farther away from the Mediterranean and in very challenging areas from a logistical standpoint. Roman Imperial legions fought, and ate, in the forests north of the Rhine and Danube, in the mountains of the Caucasus and in the deserts of Arabia and North Africa. These supply lines were sometimes hundreds of kilometers long.

The Romans used operational bases to link their water-borne supply lines (usually through the Mediterranean) with the armies. These bases were usually located at sea-ports, but river-ports were sometimes used. At these bases provisions obtained locally, and those collected in various strategic bases, were gathered together and stored for the army's use over the course of the campaign. Such operational bases often received improvements in advance of a campaign, parti-

cularly in the Imperial period. Legionary garrisons placed along frontier rivers often served as operational bases for offensive actions outside of the Empire's boundaries. It was customary for the Roman army to go into winter quarters, both in the Republic and under the Empire. These *hiberna* shared many qualities with the operational base.

Provisions were moved up supply lines from the operational to the tactical base. As noted above, the Romans customarily a marching camp each day, one of whose main purposes was to serve as a tactical base for storing supplies. Occasionally, particularly in the case of sieges, cities or towns might serve as a tactical base. Storage was necessary along many points in the Romans' supply line. The Romans built and maintain sophisticated granaries and other storage facilities to minimize the spoilage of foodstuffs and extend its usable life. The army probably stored, and transported, grain primarily in sacks. These took up more space but facilitated rotation and movement of stock.

Whenever possible the Romans moved supplies over water. Shipping supplies over the Mediterranean, Black Sea and Atlantic did expose them to the ever-present danger of ancient sea-travel, but was much less expensive and easier, given ancient transportation technology. While by Roman times, ships of several hundred tonnes capacity were not uncommon, most Roman military supply was probably carried in much smaller ships, of perhaps 30 to 40 tonnes. Over the course of a campaigning season, a fleet of such ships could make several round trips between the strategic and operational base, therefore ancient water-borne supply lines could have a large capacity without relying on enormous grain ships. The Romans also moved supplies routinely over the major rivers of their Empire: the Rhine, Danube, Nile and, occasionally, the Euphrates.

While water-borne supply lines were preferable, the Romans did move provisions overland, either out of necessity or to gain a strategic advantage. The difficulties and expense of land transportation given ancient technology are real enough, but the Romans could and move large amounts of supplies over one hundred, or in rare cases, up to a two hundred, kilometers over land. Depots played an important role in overland supply. Pack animals and wagons would move provisions from depot to depots, so it was not necessary to traverse the entire supply line. The routine use of grazing made it unnecessary for animals to carry their own food, thus extended their effective range.

Pack animals have a much higher carrying capacity than is reflected in modern military manuals. Donkeys can easily carry 100 kg. (220 lbs.), mules 135 kg. (300 lbs.) and camels 175 kg. (385 lbs.). The Roman army also used wagons, drawn both by oxen and mules, to carry provisions. Their capacity would have varied greatly, of course, but a reasonable average is 500 kg. (1100 lbs.) for a two-wheeled, and 650 kg. (1430 lbs.) for a four-wheeled cart. The Romans occasionally used human porters, who probably carried some 20 kgs. (45 lbs.), usually for short distances. Cattle on the hoof provided a way to "self-transport" meat.

Both in the Republican and Imperial periods, the Romans invested a tremendous amount of money and energy into logistical infrastructure such as roads, bridges and canals. While these certainly facilitated trade and brought economic benefits, their primary purpose was to ease or make possible the movement of military supplies.

CHAPTER FIVE

SOURCES OF SUPPLY

Introduction

Labisch uses the term "strategic base" (*strategische Basis*) to refer to the sources of supply for an army.[1] The strategic base can best be understood as the source of provisions outside the area of operations. In this case, "base" does not necessarily refer to a single point, such as a city, but rather to all the regions which contribute provisions to a distant army. In the context of the Roman Imperial army, the term "strategic base" generally refers to a province or provinces which provided supplies to an army in the field.

A state that uses supply lines to provision an army must develop the means of obtaining those supplies, or the money to pay for them, from a civilian population. Obtaining, storing and transporting these supplies from the strategic base to the army in the field is a difficult proposition for any large force using supply lines. As Garlan notes in his study of ancient war, this was particularly onerous under the technological constraints of ancient economy.[2]

For the Roman state to raise the money to buy provisions, or obtain the food directly from the producer, usually involved some sort of taxation. This study is not intended to adequately cover the complicated question of Roman taxation, but some discussion of the means by which the state acquired the provisions that supported its armies is necessary to an understanding of Roman logistics.[3] In addition, the Romans utilized various financial means to gather supplies, including forced and market purchase, contracting and contributions (voluntary and otherwise) by allied states and even individuals. As in all the aspects of logistics, one sees the Romans use various means as appropropriate to obtain supplies for their armies.

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[1] Labisch (1975) 86–7. Labisch's "strategic bases" correspond to the "*Getreidelieferzentren*" of Kissel (1995) 38ff.

[2] Garlan (1972) 164; the point is taken up by Keegan (1993) 301–303.

[3] For Roman taxation see Jones (1974); MacMullen (1976) 129–181; Nicolet (1976); Hopkins (1980); Neesen (1980); Aubert (1994) 330–347.

Sources of Supply in the Republican Period

In Republican Rome we find a state, and in the Romans a people, extraordinarily devoted to the making of war.[4] There were many aspects to Roman military culture that led to their success in creating their empire. One of the key elements, certainly, was their ability to exploit the resources of their empire, as it grew, to support their on-going military operations. At several points, in the late third and late first centuries B.C., there were hundreds of thousands of Roman soldiers campaigning in armies throughout the Mediterranean. What is more remarkable, though is that from the First Punic War down to the establishment of the Principate, the Roman Republic was almost routinely at war, keeping large armies in the field year after year for over two centuries. Gathering sufficient supplies was an enormous challenge, one generally met by the Romans.

Republican Taxation

Regular direct taxation was not the rule in the city-state system, and this is true of Rome as well.[5] Polybius tells us that money was deducted from the pay of Roman soldiers to pay for provisions and clothing, though these were given as a "free gift" (*en dôrea*) to the Italian allies.[6] This deduction presumably is the remnant of the primitive logistical system in place before the introduction of the *stipendium*— that is, the soldiers paid for their own supplies. The deduction was, of course, only a bookkeeping device, and the actual costs of the grain was paid out by the Roman state. In the third century B.C., the costs of provisions was probably paid through the *tributum* levied on each Roman citizen until its abolition in 167 B.C. In contrast to regular *vectigalia*, the *tributum* was, at least in theory, an extraordinary levy authorized each year by the Senate, which set its amount. Indeed, it seems to have been closely tied to the authorization of the *dilectus* and the preparations of an army for a particular campaign.[7] The amount of the *tributum* would have to cover the pay and

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[4] Harris (1979) *passim.*
[5] Neesen (1980) 4.
[6] Polyb. 6.39.15.
[7] Nicolet (1976) 19–26; Neesen (1980) 5; see discussion of Senatorial authorization of campaigns, Chapter Six, pp. 245ff.

supplies for the Roman troops, and the latter for the allies.[8] Actual payments, whether direct or indirect, were paid into and dispersed by the state treasury (*aerarium Saturni*).[9] Up to the end of the Punic Wars, the Romans probably underwrote most of the cost of paying and provisioning the army through the *tributum*. Of course, there were exceptions: as early as 263 B.C., Hiero I of Syracuse supplied the Romans operating in Sicily with provisions as part of the terms of his alliance with them.[10] The Romans also used allied contributions during the siege of Lilybaeum to supplement supplies sent from Italy.[11]

The Roman state seems to have continued to have borne most of the cost of provisioning the army until the Second Punic War. This explains the financial difficulties facing the Republic at the height of the fighting.[12] Of course, the Roman state was receptive to alternative sources for grain to supply its armies. When, in 217 B.C., Hiero II of Syracuse sent 300,000 *modii* of wheat and 200,000 of barley, to Italy to support the Roman armies fighting Hannibal, the Romans were surprised to receive it.[13] In the next year, however, the Romans sent legates to Hiero requesting more aid—the voluntary contribution had now become an expected duty.[14] In 215 B.C., the last year of his life, Hieron sent another 200,000 *modii* of wheat and 100,000 of barley.[15] There were other cases of such voluntary contributions: in 212 B.C., the people of Thurii, seemingly on their own accord, tried unsuccessfully to supply the Roman force besieged in the citadel of Tarentum with grain.[16] By 210 B.C., according to Polybius, both Italian and overseas allied resources were exhausted; the Romans sent envoys to the Ptolemy IV of Egypt to purchase grain at market prices.[17] Even before the end of the Second Punic War, the Romans took steps to reduce the state burden of provisioning the army.

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[8] Livy 5.10.5; Dion. Hal. *Ant. Rom.* 4.19.1–4; Nicolet (1976) 37–9.
[9] Corbier (1974).
[10] Polyb. 1.16–17.
[11] Polyb. 1.52.8.
[12] Livy 23.31.1, 32.12, 48.7–9; 24.11.7–9, 18.11–15; Nicolet (1976) 69–79.
[13] Livy 22.37.1–13.
[14] Livy 23.21.4.
[15] Livy 23.38.13.
[16] App. *Hann.* 6,34.
[17] Polyb. 9.11a.1–2.

Once they had taken control of Sicily, the Romans quickly ex-
ploited its resources to continue the war effort. Livy describes how
M. Valerius Laevinus, the first Roman proconsular governor of the
island (209–8 B.C.):

> . . . visit[ed] the farms and distinguish[ed] cultivated and uncultivated
> lands, and . . . owing to his diligence, such a crop of grain was pro-
> duced that he sent grain to Rome and also transported it to Catina,
> whence it could be supplied to the army [at] its summer camp (*aestiva*)
> near Tarentum.[18]

The Roman use of provincial resources is quite natural: it also grew
out of requisitions made to support armies in the field. In 205 B.C.,
even before the formal establishment of the provinces of Nearer and
Farther Spain, the Romans required the Spanish to provide the mil-
itary with clothing and "grain for six months."[19] Another such impost
made on the Spanish in 203 B.C. supplied the Roman army in
Africa, though this is quite possibly an *ad hoc* levy rather than an
established tax.[20]

The process by which the Romans converted conquered regions
into provinces is rather vague and the Romans extracted revenue
from their provinces in a large variety of ways and means.[21] Cicero
distinguishes between the *stipendium*, a fixed amount paid by provin-
cials directly to Roman officials, and other taxes which were let by
contract to *publicani*.[22] The *stipendium* probably derived, at least in
part, from the right to requisition money to provide money and pro-
visions for the invading Roman army—indeed its very name recalls
military pay.[23]

The direct taxation of the provinces developed only gradually over
the second century B.C. Although there had been a number of levies
placed on Spain from the Second Punic War onwards, regular tax-
ation probably did not begin until the 170s B.C. This eventually
resulted in a 1/20 tax on the grain crop. Even the wealthy province
of Asia did not pay taxes until 123 B.C.[24] Particularly after the direct

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[18] Livy 27.8.18–19.
[19] Livy 29.3.5.
[20] Livy 30.3.2.
[21] Nicolet (1976) 69–79; Neesen (1980) 6–10.
[22] Cic. *Verr.* 3.12–15; for the *publicani*, see below pp. 230–1.
[23] Richardson (1994) 586; see "Requistion" Chapter Three, pp. 141ff.
[24] Richardson (1994) 569.

tax on Roman citizens was abolished in 167 B.C., the direct provincial tax, or *stipendium*, became known as the *tributum*, although the former name continued to be used as late as 111 B.C.[25] Provincial tribute tooks two forms, a *tributum capitis*, or poll tax, and the land tax, *tributum solis*, first attested in Africa in 146 B.C.[26]

By the end of the Second Punic War, the Roman had regularized the grain contributions of Sicily according the the so-called *Lex Hieronica*. Grain, drawn by a tithe (*decuma*) on the harvest was conveyed directly from Sicily (and, by a similar method, from Sardinia) to Roman armies and fleets.[27] Livy says that in 198 B.C. Sicily and Sardinia provided "great stores of provisions (*commeatus*)" and clothing for Flamininus's army in Macedonia.[28] Similarly, for the war against Antiochus III (192–189 B.C.) and the Third Macedonian War (172–167 B.C.), the Senate ordered a second tithe requisitioned from Sicily and Sardinia to support campaigns, doubling the normal tax.[29]

The Romans also purchased grain for the army on the open market, though this seems to have been done only when absolutely necessary. In 191 B.C. three legates went to Africa and three to Numidia to purchase grain to supply the armies in Greece.[30] The purchase of grain on the open market becomes less common, of course, as the Romans develop a provincial system capable of drawing sufficient supplies for the army in the form of taxation.

Allied Contributions

In addition to tithes and purchases, we find the Roman military relying on grain contributed by the allies during the important wars of the first third of the second century B.C. Livy mentions a number of such contributions, that are set out in the following table:

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[25] *FIRA* 1² no. 8; Nicolet (1976) 2 n. 2.
[26] App. *Pun.* 18, 135.
[27] Erdkamp (1995) 175–80.
[28] Livy 32.27.2–3.
[29] Livy 36.2.12; 37.2.12, 50.9; 42.31.8; Herz (1988) 30 n. 21.
[30] Livy 36.3.1.

Table V: Allied Grain Contributions to Roman Armies (200–170 B.C.)

Allied State	Date	*Modii* of Wheat	*Modii* of Barley	Location of Army	Days of grain for 40,000 men
Carthage[31]	200 B.C.	200,000	–	Macedonia	40
Numidia[32]	200 B.C.	200,000	200,000	Macedonia	40
Numidia[33]	198 B.C.	200,000	–	Macedonia	40
Carthage[34]	192 B.C.	500,000 (?)	500,000	Greece	100
Numidia[35]	192 B.C.	500,000	300,000	Greece	100
Various Asian Cities[36]	186 B.C.	360,000	–	Galatia	72
Carthage[37]	170 B.C.	1,000,000	500,000	Macedonia	200
Numidia[38]	170 B.C.	1,000,000	500,000	Macedonia	200

This table is by no means comprehensive, as there were certainly many unrecorded contributions. In addition, this table only includes cases in which the actual amount of grain give is known. During the war against Antiochus III, the consul Lucius Scipio received supplies of food from the kings Philip V of Macedon and Attalus of Pergamum, although the amounts are unknown.[39] An inscription from Larissa, dating to 151–150 B.C., records the contribution of some 430,000 "baskets" (*kophinoi*) of wheat, the equivalent of almost 485,000 *modii*, from the *koinon* of the Thessalians cities to the "senate and people" of Rome, but it is unclear if this is intended for the city itself or for preparations for the Third Punic War.[40] What is noteworthy is that the inscription suggests that very significant amounts of grain continued to be contributed to the Roman state from allies throughout the second century B.C.

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[31] Livy 31.19.2.

[32] Livy 31.19.3–4.

[33] Livy 32.27.2–3.

[34] Livy 36.4.5 (the manuscript figure for the amount of wheat is uncertain).

[35] Livy 36.4.8.

[36] Livy 38.13.13, 14.14, 15.11–12.

[37] Livy 43.6.11.

[38] Livy 43.6.13.

[39] Livy 37.7.12, 37.5; App. *Syr.* 5,23.

[40] Garnsey, Gallant & Rathbone (1984) 36–39; Erdcamp (1994) 184–7. The fact the the grain was requested by an *aedile* suggests the purpose was it was for civilian consumption, this official was only rarely involved in military supply during the Republic, see Chapter Six, pp. 249–50.

As a general rule, the contributions by allies were compulsory: during wartime, the allies had not only to provide supplies, but also to transport them to the army.[41] For his campaign against Nabis, the tyrant of Sparta, in 195 B.C., Flamininus ordered supplies (*commeatus*) to be contributed by various Greek allied cities,[42] and in 190 B.C., during the war against Antiochus III, the consul Lucius Scipio ordered his Pergamene allies to supply grain to the Roman army[43] During the invasion of Galatia Vulso extorted grain from Cibyra under the threat of plundering its territory.[44] Occasionally, however, one sees cases of truly voluntary contributions. Livy points out that some of the allied contributions were voluntary and that the Romans sometimes paid for them.[45] It is impossible, however, to say whether the allies could have refused, or if market price was paid for the grain. In certain cases Rome turned down offers of provisions and money,[46] but the political dynamics of such situations is uncertain.

An incident during the preparations for the Roman campaign against the Galatians in 189 B.C. casts light on how allied contributions affected their logistical system. Manlius Vulso was gathering his supplies at Antioch in Pisidia, when Seleucus, the son of Antiochus III arrived at the city. He had come to Antioch in order to furnish grain to the army in accordance with the armistice agreement made with Lucius Scipio. Seleucus maintained that Antiochus had agreed to supply grain to the Roman soldiers only and not to the 1500 Pergamene auxiliaries provided by King Attalus. However, Vulso insisted that his ally supply the entire army and gave an order that "no Roman soldiers should receive any grain until the auxiliaries of Attalus . . . had their share," so Seleucus submitted.[47]

Rome's reliance on allies for supplies, however, was not problem-free: in 190 B.C., Phocaea, a port on the coast of Asia Minor, which quartered the fleet and contributed clothing to the army, revolted. Both the fleet and garrison were forced out, although the Romans returned that winter.[48] A speech that Livy attributes to Attalus of

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[41] Labisch (1975) 72.
[42] Livy 34.26.10.
[43] Livy 37.37.5.
[44] Livy 38.14.14, 15.11–12.
[45] Livy 36.4.9; 45.13.15.
[46] Livy 36.4.3.
[47] Livy 38.13.8–10; cf. 38.37.8–9.
[48] Livy 37.9.2, 32.14.

Pergamum complains that Roman reliance on the allies might exhaust the latter's resources.[49] This was not mere rhetoric: the Athenians sent an embassy to Rome to complain of being forced to contribute 100,000 *modii* "although they tilled a barren soil and supported even their farmers on imported grain."[50]

At least, technically, the Senate and the assemblies in Rome had to authorize supplies obtained from allies in the theater of operation.[51] Nevertheless, the local commander had considerable power in the theater of operations as part of his *imperium*, or military authority. Sometimes a Roman commander in the field purchased his own supplies. Marcius Philippus did this in 169 B.C., buying 20,000 *modii* of wheat and 10,000 *modii* of barley from the city of Epirus. Interestingly, he did so on credit, as evidenced by his letter asking the Senate to pay the Epirotes' agent in Rome.[52]

Publicani

The Roman Republic made great use of private contractors, called *publicani* or *socii* in many aspects of public economy.[53] Livy discusses a scandal during the Second Punic War, in which a number of publicani are accused of malfeasance while carrying out a contract for provisioning the army in Spain. In 215 B.C., the urban praetor Q. Fulvius Flaccus let out contracts to supply the armies in Spain with grain. Livy describes this process:

> [The Senate ordered that] Fulvius . . . go before the assembly . . . and exhort those who by contracts [*redemptores*] had increased their property to allow the state . . . time for payment, and to contract for furnishing what was needed for the army in Spain, on the condition that they would be the first to be paid, as soon as there was money in the treasury. . . . [T]he praetor . . . named a date on which he would let the contracts for furnishing clothes and grain.[54]

Three companies of contractors, in all nineteen individuals, agreed to furnish supplies on credit to the state, with two conditions: exemptions from military duty and insurance on their cargo.[55] Several of

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[49] Livy 37.19.4.
[50] Livy 43.6.3.
[51] Sall. *Cat.* 29.3; Livy 43.17.2.
[52] Livy 44.16.2.
[53] Frank (1959) 149; Badian (1972) 17; 158–60; Aubert (1994) 325–330, 342–6.
[54] Livy 23.48.4–12.
[55] Livy 23.49.1–3.

these contractors arranged an insurance fraud scheme which was discovered several years later.[56] Erdkamp argues that this incident reflects conditions in the first, rather than the third century B.C.,[57] but Badian, though admitting some anachronistic elements, used this incident as a model and argues that the *publicani* played a key role in supplying the Roman armies with during the Republican period.[58] It is true that *societates* of *publicani* had a sophisticated infrastructure in their own right, including executives (*magistri*), provincial representatives (*pro magistri*), liaisons with government (*mancipes, actores, redemptores*), numerous trained slave and free employees, their own buildings, ships and even paramilitary forces.[59] The major profit-making activity of such societies was tax-collecting, and the experience and commercial contacts they established in this business certainly could have transferred to the organization of provisions for a military campaign.

The fact that the *publicani* might have provided the provisions for the Roman Republican army, however, does not mean that they did. Erdkamp has argued persuasively that the *publicani* took little or no part in obtaining grain for the military, except possibly in emergency situations, such as that described by Livy.[60] The Roman state did have the infrastructure necessary to draw supplies through taxation, purchase and contributions, and did not need to rely on the private sector in this regard. It is striking that although we are fairly well-informed about many of the other contractual activities of the *publicani*, there is no other example of the provision of foodstuffs being contracted out by the Roman state.[61]

Market and Forced Purchase

Despite the increasing reliance on provincial and allied grain, Italy continued served as the strategic base for Roman military operations. Tacitus refers to this when, rhetorically contrasting Republican practice with Imperial Rome's dependence on imported grain, that "in former times Italy conveyed supplies to distant theaters of operation

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[56] Livy 25.3.8–4.11.
[57] Erdkamp (1995) 169–70.
[58] Badian (1972) 16–30.
[59] Nicolet (1994) 636; Aubert (1994) 327–8.
[60] Erdkamp (1995) 168–191, though he does admit role of *publicani* in supplying horses and clothing to the army.
[61] Erdkamp (1995) 189.

for its legions."[62] Livy also attests to Italy's importance in support-
ing Rome's army: the Senate sent legates to Apulia and Calabria to
purchase grain in preparation for the 3rd Macedonian War in 172
B.C.[63] Nevertheless, given the enormous amounts of grain contributed
both by the provinces, primarily Sicily and Sardinia, and the allies,
mainly Carthage and Numidia, it makes perfect sense that the Romans
found it possible to stop collecting the *tributum* from Roman citizens
in 167.[64] The income was no longer necessary to pay for provisions,
and the soldiers' pay could presumably be paid out of other income.[65]
Rome had succeeded in this period in shifting the burden of sup-
plying their armies from the citizen body to the provincials and the
allies.[66]

   Between c. 140 to 100 B.C., there is an enormous rise in the
numbers of Roman coins minted—an increase estimated at more
than 500%[67]—that Crawford connected with Roman military expendi-
ture. It is tempting to see in this massive change a clue to a shift in
Roman logistics. There is certainly an increasing demand on Sicilian,
Sardinian and African grain supplies by the city of Rome, and per-
haps the Roman state is relying more on buying grain.

   This was probably not a matter of buying market price grain, but
rather forced purchase (*frumentum emptum* or *coemptio*).[68] Livy reports
that the Spanish, complaining of Roman corruption in 171 B.C.,
requested that Roman magistrate cease either compelling them to
sell the so-called "five-per-cent quotas (*vicensimae*)" at an arbitrarily
low price or converting the grain tax into money.[69] Certainly, some
of this taxed grain was for the support of the Roman administra-
tion and some was intended for the population in Rome.[70] The mil-
itary, however, is also an obvious recipient.

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   [62] Tac. *Ann* 12.43.
   [63] Livy 42.27.8.
   [64] It is true that many uncertainties surround the question of the end of the
tributum, as noted by Nicolet (1976)79–80.
   [65] Cf. Livy 4.36.2; Nicolet (1976) 82.
   [66] Nicolet (1976) 99.
   [67] Crawford (1974) 698ff.; Hopkins (1980) 109–11, 124–5; Howgego (1992) 13;
Nicolet (1994) 632.
   [68] Neesen (1980) 104–5; Herz (1988) 342–351; Kissel (1995) 130–131.
   [69] Livy 43.2.12.
   [70] Spanish grain was sold to the Roman people at subsidized prices in 203 B.C.,
Livy 30.26.6.

Sources of Supply in the Late Republic

The Roman state continued to rely on provincial taxation, in various forms during the period of the Late Republic.[71] The provinces continued to provide supplies for the army. Cicero, in a speech defending Fonteius from a charge of malfeasance as governor of Gaul, says that he supplied large amounts of grain to the Roman army operating in Spain.[72] When Marcus Terentius Varro, the propraetor of Farther Spain, decided to join the Pompeians in 49 B.C., one of his first acts was to requisition 120,000 *modii* of grain from the provincials. Politics played a role in logistics: Varro imposed especially heavy burdens on the towns loyal to Caesar.[73]

The practice of drawing on allies for provisions continued through the first century B.C.; indeed, this reliance increased during the Civil Wars as the central state lost power and resources.[74] During the Late Republic, an ally supplying a Roman army often meant the tacit support of one side or the other in a political dispute or even a civil war. During the Civil Wars between the Sullans and the Marians (82–72 B.C.), for example, the Lusitanians in Spain invited Sertorius and his Marian army into their country: game and other produce were offered to the troops as a gift.[75] The defection of Spanish allies to Sertorius led to serious supply problems for the Roman government forces.[76] When Smyrna was competing to build a temple for Tiberius, Livia and the Senate, it recalled its services to Sulla:

> . . . with his army in a most critical position through the inclement winter and scarcity of clothing, the news had only to be announced at a public meeting at Smyrna, and the whole of the bystanders stripped the garments from their bodies and sent them to our legions.[77]

In 53 A.D., an embassy of the Byzantines to the emperor Nero asking for the remission of tribute, looked back at the Republican period and summarized out their long history of assistance to the Romans:

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[71] Neesen (1980) 12–13.
[72] Cic. *Font.* 6.14.
[73] Caes. *BCiv.* 2.18.
[74] Caes. *BGall.* 1.16.1–17.2; 2.3.1–3; 5.20; *BCiv.* 3.42; [Caes.] *BAfr.* 6,7; Dio Cass. 41.51.4; App. *Mith.* 5,30.
[75] Plut. *Sert.* 11.2.
[76] Sall. *Hist.* 2.47.5.
[77] Tac. *Ann.* 4.56.

> . . . starting with the treaty concluded with ourselves at the start of the
> War against . . . Pseudo-Philip [Andriscus], they mentioned the forces
> they had sent against Antiochus, Perseus and Aristonicus; their assis-
> tance to Antonius [father of the triumvir] in the Pirate War; their
> offers of help at various times to Sulla, Lucullus and Pompey; then
> their recent services possible because they occupied a district conve-
> niently placed for the transit of generals and armies by land and sea,
> and equally so for the conveyance of supplies (*commeatus*).[78]

During the first century B.C., the Roman allies in the eastern Medi-
terranean were primarily client kings; from the Late Republic onwards,
they supplied large numbers of light horse and foot archers to Roman
armies.[79] These client kingdoms frequently supported Roman mili-
tary operations with provisions as well as troops: for example, Cap-
padocia supplied grain to Lucullus when he was besieging Cyzicus in
71 B.C.[80] During Gabinius's campaign against Egypt (55 B.C.), when
the Roman army crossed the Sinai desert, the Hasmonean client king
John Hyrcanus I sent provisions from Judaea.[81] The same system was
at work in 39 B.C., when Judaea's new king Herod, installed by Marc
Antony, provided grain, wine, oil and livestock to the Roman army
operating in Palestine under Silo.[82] Herod ordered the Samaritans
to collect the provisions and bring them to Jericho, where they were
turned over to the Romans.[83] Herod, judiciously switching sides after
Actium, provided Octavian's army with provisions during his march
into Egypt in 30 B.C., supplying it with water on the march across
the Sinai to Pelusium.[84] The system did not only function in the
East: Caesar expected the Aedui, as Roman allies, to provide grain
for his army.[85]

Sallust says that Pompey purchased supplies on credit (*fides*); The
author of the *Invective Against Sallust* says Sallust did the same when
obtaining provisions for Caesar.[86] Caesar notes that, during the fighting
in Spain in 49 B.C., "the price of grain had risen to fifty *denarii* a
modius" and that this caused deprivation among the soldiers.[87] He

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[78] Tac. *Ann.* 12.62; cf. Dio Cass. 75.14.4.
[79] Coulston (1985) 285, 295.
[80] App. *Mith.* 12,80.
[81] Jos. *BJ* 1.159.
[82] Jos. *AJ* 14.408; *BJ* 1.299–300.
[83] Jos. *BJ* 1.300.
[84] Jos. *BJ* 1.395.
[85] Caes. *BGall.* 1.16–17.
[86] Sall. *Hist.* 2.98.9; [Cic.] *In Sall.* 19.
[87] Caes. *BCiv.* 1.52.

does not mean that the soldiers bought their grain as individuals, but that Caesar's army, cut off from normal supplies, was forced to rely on merchants for its grain.

By the end of the Republic, a Roman general might extort money and provisions from Roman allies almost at will, as Domitius Aheno-barbus ruthlessly did on a trip through Asia Minor and Greece in 47 B.C.[88] Coercion was not always possible: a Roman general might have to beg. Dio Cassius says that Antony, encountering supply diffi-culties during his retreat from Parthia in 36 B.C., "flattered and paid court" to the Armenian king Artavasdes in order to get provisions.[89] Antony was in no position to make demands at the time.

As the institutions of the state came under increasing pressure in the civil wars, the armies were often supported by a series of exac-tions, legal and semi-legal.[90] During the Alexandrian War, for example, Caesar, for example, raised money by drafting equestrians, and the allowing them to purchase their discharge.[91] In addition to seizing control of state institutions, civil war era generalissimos took over the sophisticated infrastructure of the *publicani*, and used it to support the logistics of their forces.[92]

Ironically, one of the last acts of a relatively free Senate, was the reinstitution of the *tributum* for Roman citizens, at the instigation of Cicero, in 43 B.C.[93] This was done in order to provision and pay the consular armies fighting against Antony at Mutina. Between 43 and 40 B.C., the triumvirs instituted a series of extraordinary financial measures, in part to provision their armies, including special imposts on slaves, furnitures, and even on the "excess" property of wealthy women.[94] Attempts to pay for the enormous costs of civil war on the backs of the Roman people led to tremendous resentment, and even street-fighting in Rome.[95]

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[88] Dio Cass. 42.49.1–3.
[89] Dio Cass. 49.31.2–3.
[90] Nicolet (1976) 88.
[91] [Caes.] *BAfr.* 56.4.
[92] Badian (1972) 116–7.
[93] Cic. *Ad. Fam.* 12.30.4; Dio Cass. 46.31.3–4.
[94] Nicolet (1976) 89–90.
[95] App. *BCiv.* 5.8,67.

Sources of Supply in the Imperial Period

Augustus was well aware of the breakdown in the normal Republican
instititutions that had supported the army's provisions. As part of his
general reform of the state, he certainly found it necessary to estab-
lish a firm footing for supplying his army.[96] As Dio Cassius points
out, it became increasingly difficult to distinguish the emperor's per-
sonal funds and that of the state.[97] By holding the purse-strings and
managing the flow of supplies, the emperor could effectively control
his commanders in the field and reduce the danger of a military
coup d'état.

Augustus set up a special military treasury (*aerarium militare*) and
kept a record of the exact number of troops in the army, as well
as the exact costs which the military entailed.[98] The *aerarium militare*
was initially funded by a large capital sum contributed by Augustus
and kept up with an auction and an inheritance tax. This was the only
direct imposts on Roman citizens that supported the army in the
Imperial period.[99]

Imperial Taxation

Roman Imperial taxation remains a poorly understood topic.[100] In
areas under their direct control, the Romans used direct taxation,
requisition and both compulsory and market purchase to obtain pro-
visions.[101] Though the Roman tax system was complicated and differed
from province to province, Wierschowski estimated that the direct
tax on land took about ten to twelve percent of the crop, though
this may be excessive.[102] Hopkins questions whether such methods
were used until the third century.[103] Direct Roman requisitions in grain

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[96] Neesen (1980) 13–16.
[97] Dio Cass. 53.22.2; Millar (1977) 189–201.
[98] Suet. *Aug.* 49, 101; *Res Gest. Div. Aug.* 3.17; Dio Cass. 54.25.5; 55.25.2;
56.33.1; Kissel (1995) 115, 293.
[99] Nicolet (1976) 95–98.
[100] Millar (1993) 49, n. 22.
[101] See Isaac (1992) 283–304; Kissel (1995) 113–119.
[102] Wierschowski (1984) 152, citing the definition of *tributum* in *Dig.* 50.16.27
(Ulpian, third century). For the complexities of taxation in the Roman Near East,
see Millar (1993) 110, who notes ". . . the realities of the process by which the
Roman state lived off its subjects, in this as in other areas, escape us."
[103] Hopkins (1983) 86–7.

continued in Sicily, and were introduced, but the bulk of this grain
went to feed the population of the city of Rome.[104]

Under normal circumstances the Romans would have provisioned
their troops with food obtained within the province they were sta-
tioned in, whether it was contributed in kind or purchased with tax
money. Tacitus describes this system at work in the *Agricola*, though
he is, typically, short on detail.[105] While the army in garrison may
well have been supported, at least in part, by local taxes in kind,
the Roman Imperial state relied on direct taxation (*tributum*), either
in the form of a fixed quota on land (*tributum solis*), or a cash pay-
ment (*tributum capitis*), for the money to buy provisions for military
campaigns.[106] Certainly throughout the first century, and probably
into the first, money continued to be deducted from the soldiers'
pay for food.[107] The imposition of direct taxes and forced purchase
involved certainly placed a heavy burden on the provinces. The
Talmud graphically illustrates the provincial attitude toward Roman
taxation. A *midrash* on Deuteronomy 32:14 ("And he ate the pro-
duce of the field, and he made him suck honey out of the rock and
oil out of the flinty rock") takes it to refer to the efficient extraction
of taxes by Roman officers, specifically mentioning *beneficarii*.[108]

Whether the money for provisions passed through the *aerarium mili-
tare* or the *aerarium Saturni* is unknown.[109] At least in the early Imperial
period, one sometimes sees the use of *ad hoc* taxes to support cam-
paigns: for example, when Germanicus moved against the Cherusci
in 16 A.D., he sent Publius Vitellius and Gaius Antius to assess the
Gallic tribute (*census*).[110] It is clear, however, that in the first century,
at least, that armies in the field were provisioned mainly by supplies
purchased by cash, and not taxed in kind.[111] For example, when
Augustus enlisted freedmen and slaves to put down the Illyrian revolt
(6–9 A.D.), he forced their masters and former masters to pay the
cost of maintaining them over a period of six months. Since much

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[104] Rickman (1980), *passim*.
[105] Tac. *Agr.* 19.
[106] Nicolet (1976) *passim*; Neesen (1980) 25–29; Kissel (1995) 151ff.
[107] *P. Gen. Lat.* 1 (88–90 A.D.) [= Fink (1971) no. 68]; *Mas. Doc.* 722 (72 or 75 A.D.)
[= Cotton & Geiger (1989) 46–7], the latter is particularly significant, as it was
probably issued on campaign.
[108] *Sifre Deut.* 318; for the *beneficiarii* and the *annona militaris* see Ott (1995) 142–149.
[109] Corbier (1977).
[110] Tac. *Ann.* 2.6.
[111] Wierschowski (1984) 154.

of the expense of maintaining the army must have gone to provisions, assigning the cost to the masters suggests that the state was purchasing grain.[112] The *dispensator* for Nero's planned invasion of Armenia was able to embezzle 13 million sesterces, presumably only a fraction of the cost of the campaign.[113] It is this fundamental reliance on cash, as opposed to requisition in kind, that makes it possible, in some cases, to trace the movement of Roman troops by the activity of various mints.[114]

Rickman and Kissel claim that forced purchase was the major method by which grain was obtained for the army under the Principate.[115] Duncan-Jones estimates that in Egypt the price of grain set by the state was 1/3 lower than the market price, and this can probably be applied to military purchase as well.[116] As noted above, Wierschowski disagrees, proposing that direct taxation normally sufficed to provision the army: he sees the *frumentum emptum* as a supplement to the provincial *tributum*.[117] In either case, it is cash payments for provisions, and not taxation in kind that is typical of Early Imperial logistics. Money could be used for market purchase for staples, but although soldiers did purchase supplemental items from sutlers,[118] we have no attestation of such purchases on a large scale.

Of course, in addition to state taxation, the emperors' private estates were a potential source of grain and other foodstuffs for the military.[119] Certainly the estates of the emperor ought to be considered state assets, and booty from military campaigns went to the *patrimonium*.[120] A papyrus from Dura-Europus mentions the supply of barley from an imperial estate to a *vexillatio* of the cohort XX Palmyrenorum stationed in Appadana.[121] This does not concern a military campaign, indeed it probably concerns the supply of the *cursus publicus*.[122] and one cannot extrapolate from this a regular practice.

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[112] Dio Cass. 55.31.1; see Segré (1942/3) 434.
[113] Plin. *HN* 7.129.
[114] Heichelheim (1944) 113–5; Adams (1976) 88–128.
[115] Rickman (1971) 271–2; Kissel (1995) 130ff; cf. Neesen (1980) 106–107.
[116] Duncan-Jones (1976) 247ff.
[117] Wierschowski (1984) 152–3; cf. Van Berchem (1937) 138–9.
[118] See Chapter Two, p. 100.
[119] Kissel (1995) 117.
[120] Millar (1977) *passim*.
[121] *P. Dura* 64 [= Fink (1971) no. 91].
[122] Davis (1967); cf. Kissel (1995) 151.

Allied and Private Contributions

Nominally independent "allied" and client states continued to contribute supplies, either voluntarily or through compulsion until their gradual incorporation as provinces of the Empire. The nominally independent client kings of the Near East kept functioning as Roman allies during the first century of the Empire.[123] For example, Nero ordered two of these client kings, Agrippa II of Judaea and Antiochus IV of Commagene to supply military forces for Domitius Corbulo's army in 54 A.D.[124] These two kings, plus Soehaemus of Emesa and Malchus of Nabatea, furnished troops to help supress the Jews in 66 A.D.[125] The client kings also doubtless contributed the costs, and perhaps provisions themselves, for the upkeep of their soldiers.

Tribes and cities that had functioned as allies during Republican times sometimes continued to do so under certain conditions. During the Civil War of 69 A.D., the Aedui and the inhabitants of Lugdunum (Lyons) supplied the troops of the Vitellian commander Fabius Valens with provisions (*commeatus*), without cost. Tacitus notes that the "gift" of the Aedui was made under the pressure of tens of thousands of soldiers marching through their territory. The Lugdunenses, however, wholeheartedly supported the Vitellian cause.[126]

We have evidence of wealthy individuals from the provincial aristocracy providing large amounts of supplies to the army without cost during the second century. A local magnate in Ancyra set up an inscription stating he "[supplied] the forces wintering in the city and sent forward [with supplies] those on the way to the war against the Parthians" in 113–4 A.D.[127] Such a contribution had the added advantage of moving the army away from a city's territory.[128] When the Roman army passed through Asia Minor, after returning from a successful Parthian War in 166 A.D., a Flavius Damianus of Ephesus gave 201,200 *medimnoi* of grain, the equivalent of over 800,000 *modii*.[129]

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[123] The client kings kept standing armies, organized, at least to some extent, on Roman lines: *AE* 1966.493 (Hauranitis, early 2nd c.) mentions a "*kenturiôn*" in Herod Agrippa II's army.

[124] Tac. *Ann.* 13.7; Wheeler (1997) 383.

[125] Jos *BJ* 3.68.

[126] Tac. *Hist.* 1.64.

[127] *IGRR* 3.173 = *OGIS* 544; Millar (1993) 103; Kissel (1995) 55, 84.

[128] As noted by Dennis Kehoe (personal correspondence).

[129] *AE* 1913.170 (Ephesus, 166): *hupo dexamen[on] tou tois strat[o]peda ta ap[o tês] kata Parthôn neikês hup[o]s[tre]phonta*; Kissel (1995) 283 n. 74.

This is enough to feed an army of 40,000 for over five months. This
is an astonishingly high contribution for an individual to make (com-
pare those made by entire state in Republican times);[130] it is a reflec-
tion of the enormous wealth of some Imperial Roman landowners.
Whether such contributions were a feature of the second century, and
perhaps a sign of stress on a cash-based supply system, or if we only
happen to have evidence of it in this period, is unknown.

Annona Militaris

Dio Cassius complained about Caracalla's requisitions, which he per-
sonally experienced:

> There were provisions (*epitedeia*) that we were required to furnish in
> great quantities . . . without receiving any remuneration and sometimes
> actually at additional cost to ourselves—all of which supplies [Caracalla]
> either bestowed upon the soldiers or else peddled out.[131]

By the beginning of the third century, a new system for supplying
the Roman army had developed, the so-called *annona militaris*.[132] Under
this new system, rations were issued to soldiers without the deduc-
tions from their pay that had been standard throughout the Republican
and Early Imperial periods. The term *annona* is frequently used in
ancient sources to refer both to military supply and to grain for Rome,
so a confusion between the *annona civica* and *annona militaris* is not
suprising.[133] Indeed Kissel, who sees Roman military logistics as closely
tied to the collection of grain for the capital, uses the term "*annona
militaris*" to refer to supply for the army in general, and not only for
the Late Roman system.[134] The relationship of the prefect of the
Annona to the military system, however, is open to question,[135] and
a shift to a tax-in-kind system, and the elimination of deduction for
food, represented a real change in Roman logistical practice. Thus,
although it is a neologism, it makes sense to confine the use of the

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[130] See above, Table V, p. 228.
[131] Dio Cass. 78.9.3. *P. Oxy.* 43.3091 (216/7 ?) is an example of requisition of
barley for Caracalla's Parthian expedition.
[132] Van Berchem (1937) 117–202; Develin (1971) 687–95; Adams (1976) 238–40;
Van Berchem (1977) 331–6; Neesen (1980) 108–112; Isaac (1992) 285–291; Le
Bohec (1994) 218–219.
[133] MacMullen (1976) 230.
[134] Kissel (1995) *passim.*
[135] See Chapter Six, pp. 263–4.

term "*annona militaris*" to the practice of levying taxes in kind to supply the Roman army.

There is some question as to when this new system was put into place. Indications exist that there may have been a shift toward the use of tax in kind as early as the turn of the second century. In his *Panegyric*, Pliny praised Trajan for paying for the military *copia*, that is, provisions for army, as well as for the civil *annona*, provisions for Rome.[136] This, of course, implies that the alternative, direct requisition, is conceivable and may have been practiced in the previous reigns. Develin's arguments against a date as early as Antonine times are convincing; he makes a case for its introduction during Septimius Severus' military crisis in 198.[137] There are two possible references to the *annona militaris* in Dio Cassius (in addition to his complaint about Caracalla above),[138] and another in the *Historia Augusta*'s biography of Alexander Severus.[139] None of these literary sources unambiguously refers to a permanent shift to a tax in kind system, and indeed there is no clearcut evidence for the *annona militaris*, in this sense, before 235. The *annona militaris* system is very important in the support of the Late Roman army, both at peace and in war, but this is outside the scope of this study.[140]

Conclusion

The strategic base of a military force is the area, or areas, that supply it with provisions from outside the area of operations. Rome's military success relied in large part on its ability to exploit these strategic bases in support of its armies. Until the end of the Punic Wars, Rome relied heavily on a direct tax, the *tributum*, levied on its citizens, to support its armies. This money was used to pay for grain and other provisions. Other sources added to such supplies: voluntary (and involuntary) contributions by allies, and special imposts laid on local populations.

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[136] Plin. *Pan.* 29.5; Van Berchem (1937) 140–1; Wierschowski (1984) 153; Kissel (1995) 123.

[137] Develin (1971) 692–5.

[138] Dio Cass. 78.28.2, 34.3.

[139] *HA Sev. Alex.* 15.4–5; the passage on rations in 47.1 has no bearing on this question.

[140] For the *annona* in the Late Roman army see David (1977) 149–160; Elton (1995) 121–4.

As Rome established its provincial system, in the late second and over the course of the first century B.C., a direct tax, first called the *stipendium* and later the *tributum*, was introduced in some of the provinces. In 167 B.C., the *tributum* on Roman citizens was abolished, leaving only the provincial direct tax. The grain tithe or *decuma*, levied on Sicily and Sardinia, was an important source of supplies for the army, and help support the conquests of the first half of the second century B.C.

The allies, nominally independent but bound to support Rome in its wars, provided an increasingly important source of grain, both wheat and barley in this period. Carthage and Numidia, in particular, contributed literally millions of *modii* of grain, a significant amount of the army's needs. The contributions we hear about in Livy's narrative probably only represents a fraction of the allies' contributions during the second century. The grain tithes and allied contributions made direct purchase of grain less important, though there are still some cases of market purchase through the second century.

Throughout Republican times, the Romans made use of *publicani* on contract to provide various state functions, particularly tax collection. Although private contractors did supply horses and clothing to the army, they probably rarely were directly involved in gathering provisions for the military.

The rise in the amount of Roman coinage in the period 140 to 100 B.C. may represent a change in the Roman method of supplying its armies. As grain from Sicily and Sardinia was drawn into the feeding of Rome's populations, and as allied states such as Carthage and Numidia became provinces, forced purchase (*frumentum emptum*) seems to have become the prime means of collecting provisions.

As the Republic began to disintegrate over the course of the first century, reliance on allies again increased, as did the use of irregular imposts. At the end of the Republic, in 43 B.C., the Republican method of taxation comes full circle, with the reintroduction of the citizen *tributum* to purchase provisions for the army. This is an unsuccessful reform, and the last ten years of civil war saw a general free for all of imposts and levies to support the massive armies of the various parties.

The Imperial Roman method of taxing the provinces, and of paying for army supplies at the central level remains poorly understood and controversial, largely due to a lack of standard procedure throughout the Empire. The role of the new military treasury, the *aerarium*

militare, the relationship of the prefecture of the annona or of impe-
rial procurators to military supply and the relative use of direct tax-
ation and forced purchase, are all subjects of debate. Without further
evidence, the exact method of Roman supply is likely to remain
obscure. What is clear, is that whatever the method used, the emperor
remained in firm control of the system. Allied states continue to be
a source of supplies, particularly the client kingships of Western Asia,
and in the second century one sees the gifts, often on a massive
scale, of private landowners, towards the army's supply.

   Toward the end of the second century, there seems to have been
increased pressure on the system of paying for army provisions out
of tax receipts. This trend leads to the eventual institution of the
annona militaris, the collection of taxes in kind to feed the army. This
probably occurred in the Severan period, though there is no direct
evidence for it prior to 235 A.D. The *annona militaris* did become
the main method of supporting the army in the Late Roman Empire.

   The effective exploitation of strategic bases, as well as the effective
functioning of all aspects of logistics, involved administration, the
subject of the next chapter.

THE ADMINISTRATION OF LOGISTICS

Introduction

Just as war is an extension of politics, logistics is an extension of the economic structure of a state at war. A state must have a certain level of economic development, technology, infrastructure and administrative skill in order to supply its armies at a distance. Polybius makes this point in explaining why the Spartans, despite their military prowess, never became a major power:

> Once [the Spartans] began . . . to make military campaigns outside the Peloponnesus . . . neither their iron currency nor the exchange of their crops for commodities which they lacked, as permitted by the legislation of Lycurgus, would suffice for their needs, since these enterprises demanded a currency . . . and supplies drawn from abroad (*xenikes paraskeues*).[1]

The proper administration of logistics is the key to supplying an army. This is especially true when a commander must coordinate strategic, operational and tactical bases with connecting supply lines. Yet even an army supporting itself on the resources in the area of operations ("living off the land") needs to administer its logistics in order to avoid breaking down into a disorganized mob. It was the development of administration and bureaucracy that allowed ancient armies to operate for extended periods away from a home base.[2] Central administration was vital in order to marshal available resources and direct them to the military forces.[3]

Throughout history, the private sector of the economy has played an important part in producing and transporting provisions for military forces, and this was certainly the case for the Romans. The participation of private business in logistics, however, makes accounting

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[1] Polyb. 6.49.8–9.
[2] Ferrill (1985) 38.
[3] For the best study of the administration of Roman military logistics in the imperial period see Kissel (1995) *passim*, esp. 120–176, 271–291.

by the central authorities all the more important in order to prevent graft and make effective use of resources. The efficient administration of supply was an important feature of Roman warfare from the third century B.C. onwards, and a major element in the success of their armies.[4] This point was well understood by the Romans: Dio Cassius quotes Julius Caesar as saying "It is by proper maintenance [of supply] that armies are kept together."[5]

   Some of Rome's enemies had political infrastructures, and military logistics, as well-organized as the Roman one. Many of its foes, however, did not. One weakness of the Parthian Empire seems to have been its inability to organize a logistical system sophisiticated enough to support sustained warfare against the Romans. Dio Cassius explains that the Parthians "cannot wage an offensive war continuously . . . because they do not lay in supplies of food or pay."[6] Tacitus remarks that "inadequate provision of supplies (*commeatus*)" forced the Parthian king Vologaeses to abandon his invasion of Armenia (51 A.D.). While not stating it explicitly, Tacitus implies the siege of Tigranocerta failed in 61 because the Parthians could not bring fodder to the site for their cavalry.[7] This is, of course, only the Roman point of view and we are ill-informed about such aspects of Parthian warfare.[8]

   The less sophisticated "barbarian" peoples whom the Roman fought had even more primitive logistical administration. Tacitus notes that the Britons lacked provisions during Boudicca's revolt (60 A.D.) partly because all the men had been pressed into military service and none were left to sow the crops.[9]

Republican Central Administration of Logistics

Under the Republican system, the Senate effectively controlled the military, and particularly its supply. The executive functions of logistics, however, were managed by various elected magistrates. After the Roman state declared war, the Senate would designate the area of operations as a "province" (*provincia*) of a consul, proconsul, praetor

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[4] Junkelmann (1997) 30–33, 83–5.
[5] Dio Cass. 42.49.5.
[6] Dio Cass. 40.15.6.
[7] Tac. *Ann.* 12.50; 15.5; cf. Dio Cass. 62.21.2; 79.27.2.
[8] As noted by Goldsworthy (1996) 50.
[9] Tac. *Ann.* 14.28.

or propraetor, conferred the military authority (*imperium*) to command troops within the province for the magistrate's one-year term of his office. The Senatorial decree also gave the commander the authority to buy and requisition supplies, but much of the authority over, and administration of, logistics was kept in the hands of the Senate. Plutarch says that Aemilius Paulus in a speech to the assembly before setting out on the Third Macedonian War, told the Senators not to "indulge in rhetoric about the war, but to furnish quietly the necessary supplies for it."[10] Polybius explains the Senator's jurisdiction over the army's supply lines:

> The consul, when he leaves with his army . . . appears to have absolute authority . . . but in fact he requires the support of the people and the Senate. . . . For . . . the legions require constant supplies and without the consent of the Senate, neither grain, clothing nor pay can be provided . . .[11]

According to Polybius, the consuls were responsible for the "preparation for war," including undoubtedly the organization of supplies, and could draw directly upon public funds to do so, the expenses incurred by magistrates had to be approved by the Senate and the Centuriate Assembly (usually a rubber stamp).[12]

   Livy bears out Polybius's analysis, reporting that in 201 B.C. the Senate was intimately involved in the planning for the Second Macedonian War.[13] In fact, Livy frequently describes how the Senate assigned provinces to consuls and set the size of armies.[14] The Senate, in so doing, probably allocated money for supplies and authorized requisition. Sallust explicitly states that at the beginning of the Jugurthine War, the Senate voted "the soldiers' pay and . . . necessities of war."[15] The same process applied to praetorian armies.[16] For most of the Republic, the state treasury (*aerarium Saturni*) was administered by the quaestors with the assistance of a staff of scribes. The *tribuni aerarii* were probably officials of the tribes who were responsible for paying the *tributum*, and other payments, into the treasury.[17]

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[10] Plut. *Aem. Paul.* 11.1.
[11] Polyb. 6.15.4–5.
[12] Polyb. 6.12.5,13.1; Sall. *Cat.* 29.3; Nicolet (1976) 60–1; Erdkamp (1994) 180–181.
[13] Livy 31.3.2–3, 19.2–4.
[14] Livy 32.8.2–3, 28.9–11; 33.43.1–4, 3–9; 35.20.5–6; 36.1.6–8; 42.18.6–7.
[15] Sall. *Iug.* 27.5.
[16] Livy 42.18.6–7.
[17] Polyb. 5.12.10, 13.3, Sall. *Iug.* 104.3; Nicolet (1976) 46–54.

At the request of the *praetor urbanus*, or consul, with the authority of the senate, they would pay out the money for supplies.

A magistrate's authority to raise and equip an army lapsed at the end of his one-year term. Every year it remained on campaign the Senate had to resanction the army, authorizing its size and requisite supplies. Livy says that in 180 B.C., the consul Aulus Postumius announced to the Senate (prematurely in the event) that such reauthorization of pay and grain for the army in Spain was unnecessary, as the Celtiberian revolt in Spain had been crushed.[18] When Gaius Marius allowed proletarians to enlist in the army for the first time, he ended up, according to Sallust, with "a larger force than had been authorized [by the Senate] (*maiore numero quam decretum erat*)."[19] Although noting that Marius brought provisions (*commeatus*) along with him, Sallust does not explain how, or if, the Roman commander obtained sufficient supplies for this larger army. Marius did suffer a shortage of supplies later in the campaign, perhaps due to Senatorial obstruction.[20]

The Senate also had authority to obtain grain, whether by requisition, taxation, forced or voluntary purchase from provinces.[21] In 191 B.C., for example, the Senate ordered the governor of Sicily, Marcus Aemilius Lepidus, to requisition a second tithe of grain and arrange for its transportation to the army in Greece.[22] When allies offered grain or other supplies, it was the Senate that decided what and how much to take, and under what circumstances.[23] The Senate also controlled state purchase of grain. In 171 B.C., it sent three commissioners (*legati*) to purchase grain in Apulia and Calabria for the Third Macedonian War.[24]

The Senate at times extended its supervision of the Roman logistic system into the area of operations, i.e. the commander's *provincia*. For example, when Quintus Fabius Maximus established an operational base at Puteoli, fortifying it and placing a garrison there, he

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[18] Livy 40.35.4. Other examples: Sall. *Iug.* 43.3–4; 84.3.

[19] Sall. *Iug.* 86.4.

[20] Sall. *Iug.* 90.2–3. It is possible that the development of the soldiers' packs (discussed in Chapter Two, pp. 75–7) were a response to a shortage of pack-animals due to insufficient money voted by the Senate.

[21] Erdkamp (1996) 180–1.

[22] Livy 36.2.12; see also 37.2.2.

[23] Livy 36.4.1–9; 37.50.9–10; 42.31.8; 43.6.4, 11–14; 45.13.15; see Chap. 5, Table V.

[24] Livy 42.27.8.

did so with senatorial authority.[25] In rare cases Senate might assert
its authority even over the distribution of rations: to punish legions
which had refused to serve after the defeat at Cannae, the Senate
ordered them placed on barley rations for seven years.[26] This over-
lap of military authority sometimes led to tension between the Senate
and elected magistrates. In 171 B.C., the consul Gaius Cassius
marched into Illyricum without the authorization of the Senate. As
part of its investigation, the Senate learned that the troops had been
issued thirty days' grain, and that guides had been requisitioned, nei-
ther of which ought to have happened without a Senatorial resolu-
tion.[27] The next year, an embassy from the city of Abdera complained
to the Senate that the praetor Lucius Hortensius had requisitioned
50,000 *modii* of wheat without Senatorial decree. After looking into
the matter, the Senate agreed and declared Hortensius's actions
illegal.[28] In 169 B.C. the Senate went so far as to send two senators
to Greece, to publicize a decree of the Senate that no ally should
contribute supplies to a Roman commander without a senatorial
resolution.[29] A consul did not always wait for Senatorial approval
to obtain supplies if time was not available: in 169 B.C. the consul
Q. Marcius Phillipus purchased 30,000 *modii* of grain from the
Epirotes, but he did write the Senate seeking *ex post facto* approval
and requesting that the money for it be paid in Rome.[30]

   Before, and even during, the First Punic War, there does not seem
to have been a specific official assigned to supervise the logistics of
a campaign, rather this function appears to have been handled di-
rectly by the Senate. This rather unwieldy system seems to have
worked well enough as long as the Romans were operating within
Italy. Overseas operations, however, needed a more sophisticated ap-
proach. In 242 B.C., the Senate assigned the *provincia* of supplying
of the army besieging Lilybaeum to one of the consuls, L. Junius
Pullus.[31] This seems to have been an *ad hoc* measure, but we do not
know the general rule for Roman supply in the First Punic War.
Pullus stayed in Syracuse, where he personally managed the opera-

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[25] Livy 24.7.10.
[26] Front. *Strat.* 4.1.25.
[27] Livy 43.1.8.
[28] Livy 43.4.8–10.
[29] Livy 43.17.2.
[30] Livy 44.16.1–2.
[31] Polyb. 1.52.5.

tion; his quaestors supervised the shipment of supplies to Lilybaeum, where the army was located.[32] As noted in Chapter Four, the operation ultimately failed.[33]

The Roman supply system grew more complex during the Second Punic War. The consuls, in consultation with the Senate, took charge of arranging for the supply of the military while they were in Rome.[34] Usually, however, the consuls were leading armies outside the city; in these cases the Urban Praetor took over the logistical administration at Rome. The Urban Praetor also administered the direct purchase of grain for the army although he usually used agents (*legati*) to do the actual work. In 212 B.C., as *praetor urbanus*, Publius Cornelius Sulla, with senatorial authority, sent Gaius Servilius as a legate to Etruria to purchase grain.[35] When the consul Q. Marcius Phillipus purchased grain from the Epirotes in 169 B.C., he asked the Senate to authorize the Urban Praetor to pay the Epirotes' agents in Rome, which was done.[36]

The Senate might also assign the Urban Praetor other tasks to support the military on an *ad hoc* basis: in 172 B.C., as part of the preparations for the Second Macedonian War (200–196 B.C.), the Senate ordered the Urban Praetor Gaius Licinius Crassus to repair 50 old ships which had been stored in the shipyards of Rome and raise crews for half of them.[37] He probably also arranged to provision them at the same time. In 169 B.C., the Urban Praetor Gaius Sulpicius Gallus let out a contract for providing and transporting to Macedonia 30,000 tunics, 5,000 togas and 200 horses for the army.[38]

The aediles controlled the grain supply within the city of Rome. Their authority was primarily civil, but they did receive grain won by military conquest, for example, the grain seized by Titus Manlius during his conquest of Sardinia in 215 B.C.[39] In addition, the aediles were responsible for the public sale of surplus grain left over from military operations to the Roman people.[40] On the rare occasions when an army was stationed in Rome itself (for example the 16,000

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[32] Polyb. 1.52.8.
[33] See Chapter Four, pp. 158–9.
[34] Polyb. 3.106.7.
[35] Livy 25.15.5.
[36] Livy 44.16.4; see Chapter Five, p. 230.
[37] Livy 42.27.1.
[38] Livy 44.16.4.
[39] Livy 23.41.6.
[40] Livy 31.4.6, 50.1; 33.42.8.

men that Fulvius Flaccus brought from Capua to guard against Hannibal's *razzia* of 211 B.C., the plebeian aediles supplied the army with provisions (*commeatus*).[41]

As noted in the previous chapter, the role that private contractors played in Roman logistics may well be exaggerated.[42] Nevertheless, they did have some role, particularly in transport, and thus needed to be supervised; censors, consuls, the urban praetor, aediles and quaestors, as well as the Senate as a body all played a part in supervising the contractors at various times.[43]

Late Republican Central Administration

In the first century B.C., the senatorial control over the raising and supplying of armies began to be challenged. Indeed, this was one of the factors that led to the Civil Wars which plagued Rome in this period. Occasionally, the assemblies asserted their technical power, but mainly it was the consuls who seized more control over the army's supply as the Republican constitution began to unravel. Sallust quotes (or invents) a speech of the aristocrat Lucius Marcius Philippus, attacking the *popularis* consul Marcus Aemilius Lepidus for levying troops, raising money and moving garrisons without senatorial authorization.[44] As the Late Republic began to collapse, the consuls and proconsuls started to exercise control over the Roman military's logistics—without Senatorial authority. Gradually these forces turned into private armies.

When generals managed to seize control of the state, they tended to make use of traditional Republican methods in supplying their armies. For example, when Pompey controlled Rome, the Senate voted him the equivalent of 1,000 silver talents a year (24,000,000 HS) to feed and equip his soldiers.[45] Sometimes, however, the administration of Civil War era armies were necessarily *ad hoc*, as the legitimate officials of the state might be arrayed in the opposite camp. The logistical administration of Roman commanders during the per-

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[41] Livy 26.10.2.
[42] See Chapter Five, pp. 230–1.
[43] For supervision of the *publicani*, see Badian (1972) 34–47, 79–81; Erdkamp (1994) 180–183.
[44] Sall. *Hist.* 1.77.17.
[45] Plut. *Pomp.* 55.4.

iod of the Civil Wars became increasingly idiosyncratic. Increasingly, Late Republican generalissimos administered their army's supply as they found suitable and convenient. For example, to pay for his siege of Athens (87–86 B.C.), Sulla "borrowed" money from many of Greek' temples, including Delphi, and Pompey supplied his armies fighting Sertorius in Spain (77–2 B.C.) out of his own resources.[46]

Under the conditions of civil war, there was a tendency to give the vital job of administering the army's logistics to trustworthy individuals, regardless of their official rank or position. For example, Sertorius had a quaestor, Marcus Marius, who had logistical duties, such as transporting grain, but this Marius was clearly appointed by Sertorius (at this point an outlaw) and not an elected magistrate.[47] Caesar placed a private citizen, C. Fufius Cita, described as a "businessman" (*negotiator*) in charge of logistics (*res frumentariae*) during his Gallic campaigns.[48] Caesar also employed the historian Sallust, then a praetor, to obtain supplies from the island of Cercina for his African campaign of 46 B.C. clearly an *ad hoc* measure.[49] Publius Ventidius Bassus rose from humble origins to become consul, partially due to the wealth he amassed as a military contractor and quartermaster for Caesar and Antony.[50] Cicero contemptuously refers to Ventidius as a "mule-driver" (*mulio*),[51] but this is not to be taken literally, rather as propaganda exploiting the Roman nobility's contempt for trade— even when it involved the support of armies. Accounts of Ventidius's life based on Caesarian sources, preserved in Dio Cassius, do not mention his sordid beginnings in logistics, focussing on his field commands, the more the pity.[52]

Extra-legal logistical arrangments could also be criticized as part of the propanda exchanges of the Civil Wars. Velleius Paterculus, who wrote from a Caesarian perspective, criticized the tyrannicides Brutus and Cassius because:

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[46] Plut. *Sulla* 12.4–5 (Sulla claims to have paid the money back, 19.6); *Pomp.* 20.1; Sall. *Hist.* 2.98.3, 9.

[47] Livy 91.18 (frag. *ex codice Vaticano*).

[48] Caes. *BGall.* 7.3.1.

[49] [Caes.] *BAfr.* 8.3; 34.1–3.

[50] Plin. *HN* 7.135; Gel. *NA* 15.4.3; App. *BCiv.* 6.6,50; see Chapter One, p. 44, Chapter Three, pp. 146–7.

[51] Cic. *Ad. Fam.* 10.18.13.

[52] Dio Cass. 43.51.4; 48.39.3ff.

> . . . without government sanction they had taken possession of provinces
> and armies and under the pretence that the republic existed wherever
> they were, they had gone so far as to receive from the quaestors, with
> their own consent, it is true, the moneys which these men were con-
> veying to Rome from the provinces across the sea.[53]

He notes, however, that because of the temporary alliance between
the Republicans and Octavian against Marc Antony, "these acts were
now included in the decrees of the senate and formally ratified."[54]
The long period of Civil Wars often left persons without any legal
status in positions of authority: for example, in 38 B.C., one of Sextus
Pompeius's freedmen, Pompeius Menas, actied as "a kind of praetor,"
that is governor, of Sardinia. When Pompeius ordered him to give
an accounting of the grain and money on the island, Menas, who
had apparently been "dipping into the till," defected to Octavian.[55]

By the end of half-century of Civil Wars which brought down the
Republic, the positions of the Senate and the army commander were
completely reversed as far as logistics were concerned. In 31 B.C.
Octavian, operating as *dux belli* without any constitutional authority
in the traditional sense, issued peremptory orders to Senators accom-
panying his army.[56] The Senate had lost its control over military
logistics, a key element in its loss of real power.

Republican Administration of Supply Lines

In the Republican period, the state seems to have assigned either
military officers or magistrates to its naval forces and given them
control over the shipping of supplies. These individuals apparently
took orders from the field commanders, though this command rela-
tionship is not always clear. The organization of supply by sea went
through a number of changes, as the Romans struggled to organize
a sophisticated logistical system. In 210 B.C., the plebeian Decimus
Quinctius commanded both a fleet of 20 ships and "the supply line"
(*commeatus*) supporting the siege of Tarentum from Sicily. Livy does
not explicitly give his title, but Broughton suggests he was a prefect.[57]

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[53] Vell. Pat. 2.62.3.
[54] *Loc. cit.*
[55] Dio Cass. 48.45.5–6.
[56] Dio Cass. 50.11.6.
[57] Livy 26.39.3; *MRR* 1.281.

During the final phases of the Second Punic War, it appears as though the consul Scipio Africanus had control over his supply line to Africa, as Appian reports the Senate sent him warships to protect it.[58] In 198 B.C., during the Second Macedonian War, the consul Flamininus ordered supply ships to rendezvous with his army at the Ambracian Gulf.[59] The praetor Lucius Quinctius Flamininus (the consul's brother) commanded the fleet and gave orders to merchant ships carrying supplies, under contract, for the army.[60] When Cato, as consul, commanded the army in Spain in 195–194 B.C., Livy says that he "ordered ships of every kind collected" and seems to have had control over a fleet.[61] Polybius specifically says that in 188 B.C. the proconsul Manlius Vulso issued orders to the prefect of the fleet Quintus Fabius Labeo.[62] On the other hand, during the operations against Antiochus III (192–189 B.C.), there appears to have been little or no cooperation between the praetor of the fleet, Aemilius Regillus, and the consul, Lucius Scipio, though this may have merely reflected a mutual dislike.[63] These references suggest that the field commander normally had control over his supply line.

The office of *duumvir navalis* was created by tribunician law in 311 B.C.,[64] but its first appearance in our period was in 181 B.C.[65] Each of the two officials was in charge of a fleet, but our sources do not set out the relationship of these officers with the field commanders. In 178 B.C., the *duumvir navalis* Gaius Furius did support Manlius Vulso with supplies in his campaign against the Istrians in northern Illyria. When the Roman camp was stormed, the consul ordered the Roman fleet to withdraw, but this was a tactical move, and does not necessarily reflect his authority over the supply line.[66] In any case, the office of *duumvir navalis* was abandoned in 171 B.C. during the Third Macedonian War, and replaced by a praetor of the fleet who had command over supply lines. C. Lucretius Gallus was the first to serve in this position.[67] As the war went on, however, logistical

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[58] App. *Pun.* 4,25.
[59] Livy 32.14.7.
[60] Livy 32.16.2–5.
[61] Livy 34.8.5; 34.9.11–13.
[62] Polyb. 21.43.2–3.
[63] Livy 37.27.1ff.
[64] Livy 9.30.4; *MRR* 1.163.
[65] Livy 40.18.7.
[66] Livy 41.1.4,3.3.
[67] Livy 42.35.3; *MRR* 1.416.

support suffered due to lack of cooperation between the consul and the praetor of the fleet.[68] There appears to have been another attempt to solve this problem in 169 B.C. In that year, the Senate voted that the newly elected magistrates:

> . . . should be allotted their fields of operations (*provincia*) immediately, so that when it was known which consul had received Macedonia and which praetor the fleet, the designated men might begin their plans and preparations of the supplies necessary for war and might consult the senate if there was need for consultation on any subject.[69]

In this year, Lucius Aemilius Paullus received the province of Macedonia, and the praetor Gnaeus Octavius the fleet. Livy does not explicitly say so, but the Senate also seems to have placed the naval praetor under the consul's authority. Later, we read of Octavius getting orders from Aemilius Paullus to transport the army and provide supplies for them.[70]

We hear no more of the praetor of the fleet, but this may well be due to the end of Livy's narrative. In the first century B.C., we find a prefect of the fleet being appointed.[71] Occasionally, legates also appear in command of fleets, or parts of fleets.[72] One such legate, M. Fabius Hadrianus, commanded a convoy of supplies for Lucullus' army in Pontus in 72 B.C.[73] In 70 B.C., a legate or prefect named Censorinus commanded a squadron bringing supplies to the Romans camped at Sinope.[74] During the Gallic Wars, Caesar frequently appointed prefects to command fleets, but these seem to have been tactical, rather than logistical, commands.[75]

During the Civil Wars, generalissimos asserted their complete authority over naval forces. As with other aspects of military organization, each commander handled his fleet as he saw fit. For his war with Caesar (49–45 B.C.), Pompey had 600 ships divided into several divisions each under the command of a different prefect, with a proconsul, M. Calpurnius Bibulus in overall command.[76] The Latin designations of these units is unknown, but different naval squadrons

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[68] Livy 42.48.9–10; 44.7.10ff.
[69] Livy 44.17.7.
[70] Livy 44.35.13.
[71] Plut. *Pomp.* 34.5; *MRR* 1.577, 2.44, 160; cf. Dio Cass. 37.3.2–3.
[72] *MRR* 2.36, 113.
[73] Plut. *Luc.* 17.1.
[74] *MRR* 2.129.
[75] Caes. *BGall.* 3.11.5–16.4; 5.9.1, 10.2.
[76] Caes. *BCiv.* 2.3,23; 3.5.3,7.1; App. *BCiv.* 2.46.

certainly had logistical as well as tactical missions: two of the naval
commanders Lucretius and Minucius guarded merchants ships carry-
ing grain for the Pompeian army.[77] In the same war, however, Caesar
placed a quaestor, Ti. Claudius Nero, in charge of his fleet at Alex-
andria,[78] and a legate in charge of that at Messana.[79]

Although magistrates or military officers supervised naval logistics,
the actual conveyance of supplies was done in private ships by mer-
chants under contract. The army's control over these ships was some-
times limited, particularly in the confused days of the Late Republic:
when Curio's army was defeated in Africa in 48 B.C. he had to ask
merchantmen in the harbors of Utica (who may or may not have been
under contract to convey supplies) to take his army on board.[80] During
the Civil Wars, private merchants played some role in logistics out-
side the contractual system. Appian notes that at Philippi (42 B.C.),
Octavian and Antony "could obtain nothing through merchants
(*emporoi*) since [Greece] was exhausted by famine."[81] This suggests
that private merchants would have been a normal channel of sup-
plies under the circumstances—perhaps they were using food short-
age as an excuse to stay neutral. Given the lack of evidence for this
period, little can be said about the role of private enterprise in supply-
ing the armies of the Roman Civil Wars. Generally, one meets such
merchant ships only when they feature in fighting; for example, when
one of Sextus Pompeius's admirals, Menodorus, raided Octavian's
naval bases in Italy in 36 B.C., he not only captured or destroyed
warships, but also "the merchant vessels laden with grain that were
moored there."[82] The status of these vessels is not indicated.

The field commander appears to have had considerable leeway in
assigning administrative control of operational bases. One finds
different sorts of individuals managing this important link between
the supply lines and the army. In the Second Punic War, for exam-
ple, an Italian ally, Dasius of Brundisium, commanded a Roman
operational base, which he turned over to Hannibal in exchange for
400 gold pieces.[83] In 171 B.C., during the 3rd Macedonian War, the
consul Licinius Crassus placed his operational base at Ambracia under

[77] App. *BCiv.* 2.8,54.
[78] [Caes.] *BAlex.* 25.3; Suet. *Tib.* 4; Dio Cass. 42.46.6.
[79] Caes. *BCiv.* 3.101.
[80] App. *BCiv.* 2.7,46.
[81] App. *BCiv.* 4.14,108.
[82] App. *BCiv.* 5.11,98.
[83] Livy 21.48.8–10.

the command of a legate, Quintus Mucius.[84] An officer of unknown
rank (possibly a legate) named Marcus Fabius, defended Lucullus's
operational base during his campaign against Tigranes (69 B.C.).[85]

   During the Civil Wars, of course, generals placed their operational
bases under the command of trustworthy individuals. Because he was
a loyal supporter, Pompey gave Cato the Younger, a praetor, the job
of arranging for supply transports in Asia; later, Pompey put Cato
in charge of the Pompeian operational bases at Dyrrachium and
Utica in North Africa.[86] At Utica, Cato in turn assigned one of his
personal freedmen, Butas (described by Plutarch as "his chief agent
in public matters") to assist him in organizing military logistics.[87]
One finds a quaestor, Gaius Decimus, in charge of Pompeian sup-
plies on the island of Cercina.[88] During the Civil War of 49–45 B.C.,
Caesar sent two legates, Quintus Tillius and Lucius Canuleius, to
Epirus to take charge of supply (*res frumentaria*). These officers were
responsible for building granaries and bringing supplies into the city.[89]

Republican Administration of Army-Level Logistics

Caesar considered supply to be the duty (*officium*) and responsibility
(*cura*) of the commander (*imperator*).[90] The commander's authority in
this regard is attested in our sources. Cato seized grain at the Spanish
port of Emporiae to supply his army in 195–194 B.C., though he
wrote to Rome to inform the Senate of his action.[91] In the same
year Flamininus ordered Greek states to contribute supplies to his
campaign against the Spartan tyrant Nabis.[92] When Sulla received
his military authority for the First Mithridatic War (88–85 B.C.), he
was authorized to obtain supplies from Aetolia and Thessaly to sup-
port his operations in Asia Minor.[93] The commander had a staff,
including scribes, who assisted him in administrative functions. Appian

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[84] Livy 42.67.8–9.
[85] App. *Mith.* 13,88; Dio Cass. 36.9.3.
[86] Plut. *Cato Min.* 54.1; 55.1; 58.3; 65.2; Dio Cass. 43.11.1.
[87] Plut. *Cato Min.* 59.2; 70.2–3.
[88] [Caes.] *BAfr.* 34.
[89] Caes. *BCiv.* 3.42.3.
[90] Caes. *BGall.* 1.40.10.
[91] Livy 34.9.12.
[92] Livy 34.26.10.
[93] App. *Mith.* 5,30.

notes that those who served Scipio Africanus as secretaries (*grammateis*) in his African campaign marched in his triumph in 201 B.C.[94] The quaestor assisted the commander, but the role of other officers, and their chain of command is not clear.

Commanders of Republican armies appear to have had direct control over their overland supply lines, at least those leading from the operational base to their armies. After the deaths of Publius and Gnaeus Scipio in 211 B.C., the army in Spain was temporarily (and irregularly) taken over by the knight Lucius Marcius. Marcius was able to move forward supplies into his camp, presumably from an operational base, but he had to apply to the Senate for further provisions and clothing.[95] Livy mentions two individuals, Gnaeus and Lucius Gavillius Novellus, who brought supplies to the army of Manlius Vulso overland from Aquilea to Illyria in 178 B.C., but it is unknown what position they held, or even whether they were civilians or military personnel.[96]

The commander also administered the various tactical aspects of logistics. *Aquationes, pabulationes* and *lignationes* were routine and part of "standard operating procedures," but the commander had to specifically order and organize foraging for provisions, the *frumentatio*. He arranged its size, direction and duration, as well as appointing its commander: usually a military tribune, though sometimes a higher officer such as a prefect or legate.[97] Our sources note several cases in which commanders set out specific directives over how the army should gather and handle forage and food.[98] As part of his *imperium*, a commander could and did punish soldiers, for example for theft, in order to maintain the discipline necessary for logistics to function properly.[99] The commander also could requisition supplies from the local inhabitants. During the invasion of Numidia in 109 B.C., for example, Caecilius Metellus established an operational base at Vaga and ordered the local inhabitants to bring grain and "other necessities of war" into the city. Metellus also seems to have exerted some authority over the Italian merchants living in Vaga, forcing them to

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[94] App. *Pun.* 9,66.
[95] Livy 25.37.7; 26.2.4; [Cic.] *In Sall.* 19.
[96] Livy 41.5.1–2.
[97] Polyb. 21.39.12–3; Sall. *Jug.* 56.4; Caes. *BGall.* 3.7; *BCiv.* 3.37; Livy 38.25.10; 41.1.6–7, 3.6; App. *Pun.* 14,99; *BCiv.* 2.10,68; *Hisp.* 13,78.
[98] Livy 44.33.10; *Per.* 57; Sall. *Iug.* 45.2; Front. *Strat.* 4.1.1, 2, 7.
[99] Front. *Strat.* 4.1.16; Dio Cass. 49.27.1.

obtain supplies for the army, and, possibly, to provide security for the base as well.[100]

Quaestors

Quaestors, usually young men of Senatorial rank just beginning their political careers, were elected by the Centuriate Assembly. While two quaestors administered the *aerarium* at Rome, and others served with provincial governors, some of them were assigned by the Senate to account for military pay and supplies at the army level.[101] Polybius specifically notes that the quaestor was responsible for deducting the cost of the grain rations from the soldiers' pay.[102] Scipio turned over to the quaestors all the money confiscated from the Carthaginian treasury at New Carthage (210 B.C.).[103] Similarly, in 112 B.C. Calpurnius Bestia's quaestor received and held grain, cattle, horses and money turned over by Jugurtha in exchange for an armistice.[104] The quaestor's job was primarily administrative, although if the consul or praetor were killed, a quaestor might take command of the army.[105] He also probably supervised the army's train: this authority is possibly reflected in the large area assigned the quaestor in Polybius's description of the Roman camp.[106]

As an elected magistrate, the quaestor was ultimately responsible to the state, and not to the commander in the field. Inevitably, therefore, conflicts between commander and quaestor arose. Plutarch reports about Cato the Elder that:

> When [Cato] was sent out with Scipio as quaestor for the war in Africa [in 204 B.C.], he saw that [Scipio] . . . lavished money without stint upon his soldiers. [Cato] therefore made bold to tell [Scipio] . . . that he was corrupting the native simplicity of his soldiers, who resorted to wanton pleasures when their pay exceeded their actual needs. Scipio replied that he had no need for a parsimonious quaestor . . . he owed the city an account of his achievements, not of its money.[107]

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[100] Sall. *Jug.* 47.2.
[101] Harris (1976) 96–7; Nicolet (1976) 46–7.
[102] Polyb. 6.39.15.
[103] Polyb. 10.19.1.
[104] Sall. *Iug.* 29.5–6.
[105] App. *Hisp.* 11,63.
[106] Polyb. 6.32.8.
[107] Plut. *Cato Mai.* 3.5–6.

Scipio was certainly in the wrong here (if Plutarch is characterizing his position correctly): a Roman commander must have accounted to the Senate both for pay and for provisions.[108] Sulla demanded an accounting from a profligate patrician quaestor Cornelius Lentulus Sura. Since the quaestor was responsible to the state not to the commander for his outlays of public money, it is not surprising that Sulla did not bring any charges when Sura refused.[109] These anecdotes illustrate the tension, still present in modern armies, between supply personnel and field officers. In practice, most quaestors, being young and at the beginning of their careers, deferred to the politically powerful consuls and proconsuls who commanded Rome's armies. When the consul Quintus Valerius Flaccus embezzled money from his soldiers' food allowance in 86 B.C., he must have done so with the aid of a compliant quaestor.[110] Indeed, the commander usually directed the use of the quaestor's office, not just for routine matters of supply, but to administer whatever logistical matters might arise.[111] Sallust mentions two *scribae*, who took part in the conspiracy against Sertorius.[112] It is not known whether these secretaries were part of the commander's, or the quaestor's, staff.

Late Republican Army Administration

As Late Republican military commanders increasingly asserted control over their own armies, the system of relying on quaestors for logistical administration broke down. This is not surprising, as the quaestor usually gained his position through political connections and was probably beholden to a particular Senatorial faction, which might well be hostile to his commander-in-chief. According to Plutarch, who was drawing on Sulla's memoirs, when the consul Catulus's army ran low on provisions in 101 B.C.:

> [Sulla] undertook the task of furnishing [supplies], and made them so abundant that the soldiers of Catulus lived in plenty, and had some to spare for those of Marius.[113]

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[108] Otherwise, there was no point in assigning a quaestor to the army.
[109] Plut. *Cic.* 17.2.
[110] Dio Cass. 31.104.2.
[111] Polyb. 10.17.11.
[112] Sall. Hist. 3.83M; *MRR* 2.120–1.
[113] Plut. *Sulla* 4.3.

Sulla was a legate, not a quaestor at the time,[114] and though the incident is obscure, it certainly reflects a change from regular Republican practice.

By the end of the Republic, any capable officer might also be used for logistical duties: Caesar used an auxiliary prefect, Quintus Varus, to command foraging expeditions during the Civil War of (49–45 B.C.).[115] In addition, as Roman armies grew larger, and spread out over the Mediterranean region, the need grew for high-ranking officers. The army increasingly used Senatorial legates, appointed on an *ad hoc* basis, to fill this need. Some legates held tactical commands, but others were assigned garrison or administrative duties. Although a general might assign a legate to the command of a legion (or several) on a temporary basis, the post of legionary legate, so important in Imperial times, did not exist in the Republic.[116]

Very little is known about the administration of logistics within individual units in Republican times. Each legion had six military tribunes.[117] In modern literature, the tribune is sometimes referred to as a "staff officer,"[118] and it is true that he did sometimes perform administrative functions. For example, when Lucius Antonius surrendered his army to Octavian after the siege of Perusia in 41–40 B.C., he

> . . . sent tribunes to receive the watchword for the army from Octavian, and they took the army roll to him, as it is still customary [i.e. in Appian's day, the early 2nd century] for the tribune who asks for the watchword to deliver to the commander the daily register of the number of troops present.[119]

Tribunes often carried out duties of a logistical nature, for example defending an operational or tactical base,[120] convoying supplies,[121] or leading foraging parties.[122] It is important to keep in mind, however,

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[114] Sulla served as Gaius Marius' quaestor in 107 B.C., and was legate under Lutatius Catulus 102–101 B.C., *MRR* 1.551, 569, 573.

[115] Caes. *BCiv.* 3.39.

[116] Keppie (1984) 99.

[117] Livy 42.31.5. These had originally been elected by the people, but in 171 B.C., it was decided to allow consuls and praetors to choose some of their military tribunes rather than having them elected. Subsequently half were elected, half were chosen.

[118] Parker (1971) 190; Rossi (1971) 71.

[119] App *BCiv.* 5.5.46.

[120] Caes. *BCiv.* 2.20; Livy 42.65.12; App. *Syr.* 6,36.

[121] Polyb. 21.40.11–12; App. *Hisp.* 13,77.

[122] Polyb. 21.39.12–3; Caes. *BGall.* 3.7; Livy 38.25.10; 41.1.6–7, 3.6; App. *Pun.* 14,99; *BCiv.* 2.10,68.

THE ADMINISTRATION OF LOGISTICS

that the tribune was fundamentally a field, not a staff, officer.[123] Though he did not command a particular unit, he might lead one or more cohorts of the legion at the discretion of the commander.[124] Caesar even used tribunes as naval officers during his campaign against the Veneti in 56 B.C.[125] The commander might assign a tribune to other supply-related missions: for example, in 189 B.C., when Antiochus III balked at providing grain for allied troops, as required by treaty, the consul Marcus Fulvius sent a tribune to ensure that the Pergamene auxiliaries received a grain ration.[126] Presumably the centurion and his junior officers, the *optiones*, had logistical as well as tactical duties.

Imperial Central Administration of Logistics

Augustus retained some elements of Republican administration, but he made sure that control of the army was placed firmly in Imperial hands.[127] This included all aspects of logistics: none of the Republican magistrates concerned with military supply—consuls, praetors or quaestors—continued to carry out these functions under the Principate. At first, military supply seems to have been organized on an *ad hoc* basis, as during the Civil Wars. As the state became more centralized and bureaucratized, logistics also increasingly came under the direct control of the Imperial government. Accounts of army spending were kept, not by state officials, but by Augustus's own slaves and freedmen.

In Imperial times, the distinction between the commander in the field and the over-all command of the emperor became increasingly important. The emperor was the commander-in-chief of all military forces. He made all major military decisions: whether and when to go to war, what resources to allot to the army, the army's strategy, and even occasionally tactical decisions. For example, Nero, remaining in Rome, ordered the movement of individual legions at the outbreak

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[123] Polyb. 10.15.7–9; 11.22.4; 14.3.5–6; Caes. *BGall.* 2.26; 4.23; 7.52; Sall. *Iug.* 46.7; Livy 40.39.7–8.
[124] Livy 32.11.9; 37.29.3; App. *Pun.* 6,36.
[125] Caes. *BGall.* 3.14.
[126] Livy 38.13.8–10.
[127] Keppie (1984) 145–71; Le Bohec (1994) 182–184; Kissel (1995) 121–124.

of the Armenian War in 54.[128] Some emperors did take the field, though they never fought personally until the third century. When troops were placed on barley rations as a punishment, it was the emperor, not the Senate or the local commander, who made this decision.[129]

Of course, field commanders did make logistical, as well as strategic and tactical, decisions,[130] but regardless of the emperor's actual participation (or lack thereof), under the Imperial system all Roman generals were considered the emperor's legate or representative.[131] This relationship is reflected in Dio Cassius's description of the preparations for the Parthian War of 162: "Lucius [Verus] . . . made all the dispositions and assembled the supplies for the war, while he entrusted the armies to [Avidius] Cassius."[132] After Claudius forbade him from invading Germany in 47 A.D., Domitius Corbulo expressed the field commander's frustration at this Imperial control in his bitter comment: "happy the Roman generals before me! (*beati quondam duces Romani*)."[133]

An official known as the procurator *a rationibus* supervised the Imperial *fiscus*. Originally held by an Imperial freedman, like the other secretariats in Flavian times, this office eventually became a salaried post held by member of the equestrian order.[134] Among the *a rationibus*'s attested duties was the accounting for weapons and forts.[135] He also doubtless kept track of the payment for military supplies, as well as of military pay, including deductions for provisions and equipment. The *Historia Augusta* reports that Hadrian made a point of having accurate knowledge of military stores and that "he examined the receipts from the provinces with care in order to make good any deficit that might occur," an interest confirmed by Dio Cassius.[136] Appian, writing the introduction to his history of Roman wars in the mid-second century, said that his last book (unfortunately lost) would

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[128] Tac. *Ann.* 13.6.
[129] Suet. *Aug.* 24.
[130] E.g. Tac. *Ann.* 1.56,71; 2.5.
[131] De Meo (1986) 181.
[132] Dio Cass. 71.2.3.
[133] E.g. Tac. *Ann.* 11.20.
[134] Millar (1977) 73–5, 105.
[135] Stat. *Silv.* 3.98.
[136] *HA Hadr.* 10.8–11–1; Dio Cass. 69.9.2.

show the present military force of the Romans, the revenues they collect from each province, what they spend for the naval service and other things of the kind.[137]

This kind of information would have been collected, and passed on to the emperor, by the *a rationibus*. It is noteworthy that unlike other Imperial secretariats, the equestrian *a rationibus* was seldom a jurist or a literary figure; a military career was the most common background.[138]

Below the level of the *a rationibus*, the administration of military logistics is even more difficult to reconstruct. Several inscriptions from Rome, probably dating to the time of Claudius, attest Imperial freedmen in an office called *a copiis militaribus*, but the brevity of the epitaphs makes their interpretation problematic.[139] Nevertheless, it is not stretching the evidence too far to see the *a copiis militaribus* as an official within the fiscus responsible for military accounting.

In any case, accounting for, and to some extent, paying for, supplies, remained centralized at Rome. Augustus transferred financial control over the military from the Senate to himself. He established a military treasury (*aerarium militare*) that he personally controlled.[140] As a result, control over the provisioning of the army no doubt also stayed firmly in Imperial hands.

Van Berchem completely rejects the idea that there was any centralized supply system overseeing Roman military logistics. He points out that there is no evidence to support the idea of a permanent existence of the prefect or office of supply under the Early Empire, or for a central organization of the supply system. Most scholars accept Van Berchem's view that the logistical offices which are attested are all special assignments and that the provisioning and finance of campaign armies was carried out in an *ad hoc* fashion.[141] Kissel argues forcefully that the prefect of the Annona (*praefectus annonae*) handled

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[137] App. *Pro.* 15.

[138] Millar (1977) 105–6.

[139] *CIL* 6.28538 (Rome, 1st c.): *Diis Manibus Iuliae Victoriae Ti. Claudius Aug. lib. Faustus a copiis militaribus coniugi et sibi, CIL 6.28539 (Rome 1st c.): Diis Manibus Paezonti Caesaris lib. a copiis militaris [sic] vix ann. XXXV fec. Flavia Laure coniugi suo bene merenti, CIL 6.28540 (Rome, 1st c.): Polychryso Aug. lib. a copiis militarib. parenti dulcissimo Ser. Asinus Phainus.*

[140] Dio Cass. 55.25.2–5; 56.33.3; *Res Gest. Divi Aug.* 3.17.

[141] Van Berchem (1937) 143–5; Rickman (1971) 273; Adams (1979) 136; Bérard (1984) 300–3.

Roman logistics in peace and war.[142] While this is an attractive suggestion, there is little direct evidence to support it. In one sense, it makes sense to utilize a massive administrative structure, already in place to gather grain for the capital, to supply the army. The emperor was not, however, solely interested in efficiency: keeping strict control over all aspects of the military was also important. Giving the prefect of the Annona dominion over both the food supply of the capital and of the army would not necessarily have been in the Emperor's interest.

There is no direct evidence on the organization of logistics at this level and no real conclusions can be made. Nevertheless, the large amount of supplies moved by the army and paid for by the state implies some sort of on-going accounting office. Rickman suggests that the *a copiis militaribus*, whose inscriptions were all found in or near Rome, formed part of a central bureau for coordinating the accounts of military supplies, presumably under the supervision of the *a rationibus*.[143] Bérard insists that the competence of the *a copiis militaribus* was limited either to troops stationed in Rome or those around the emperor.[144] However, Rickman's notion remains persuasive as there must have been a bureau or *officium* which accounted for military provisions, and there is no reason to doubt that the *a copiis militaribus* was part of it.

In the Early Empire, the various regions of the empire were administered in a number of different ways, about which we are poorly informed.[145] Not only were there senatorial and Imperial provinces, but many areas in the East and in North Africa were nominally independent client kingdoms and Egypt had its own idiosyncratic system of administration. Military supplies and personnel were levied from all of them in some form. In most provinces, administrative staff was relatively small, and in many, the majority of Roman "officials" were the officers of garrison units.[146] Therefore, the Romans relied heavily on the use of local authorities to collect taxes and supplies for the army.

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[142] Kissel (1995) 124–142; see Herz (1988) 70–81; (1988b) 69–85.
[143] Rickman (1971) 273.
[144] Bérard (1984) 300–1.
[145] Millar (1993) 48–9.
[146] Millar (1993) 32–3.

Central Accounting

It is unclear whether accounting for military expenditures in this period passed up through the provincial governor's office or, alternatively, was controlled by Imperial procurators. The latter view is argued by Remesal-Rodríguez and supported by Kissel.[147] It equally likely that unit commanders reported this information upwards to the provincial governors, who had an important role in supplying the army in peacetime.[148] Tacitus' description of Agricola's reforms in Britain, however, shows that the governor at very least had considerable influence in this regard.[149] The governor's office appears to have been closely connected with the corresponding *officia* of each legion or auxiliary unit. An inscription from Dacia, for example, records a military *adiutor* of the *officium rationum* who had previously served on the staff of the *praefectus castrorum* of *legio XIII Gemina*. Marullus Julianus, from the *officium rationum* of the governor of Africa, is known from an inscription found in the legionary camp at Lambaesis.[150] Since the provincial governor was responsible for arranging provisions for the army in his province, he had a major stake in the mechanism of provincial land transport during peacetime.[151] There is evidence that the imperial procurators may have taken over responsibility for logistics, at least in peacetime, with the introduction of the *annona militaris*.[152]

In time, as all aspects of Imperial government became more standardized and centralized, so did the collection and distribution of provisions for the army. Whether the Roman logistical system in the first century and second centuries were *ad hoc* or not, by the third century the Imperial government had a standardized administrative system in place for supplying its army both in peace and war. The efficient administration of logistics developed during the Principate was an important factor in the Empire's survival during the crisis which developed after the death of Alexander Severus in 235 A.D.

As was the case in the Late Republic, the administration of Roman Imperial logistics naturally had to be adjusted in times of civil war.

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[147] Kissel (1995) 142–151.
[148] Dio Cass. 60.24.5.
[149] Tac. *Agr.* 19.
[150] *CIL* 8.3292, (Lambaesis, undated).
[151] Mitchell (1976) 124.
[152] Kissel (1995) 155–158.

Commanders working independently of, or against, the central authority in Rome had to develop their own supply mechanism, relying on provinces which were loyal to them. For example, after the death of Nero, Vespasian had to turn to the governor of neighboring Syria, C. Licinius Mucianus, for logistical support for the army in Judaea. When Titus went to Syria to meet Mucianus, it was probably to arrange for the logistical support of the army.[153] During the Civil War between Clodius Albinus and Septimius Severus in 196–197, Albinus relied on the governors of western provinces to supply his army.[154] Their level of compliance with his orders, of course, determined their fate when Severus won the war.

Imperial Administration of Supply Lines

The care with which military movement was planned is reflected in the careful description of Vespasian's march from Egypt to Caesarea, perhaps drawn by Josephus, directly or indirectly, from a memorandum prepared by a logistical officer of some sort.[155] The earliest unambiguous reference to a general supervisor of supply lines during an Imperial campaign is Tiberius Julius Alexander, said by Tacitus to be *minister bello* during Domitius Corbulo's campaign against Tiridates (63 A.D.).[156] Adams takes him to be a logistics officer, and while no explicit reference ties Alexander to military supply. Tacitus elsewhere uses the term "*minister*" to refer to logistics.[157] The question arises whether Tiberius Julius Alexander, as *minister bello*, was an Imperial agent or a member of Corbulo's staff. Alexander appears to have been the highest ranking equestrian officer in the army at the time, a status which suggests Imperial connections.[158]

   Pliny the Elder mentions a slave *dispensator* in the context of an Eastern military campaign.[159] Since a *dispensator* was generally a slave

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[153] Jos. *BJ* 4.32.
[154] Hdn. 3.7.1.
[155] Jos. *BJ* 4.659–663.
[156] Tac. *Ann.* 15.28.
[157] Adams (1979) 136 n. 27; Tac. *Ann.* 2.78, *Hist.* 2.82.
[158] Tac. *Ann.* 15.28 reports that Alexander and Annius Vinicianus, Corbulo's son-in-law, were sent as quasi-hostages to Tiridates' camp. Apparently sending a senator into such a situation was considered inappropriate.
[159] Plin. *HN* 7.129.

in charge of handling money,[160] and some *dispensatores* held quite high positions in the Imperial bureaucracy.[161] Pliny's *dispensator* was very likely an Imperial slave in charge of paying out money for provisions and other supplies for the army.[162]

In his *Silvae*, written in the late first century, Statius addresses a certain Plotius Grypus, saying that Domitian "placed the obediant grain supply under your control, [and] put you in charge of the posts on all the road.[163] Adams and Kissel argue that Grypus was in charge of logistics during the Sarmatian War in 92 A.D.; Bérard questioned whether he controlled the entire army's supply, or merely that of the emperor's entourage. Indeed, very little is known about Plotius Grypus, only that he was probably of senatorial rank, was very young when he was assigned the position which Statius describes, and apparently had little or no previous military experience. His young age and military inexperience might argue for Grypus's being responsible only for the Emperor's entourage, and he is described as in charge of *annona*, a term Bérard, citing Pliny, claimed was primarily used to refer to emperor's supplies.[164] But young men of Senatorial rank did hold high positions in the military and the Romans commonly used the word *annona* to mean army supplies. The question of Grypus's position remains open.

The emperor probably appointed a single individual to coordinate logistical support for an upcoming campaign. This is probably the position held on an *ad hoc* basis in the first century by Tiberius Julius Alexander and, possibly, Plotius Grypus. In the late second and third century a logistical officer referred to as the *praepositus copiarum* or *annonae* is attested in inscriptions.[165] An inscription from Corinth records that Gaius Caelius Martialis had been appointed to ". . . aid in the management of supply (*cura copiarum*) in the second campaign in which all Dacia was conquered" (that is, 105–6 A.D.).[166] There

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[160] Gaius *Inst.* 1.122; Aubert (1994) 196–199.

[161] *CIL* 6.5197 (= *ILS* 1514).

[162] In the second century, there was a *dispensator Augusti* involved in two German campaigns, *CIL* 6.8541.

[163] Stat. *Silv.* 4.9.16: *arbiter sequentis annonae omniumque late stati omnibus viarum.* Adams (1979) 136 n. 27; Bérard (1984) *passim*; Kissel (1995) 271–2.

[164] Bérard (1984) 261–3, 278–9; Pliny *Pan.* 20.2. For the supply of the emperor's entourage, see Isaac (1992) 290–1; Millar (1977) 28–40.

[165] Van Berchem (1937) 145; Berard (1984) 282–9; Kissel (1995) 271–6.

[166] *AE* 1934.2 (Corinth, early 2nd c.): *C. Caelio C. fil. Ouf. Martiali . . . et copiarum curam adiuvit secunda expedition[e] qua u niversa Dacia devicta est.* Adams (1979) 136 note 27, Bérard (1984) 307; Kissel (1995) 271 n. 29.

are two individuals who were definitively involved in logistics for the campaign of Marcus Aurelius against the Quadi and Marcomanni in 177–180. The epitaph of M. Valerius Maximianus, an equestrian officer, says he was "sent to the battlefields of the German campaign, conducting supplies (*annona*) of the army which were shipped on the Danube from both Pannonias,"[167] and Tiberius Claudius Candidus, a Senator, was the *praepositus copiarum* for this same campaign.[168]

Late in the second century, M. Rossius Vitulus held a series of logistical offices: during Septimius Severus's advance on Rome in 193 he was *praepositus annonae*, then the *procurator arcae* (i.e. in charge of the army's funds) in an unnamed campaign, and the *procurator annonae* during Severus's campaign against Clodius Albinus in 196–7.[169] The position of *praepositus annonae* is also known from a number of other third century inscriptions.[170] Kissel, who argues for a military logistical system administered by the prefect of the Annona, explains the rise of the *praepositus copiarum/annonae* to the increased military activity of this period.[171] The level of warfare, however, was quite high in the first and second centuries, and one wonders why the emperor would not simply expand the office of the prefect of the Annona to deal with it.

Whatever the exact make-up of logistical administration at this level, what is clear is that, under the Imperial system, the commander in the field had tactical control of the army, but the army's logistics, at least outside the area of operations, remained in the hands of a separate staff, responsible to the Emperor. This same division of command is seen in Early Modern European warfare, where the

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[167] *AE* 1956.124 (Diana Veteranorum, after 180): *M. Valerio Maximiano . . . et misso in procinctu Germanic(ae) exped(itionis) ad deducend(a) per Danuuium quae in annonam Panno(niae) utriusq(ue) exercit(us) denavigarent.* Bérard (1984) 307, Kissel (1995) 268ff.

[168] *CIL* 2.4114 = *ILS* 1140 (Tarraco, late 2nd c.): *Tib(erio) Cl(audio) Candido . . . praeposito copiarum expeditionis Germanicae secundae.* Bérard (1984) 308; Kissel (1995) 272–274.

[169] *ILAfr.* 455 (= Bulla Regia, early 3rd c.); Van Berchem (1937) 144–145; Adams (1979) 136 n. 27; Bérard (1984) 308; Kissel (1995) 275.

[170] *CIL* 9.1582 = *ILS* 1343 (Beneventum, early 3rd c.): *M. Rustius Rufinus p[r]aepositus an[nnonae]*, Parthian War of 197–202; *CIL* 11.3104 = *ILS* 2765 (Falerium, early 3rd c.), Anonymous: *praepositus ann[o]nae expeditionis [Ger]manicae].* Kissel (1995) 275. Two further inscriptions cited by Bérard (1984) 308 are problematic: *IGRR* 4.12.13 = *ILS* 8853 (Thyatris, 3rd c.) speaks of a "*praipositon speiras deuteras Phl. Bessôn speiras ann[ ]nes,*" which is unintelligible. Whether this can be emended to "*praipositon annônês*" is problematic. *AE* 1979.506 (Sarmizegetusa, 3rd c.) has ". . . ep sac[ ]ae a[. . .,*" which may as well be "*praepositus sacrae arcae*" as "*annonae.*"

[171] Kissel (1995) 274–5.

intendant or commissary was in charge of supplies and responsible to the central government, not the commanding general. Only after the Thirty Years war, did the quartermaster general (in the 16th century in charge of camp itself, like the *praefectus castrorum*) eventually took over responsibility for all supply under the direction of the army commander.[172]

The official in charge of logistics, whatever his title, needed subordinates in two areas: (1) to oversee the collection of provisions from the provinces and (2) to supervise their transportation to the army. The former category—a collector of military supplies—is represented by Sex. Julius Possessor, an *adiutor* whose responsibility was "accounting for (olive) oil from Africa and Spain, transferring these supplies and paying off the contractors for sea transportation."[173] Rickman claims that Possessor was an official of the civil *annona*, while Remesal-Rodríguez argues that he supplied oil for the first Marcomannic War (169–174).[174] Even if Possessor was a civilian, and in charge of the civil *annona*, this type of position doubtless also existed for military supply. Some of the officials mentioned in early second century inscriptions, appear to be in charge of part of the army's supply line. A bilingual Latin/Greek inscription from Caria records that Lucius Aburnius Torquatus was given the assignment of *curator annonae/epimelêtês euthênias* on the banks of the Euphrates in Trajan's Parthian war of 114–117.[175] These officials were clearly assigned the administration of supply lines from and to a particular point. Though there is no evidence for the titles of subordinate logistical officers in the first century, they certainly existed.

Administering and accounting for supplies stored in depots and bases was an important element of the logistical system. Two inscriptions mention equestrian officials assigned to the care of *horrea*: an inscription from Mactar in Africa attests the office of *procurator ad*

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[172] Perjés (1970) 31–35.

[173] *CIL* 2.1180 = *ILS* 1403 (Hispalis, late 2nd c.): *Sex. Iulio Sex. f. Quir. Possessori adiutori Ulpii Saturnini praef(ecti) annonae ad oleum Afrum et Hispanum recendendum item solamina transferenda item vecturas naviculariis exsolvendas.*

[174] Rickman (1980) 224; Remesal-Rodríguez (1986) 100, 103; cf. Kissel (1995) 214ff.

[175] *AE* 1911.161 (see *AE* 1955.276 for attribution of Heracleia) = *ILS* 9471 (Heracleia, early 2nd c.): . . . *epimel[ê]tê euthênias en tô polemô tô Parthik[ô] tês ochthês tou Euphratou . . . curator annonae bello Parthico ad ripam Euphratis.* Van Berchem (1937) 144–5, Adams (1979) 136 note 27; Bérard (1984) 307; Kissel (1995) 56 n. 11, 265 n. 6.

solamina et horrea.[176] While the exact meaning of *solamina* is uncertain, in another inscription it appears to refer to the storage of olive oil, and the word possibly means "supply depots."[177] An altar inscription from Corbridge in Britain, probably dating to the British campaigns of Septimius Severus (206–211), mentions an "official in charge of the grain supply in the time of the British campaign."[178] As noted above (Chapter Four, p. 177), excavations show that during the 3rd-century fort at South Shields probably served as an operational base; it is possible that this unnamed official was responsible for maintaining depots from there to the army in the field.[179] The operational base was probably placed under the authority of the *praepositus* or *procurator* in charge of supplies in general. For example, T. Antonius Claudius Alfenus Arignotus, in charge of supply for the eastern expedition of Caracalla (215–217 A.D.), also received the extraordinary command of the port of Seleucia in Piera.[180]

Private Contracting

Civilian contractors continued to play an role in the logistics of the Imperial army, especially in sea transport. Onasander mentions the use of merchantmen in supplying the army.[181] The organization of the civilian grain supply (*annona*) for the city of Rome provides a model for the overseas supply of Roman armies.[182] Private merchants transported grain to the capital under government supervision.[183] The *navicularii* (overseas shippers) were given contracts through the *officium* of the *praefectus annonae* for shipping grain to Rome;[184] payment was made through an *adiutor*.[185] The duties of the *praefectus annonae* primarily involved the payment of *navicularii* and keeping track of the

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[176] *CIL* 8.619 = *ILS* 2747 (Mactar, 2nd c.).
[177] *CIL* 2.1180 = *ILS* 1403 (Hispalis, late 2nd c.): . . . *oleum Afrum et Hispanum recendum item solamina transferenda*. . . .
[178] *Eph. Epigr.* 9.1144: *[p]raep(ositus) cu[ram] agens [h]orr(eorum) tempo[r]e expeditionis feliciss(mae) Brittanic(ae)*; see Kissel (1995) 213.
[179] Rickman (1971) 290.
[180] Bérard (1984) 293–4, no. 10; Kissel (1995) 74.
[181] Onas. *Strat.* 6.14.
[182] Indeed, as noted above, Kissel (1995) argues that the same system supplied both Rome and the army.
[183] Rickman (1980) 72; Herz (1998) 113–4, 160–1.
[184] *CIL* 12.672 (Arles, undated).
[185] *CIL* 2.1180 = *ILS* 1403 (Hispalis, 2nd c.).

amounts of grain shipped to the city.[186] Even if Kissel is not correct about the direct role of the prefect of the Annona in logistics, military shipping contracts were probably administered in a similar manner.[187]

The system of private contracting continued down to the Late Empire: the preface to Diocletian's price edict complains of profiteering among suppliers of the military.[188] While engaged in private business, the *navicularii* generally shipped goods only as far as sea-ports, and then turned over their merchandise to the *nautae* (boatmen) or *utricularii* (raftsmen), who transported them further inland.[189] Alternatively, they might sell their goods to *negotiatores*, who arranged their own cartage. Similarly, military shipping contracts probably provided for the *navicularii* to deliver of supplies to a port, that is, the operational base, where inland shippers (*nautae*) took the supplies to the army.[190] A 3rd century inscription (dating to the late Severan period 218–235) mentions a *praepositus reliquationi classis* for the Misene fleet. The exact nature of this office is not clear, but he certainly was somehow involved with the movement of supplies.[191]

Imperial Administration of Army-Level Logistics

Ultimate responsibility for logistics at this level lay with the field commander: Suetonius praises Tiberius for personally inspecting wagon loads of supplies.[192] From the reign of Augustus, however, the legionary legate (*legatus Augusti legionis*)—now the commander of an individual legion—became a key officer both tactically and administratively in the Imperial army.[193] At the unit level, legates were responsible for provisioning their legions. Tacitus criticizes two legionary commanders during the siege of Vetera in 69 A.D. for insufficient control over the collection of supplies; despite ample resources, the

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[186] Rickman (1980) 89.
[187] Anderson (1992) 64; note the arguments in Kissel (1995) 121–123.
[188] Diocl. *EP* praef. 29.
[189] Schlippschuh (1987) 96–102 (*nautae*) 102 (*utricularii*); herz (1988) 113–4, 162–9.
[190] Kissel (1995) 46–47.
[191] *CIL* 8.14854 = *ILS* 2764; *AE* 1910.36 = *ILS* 9221 (Misenum, 246); Dobson (1978) 301 no. 205; Kissel (1995) 162, 282–9.
[192] Suet. *Tib*. 18.
[193] Le Bohec (1994) 38.

soldiers' pillaging soon exhausted local supplies.[194] Augustus also estab-
lished the auxiliary forces on a formal basis: prefects commanded
both the infantry cohorts and the cavalry *alae*.[195] Tacitus describes
eight Batavian cohorts as being "auxilia of the Fourteenth Legion,"[196]
and on this basis it was once believed that auxiliary units were
attached administratively to legions.[197] Although auxiliary units usually
operated tactically with legions, most military historians now believe
that the auxiliaries did not have to rely on the legions for supplies
or administrative support. This is made clear by the fact that the
garrisons of many provinces were made up entirely by auxiliary units.
These units were under the command of the provincial governor
and must have operated with an independent logistical system.[198] As
Keppie suggests, however, at least in some provinces legionary legates
may have exercised "general supervision" over auxiliary units.[199]

The Camp Prefect

In the Imperial period, the the camp prefect (*praefectus castrorum*), a
professional soldier from the centurionate, assisted the commander
of a legion in planning and operations.[200] The first reference to a
camp prefect dates to 11 B.C.,[201] and there is no reason to doubt
that this office was an innovation of Augustus. There is some question
as to whether the camp prefect was orginally assigned one per camp
(which often contained more than one legion) or one per legion; cer-
tainly by the time of Domitian, each legion had its own *praefectus
castrorum*.[202] According to Tacitus, the camp prefect managed army
discipline in general, supervised centurions in making their rounds,
and directed the giving of orders by trumpet to the whole camp.[203]
Discussing the duties of Roman officers, Vegetius says that:

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[194] Tac. *Hist.* 4.22.
[195] Keppie (1984) 48–51.
[196] Tac. *Hist.* 1.59.
[197] Cheesman (1914) 49–51.
[198] Saddington (1982) 100, 183–4.
[199] Keppie (1984) 190.
[200] Kromayer-Veith (1928) 513; Rickman (1971) 273–4; De Meo (1986) 186;
Kissel (1995) 152 n. 100; 240; 245.
[201] Jul. Obseq. *Prod. Lib.* 72.
[202] Keppie (1984) 177; Le Bohec (1994) 39; Saddington (1996) 244–52.
[203] Tac. *Hist.* 2.29 and 3.7; De Meo (1986) 186.

> [The camp prefect] was responsible for the siting of the camp . . .
> [and] he further saw to it that there were never any shortage of wag-
> ons, pack-horses . . . likewise of firewood [and] straw. . . .[204]

Vegetius assigns responsibility for pay and rations to the "prefect of
the legion," but since this officer appears only in the 2nd century,
the camp prefect probably originally handled these duties as well.[205]
Tacitus notes that a camp prefect was killed in the Silurian revolt
of 50 A.D., while supervising the construction of *praesidia*, "garrison-
posts," or perhaps better "depots."[206] We also have a reference to a
soldier being sent *ad frumentum* by a prefect of the camp in 80 A.D.[207]
The prefect of the camp probably provided a great deal of the day-
to-day logistical administration of the Roman legion.

Legionary Administration

The military tribune continued to hold much the same position in
the Imperial legion, as in Republican times, although now the Emperor
appointed tribunes, like all army officers.[208] In addition, auxiliary
cohorts were commanded by a tribune. Both legionary and auxiliary
tribunes still had primarily tactical duties,[209] but the logistical responsi-
bilities of the office continued in Imperial times. According to a passage
in the Digest, attributed to Macer, the legionary tribunes supervised
foraging and requisition (*frumentationes*) and checked the grain supply
to prevent the "grain-measurers" (*mensores*) from committing fraud.[210]
Prefects commanded auxiliary cavalry units and probably had the
same responsibilities as the tribunes. Veith claims that an *evocatus,* or
re-enlisted veteran, served as the "supply officer" (*Proviantmeister*) for
each legion, a view tentatively supported by Le Bohec.[211] This inter-
pretation seems to be based on a single inscription: an *evocatus* at
Lambaesis was *curator tabularii castrorum*.[212] Rickman notes that this
was a great deal of weight to put on one inscription and the duties

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[204] Veg. *Epit.* 2.10, tr. Milner.
[205] Veg. *Epit.* 2.9.
[206] Tac. *Ann.* 12.38.
[207] *P. Gen. Lat.* 1 [= Fink (1971) no. 10]; Kissel (1995) 152.
[208] Veg. *Epit.* 2.7; Keppie (1984) 176; Le Bohec (1994) 38–9.
[209] Tac. *Hist.* 1.38; Jos. *BJ* 2.11; 3.324.
[210] *Dig.* 49.16.12.2.
[211] Kromayer-Veith (1928) 529; Le Bohec (1994) 51.
[212] *CIL* 6.2893 = *ILS* 2144: *ex evokat., qui se probavit ann. XVII, militavit coh. XI coh.
XI urb. ann. XIII pavit leg. X Gem.*

of this officer are not at all clear.[213] Kissel suggests that the *primus-pilus*, the senior centurion of the legion, played a key role in provisioning the legion.[214] Though there is little direct evidence, this is a likely suggestion. Kissel also postulates that the *summus curator* served the same function in auxiliary units,[215] and Speidel says that *curatores* handled supplies for the Emperor's cavalry guards.[216]

It is difficult to reconstruction the administration of logistics at the the level of the legion, cohort or *ala*. Nevertheless, inscriptions attest to a large number of such logistical posts. Almost all of these appear after the first century, but it is likely that these positions date to an earlier period.[217] An officer with the title of "camp accountant" (*a rationibus castrensis*) possibly supervised the accounting of supplies and provisions.[218] The actual work of accounting was probably performed by *beneficiarii*, literate soldiers drawn from the legions and assigned to the bureaux (*officia*) of various officers. Each officer had his own staff of *beneficiarii*, *cornicularii* or *commentarienses*, the size of which depended on his rank.[219] The "grain measurer" (*mensor frumenti*) was doubtless the official responsible for physically measuring out grain to units from storage;[220] the *cibaria* were issued by a *cibariator*.[221] After the time of Septimius Severus, these seem to have been replaced by a single officer, called the *salariarius*.[222] The Digest mentions *librarii horreorum*, who were clerks responsible for keeping account of stored and distributed provisions, particularly grain.[223] These positions were not ranks, and may not be permanent titles, but rather temporary

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[213] Rickman (1971) 277; see Labisch (1975) 106.

[214] Kissel (1995) 161–166.

[215] Kissel (1995) 166–170.

[216] Speidel (1994) 96.

[217] Keppie (1984) 180.

[218] *CIL* 6.2132–5.

[219] *CIL* 3.10437 (Aquincum), *CIL* 8.2586 (Lambaesis, 2nd–3rd c.), Kromayer-Veith (1928) 517. Grillone (1977a) 798 suggests that this logistical staff corresponds to the *vexillarii*, described in [Hyg.] *De met. castr.* 4 as being placed near the first cohort of the first legion in his plan of the camp. Despite a reference to "baggage" (*impedimenta*) the *vexillarii* described by Ps.-Hyginus are almost certainly part of a *vexillatio* from another legion; see Chapter Two, p. 114, note 329.

[220] *CIL* 5.936 = *ILS* 2423: *veteranus leg. VIII Aug. stipendiorum XXV mensor frumenti*, *ILS* 9091: *veteranus ex mensore tritici leg. VII Cl.*, *CIL* 13.7007: *mensor frumenti numer(is)*.

[221] Fink (1971) no. 78. The title also appears in *P. Athen.* 64.13 (2nd c., prov. unknown), *O. Florida* 16 (2nd c., Upper Egypt), *SB* 9230 v. 29, r. 3 (3rd c., Syene). Compare the notation *ad hordeum* or ad *frumentum* on the duty rosters, e.g. *P. Dur.* 82.i.13 [= Fink (1971) no. 47].

[222] *CIL* 5.8275 (Aquilea, 3rd c.).

[223] *Dig.* 1.6.7, Rickman (1971) 274; Labisch (1975) 104.

assignments. The *mensores frumenti* and the *librarii horreorum* may have worked under the *praefectus castrorum*. The deductions from the soldier's pay for provisions was made by the *signifer*, who served as a unit banker for the cohort, aided by the *actuarii* or accountants.[224]

Corruption and Military Administration

Corruption is a fairly normal occurrence throughout the history of logistics. There is no question that fraud was (and is) a particular danger when military supplies are provided through the private sector.[225] During the American Revolution, for example, contractors providing supplies to the fledgling United States government mixed sand with flour and weighted barrels of rum with stones.[226] The scandal mentioned in Livy, in which two *publicani* scuttled supply ships and then claimed restitution for non-existant supplies, is mentioned in the previous chapter.[227] It has been noted that private contractors probably played a limited role in obtaining provisions for the army, but they were present within the system, particularly in sea transport.[228] One expects that a certain amount of corruption was always present.

As Badian points out, public officials are equally prone to misappropriation.[229] According to Dio Cassius, the consul Valerius Flaccus stole money from the soldiers' food allowance,[230] and Ps.-Cicero, accuses the historian Sallust of malfeasance when he was a quaestor.[231] This latter invective emphasizes the Senates's role in overseeing the entire process of military contracts. Corruption continued to be a problem under the Empire: Tacitus lauds his father-in-law Agricola for rooting out corruption in the collection of military supplies in Britain.[232] Dio Cassius complains of the freedman Theocritus, who sold at retail provisions and equipment he had obtained to supply the army.[233]

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[224] *PSI* 1063 (117); *CIL* 8.18224 = *ILS* 2415 (Lambaesis); Le Bohec (1994) 51.
[225] Kromayer-Veith (1928) 332; Fortescue (1930) 5.
[226] Curtis (1914) 240.
[227] Livy 25.3.8–4.11; See Chapter Five, pp. 230–1.
[228] See pp. 255, 270–1.
[229] Badian (1972) 18.
[230] Dio Cass. 31.104.2.
[231] [Cic.] *In Sall.* 17.
[232] Tac. *Agr.* 19.
[233] Dio Cass. 78.21.3; see Kissel (1995) 281ff. For a discussion of corruption in the Late Empire, and of its many negative effects in general, see MacMullen (1988).

Conclusion

Proper administration is absolutely vital to the success of a logisti-
cal system. The military infrastructure that supports an army's logis-
tics is a reflection of the civilian political and economic systems of
a state. The administration supply is important even when an army
is relying on foraging, but is necessary when supply lines are being
used. Although some of Rome's enemies had well-organized logistics,
the Romans often had an advantage over less sophisticated foes in
the organization and administration of their supply system.

During the Republic, the Senate played the key role in adminis-
tering Roman logistics at the highest level. It designated the formal
area of operations ("*provincia*"), assigned the power of command
("*imperium*") and authorized the money and supplies needed to sup-
port the army. It also ordered and supervised obtaining provisions
in the form of taxes, tithes or contribution by allies, or the purchase
of foodstuffs either on the open market or by forced purchase.

The Roman commander in the field generally controlled logistics,
like all aspects of the army, within his province. Yet even here, we
find that the Senate exerted its control at times, a practice that led
to tensions. The Senate even had authority over the very food eaten
by legionaries, such as assigning barley as a punishment, though this
power was rarely invoked.

As the Roman army's supply needs grew more complex during
and after the Second Punic War, the consuls and the Urban Praetor
took an increasing role in the central administration of logistics.
Occasionally, the aediles also played a part in logistical administra-
tion, though it was minor. Payments for supplies were made out of
the *aerarium*. The Romans made some use of private contractors, par-
ticularly in transport. State administration was needed to supervise
the use of contractors.

The Senate's control over logistics began to be challenged in the
Late Republican period. Consuls and proconsuls began administer-
ing the logistics of their military forces, in essence turning them into
private armies. Control over logistics was an important aspect of the
Civil Wars that brought down the Roman Republic.

It was during the Republic that the Romans began using supply
lines on a large scale. While the evidence is somewhat ambiguous,
it appears that in the late third and early second centuries, normally
the field commander had day-to-day control over the supply lines

leading to his province. When the Senate created the office of *duumvir navalis*, and later the praetor of the fleet, this official appears to have taken control over the Roman overseas supply lines, as well as the fleet. This caused a certain amount of tension with the field commanders. Like other aspects of supply, control over the navy and overseas supply lines fell into the hands of the generalissimos struggling over control of the Republic. Control over operational bases, the link between supply lines and the area of operations, remained in the hands of the field commander throughout the period of the Republic.

Within the area of operations, the field commander exercised daily authority over the logistical administration, subject of course to the ultimate authority of the Senate. This administrative control applied both to the overland supply lines that connected the operational base to the army, as well as over foraging and requisition. The *quaestor* was an independent magistrate, who had the responsibility of accounting for, and reporting to the Senate on, the expenditures of the commander. The fact, however, that the *quaestor* was a young man and working with a commander of consular or praetorian rank meant that he would not normally challenge the accounts of the Roman general.

In the absence of inscriptions, little is known about logistics on the unit level in Republican times. Tribunes of the soldiers played an important role, to be sure, although this was primarily a field, and not a staff, command. The centurions and *optiones* that held tactical command within the legions probably certainly also had logistical responsibilities.

While Augustus kept many aspects of Republican logistical practice, he made sure that its central administration, and authority over all its aspects, remained firmly in Imperial hands. This shift from Senatorial to Imperial authority over military matters was a key element under the Empire. The setting up of a special military treasury, the *aerarium militare*, was emblematic of this change, although its exact function is unclear. Like all aspects of Julio-Claudian administration at the Imperial level, we know little regarding the organization of the logistical administration insofar as it existed. It is likely, indeed, that in the first century that the administrative apparatus was still fluid. The imperial fiscus operated under the *procurator a copiis*, and the official known as the *a copiis militaribus* may have been the official who accounted for military expenditure.

Beyond the central accounting, the question of whether there was a central office for logistics at Rome is one of the most debated subjects of Roman military logistics. The traditional model, put forth by Van Berchem, sees the Roman Emperors setting up *ad hoc* supply systems for each campaign. In contrast, Remesal-Rodríguez and Kissel see the bureaucracy headed by the prefect of the annona organizing military supply, as well as providing food for the city of Rome. This latter view is attractive—it would have made sense for the Romans to have used the already existing administrative structure in this way—but there is no firm evidence that they did. The office known (perhaps not officially) as the *minister bello* and/or *dispensator* gave way later to the *praepositus annonae* or *copiarum*. By the end of the second century, we find a *praefectus* and a *procurator annonae*. There is no evidence of a permanent logistical office under the Principate, and these officials have all the hallmarks of *ad hoc* appointment.

Private merchants still played a large role in Imperial logistics, particularly in transportation. Shippers (*navicularii* and *nautae*) moved provisions over water borne supply lines under contract. It appears, however, that land transportation was done primarily by the military itself, although often with requisitioned animals, wagons and personnel. The administration of these supply lines, as well as depots and operational bases, were handled by military officials appointed specifically for the purpose, and we find various *praepositi, adiutores* and *curatores* assigned to this task.

Responsibility for army-level logistics remained in the hands of the field commander in Imperial times. Due to the large number of military inscriptions surviving, we are better informed about logistical officials at the unit level, particularly for the legion. The prefect of the camp played an important part in logistical administration, as did the military tribune. They were aided by soldiers with the titles *mensores frumenti, frumentatores, cibariatores, librarii horreorum* and others. Although we cannot reconstruct the organizational table of legionary logistics, it is clear that it was quite sophisticated.

A downside of using private contracting is the likelihood of corruption, although this is certainly present in state-run bureaucracies as well.

The Romans clearly understood that logistics was an integral part of army organization. They also saw the importance of supply as part of warfare itself, the subject of the next chapter.

CHAPTER SEVEN

LOGISTICS IN ROMAN WARFARE

Introduction

The Romans' success in conquering and maintaining their enormous empire lay partly in their military culture, their weapons and their training. Rome's ability to provision large armies at long distances was, however, equally as, or more important to its success. The military history of Rome is not one of continuous victory: indeed the Romans often won wars because, after losing battles—and sometimes entire armies and fleets—they could keep replacing them until the enemy was defeated. Polybius, a keen observer of the Roman military at its height, remarked that "the advantages of the Romans lay in inexhaustible supplies of provisions and men."[1]

A sophisticated logistical system allowed the Romans to exploit their military resources effectively. The Romans recognized the importance of supply and used it both as a strategic and a tactical weapon and the necessities of military supply influenced and often determined the decisions of the Roman commanders at war. Plutarch even mentions the military slang term for such tactics: "kicking in the stomach" (*eis tên gastera enallonomenos*).[2] Frontinus cites Caesar, certainly Rome's greatest general, on the use of logistics in military strategy:

> I follow the same policy toward the enemy as did many doctors when dealing with physical ailments, namely, that of conquering the foe by hunger rather than by steel.[3]

Logistics in Campaign Planning

Traditionally, Roman campaigns began on March 1st: in part to ensure the availability of fodder.[4] The Romans paid close attention

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[1] Polyb. 3.89.8.
[2] Plut. *Luc.* 11.1.
[3] Front. *Strat.* 4.7.1.
[4] Lynn (1993) 12.

both to raising armies and to the preparations for supplying them. Their habitually careful arrangements made a strong impression, and, given the general neglect of logistics in military history, our sources mention such planning remarkably often. For example, Polybius describes the large-scale Roman preparations for a Gallic invasion as early as 225 B.C.:

> [The consuls] enroll[ed] their legions and ordered those of their allies to be in readiness. . . . Of grain, missiles and other war materiel, they laid in such a supply as no one could remember had been collected on any previous occasion.[5]

There are many other examples both in the Republican[6] and the Imperial periods.[7]

Commanders naturally wanted to complete their logistical preparations before operations began. When Quinctius Flamininus was preparing his campaign against Nabis, the tyrant of Sparta, in 195 B.C., the arrival of allied troops, including Macedonians, completed his authorized force. Nevertheless, he still waited until the arrival of the supplies (*commeatus*) requisitioned from the neighboring Greek states before beginning his offensive.[8] At times, troops were moved first and supplies sent after them. When Sulla had obtained the command of the First Mithridatic War, he marched his army over to Greece and then summoned money, auxiliary troops and supplies from Aetolia and Thessaly.[9]

Some wars broke out unexpectedly and preparations had to be made in haste. Sallust notes that when the consul Spurius Postumius Albinus determined to reopen hostilities with Jugurtha, he "hastened to transport to Africa provisions (*commeatus*), money for paying the soldiers, and other apparatus of war."[10] The frequency of Roman conflict, and the experience of Roman officials with warfare, made such impromptu preparations much easier. Other times, military campaigns were planned years in advance.[11]

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[5] Polyb. 2.23.9–11.
[6] Polyb. 3.75.5–6; Sall. *Jug.* 43.3–4; 86.1; Livy 31.3.2–3, 9.5, 13.4–9, 19.2–4; 33.43.1–9; 34.8.4–7; 35.20.5–6; 36.1.6–8; 2.12–13; 3.1; 4.1–9; 42.27.1–8; 29.7–8; 31.4–8; App. *Pun.* 3,13; *BCiv.* 3.2,11.
[7] Tac. *Hist.* 2.82; Suet. *Tib.* 18; *Nero* 44.1; Dio Cass. 71.2.3.
[8] Livy 34.26.10.
[9] App. *Mith.* 5,30.
[10] Sall. *Iug.* 36.1.
[11] Adams (1976) 61.

The Security of Supply Lines

Ensuring that the army continued to receive supplies, despite an enemy's attempts to interrupt them, remained an important priority in Roman warfare in every period. Provisions reached the army in a variety of ways: by sea and river, overland and through foraging and requisition. In each of these circumstances, enemy action was a threat, and the Romans had to deploy military forces, as well as the application of strategy and tactics, to meet this threat. Rome often found it necessary to prevent the enemy plundering Roman or allied territory: it is noteworthy that the fleet of Gaius Duilius, which won the first major Roman victory of the First Punic War at Mylae (260 B.C.), was sent out to prevent the Carthaginians from plundering the territory of a Roman ally.[12]

Security of Waterborne Transport

Protecting sea-borne transport was vitally important in wartime: enemy action could seriously threaten the army's supply shipments. There are many instances of such threats. In 217 B.C., for example, the Roman grain fleet supplying the army in Spain was captured by the Punic fleet. A Roman task force was immediately mobilized to set out in pursuit, but the damage had already been done.[13] Plutarch notes that the Macedonian king Perseus during his war against the Romans (172–167 B.C.):

> . . . made an unexpected attack upon the Roman fleet which was lying at anchor near Oreus, seized twenty ships of burden with their cargoes, and sank the rest together with the grain that filled them. . . .[14]

The navy of Antiochus III, operating from the Hellespont and Abydos during the war of 192–189 B.C., made frequent raids (*excursiones*) against Roman cargo ships (*onerariae*) supplying their army in Greece. Later, Mithridates used his naval superiority in the eastern Mediterranean to cut off supplies to Sulla's forces in Greece in 87–85 B.C.[15] Attacks on sea-borne supply were important elements in the Civil Wars of the Late Republic. In 42 B.C., a Republican fleet under

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[12] Polyb. 1.23.1.
[13] Livy 22.11.6–7.
[14] Plut. *Aem. Paul.* 9.2.
[15] Livy 37.14.3; Plut. *Luc.* 2.2ff.

Statius defeated Dolabella's fleet at Laodicea, cutting him off from supplies.[16] When Octavian sent a large force by sea to reinforce and resupply the Caesarean army at Philippi, it was attacked and destroyed by the Republican navy.[17]

The Romans routinely used their fleet to protect supply transports in wartime.[18] As early as the First Punic War, the Romans assigned a fleet of 120 warships to provide a convoy for merchant ships bringing supplies for the siege of Lilybaeum (249 B.C.).[19] When the commander of the fleet in 209 B.C., Marcus Valerius Laevinus turned some ships over to the consul Quintus Fabius Maximus for use in the assault on Tarentum, they are called by Livy "the ships which Laevinius had for protecting the supply lines (*tutandis commeatibus*)."[20] Such protection continued in the late Republic: Sallust, in a speech attributed to the consul Gaius Cotta, and set in 75 B.C., refers to the fleet which "guarded our supplies (*commeatus tuebatur*)."[21]

Such naval escorts were not always successful.[22] The convoy protecting supplies going to Lilybaeum in 249 B.C., mentioned above, did not prevent the Carthaginians from attacking and seizing several of the merchant vessels.[23] The threat of attack was sometimes more destructive than the attack itself: trying to avoid attack by Carthaginian warships, a Roman supply fleet placed its ships in a dangerous anchorage where a storm destroyed the entire fleet including all the army's supplies.[24] Whenever possible, a fleet put supplies put ashore before a battle.[25] To prevent them from falling into enemy hands commanders of escorts might scuttle conveyed merchant ships, as the Pompeian admirals Lucretius and Minucius did during the Dyrrachium campaign of 48 B.C.[26] Despite the dangers of attack, supplies transported by sea were generally safer from attack than those sent overland, a point made by Tacitus.[27]

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[16] Dio Cass. 47.30.5.
[17] Plut. *Brut.* 47.2; 48.3.
[18] Livy 22.22.1; 26.39.3; Polyb. 1.52.8; Plut. *Aem. Paul.* 8.2; *Pomp.* 11.2; App. *BCiv.* 5.11,98.
[19] Polyb. 1.52.8.
[20] Livy 27.15.5.
[21] Sall. *Hist.* 2.47.7.
[22] Livy 26.39.3–19; App. *Hann.* 6,34.
[23] Polyb. 1.53.13.
[24] Polyb. 1.54.5.
[25] Polyb. 1.60.3; Livy 36.43.6, 45.3.
[26] App. *BCiv.* 2.8,54.
[27] Tac. *Ann.* 2.5.

Security of Overland Supply

The army provided escorts for supply convoys bringing provisions to troops in garrison even during peacetime, albeit on a limited scale.[28] An incident from the anti-Roman uprising of Athrongaeus in Palestine around 4 B.C. illustrates the small size of such peacetime escorts. Josephus reports that a single century (80 men at full strength) was escorting a convoy of grain and arms to a legion stationed in Jerusalem, when the rebels ambushed the column near Emmaus. The Romans lost half the century and only the intervention of King Herod's army saved the rest.[29]

Obviously, moving provisions from the operational base to the army over supply lines provided ample opportunities for attack. Due to the increased danger in war, convoy escorts were, of course, considerably larger than in peacetime. A tribune commanded the forces that escorted a supply convoy bringing provisions to the army of Pompeius Aulus in Spain in 141 B.C.[30] Appian does not give the size of the escort, but a tribune would have commanded at least several centuries and possibly a cohort or more.[31]

An escort's size was not the only factor in successful defense of a convoy. While accompanying a supply convoy to Lucullus's army from Cappadocia in 71 B.C., a Roman force defeated an attack by Mithridates's cavalry: the Pontic force had attacked the convoy in a defile, a more easily defensible position, instead of waiting until it reached open country.[32] An escort also had to maintain a disciplined defense cordon, even if the column was proceeding to pick up supplies. Tacitus notes the lack of security in an unloaded supply column going to Novaesium from the Roman forces at Gelduba in 69 A.D., during the revolt of Julius Civilis. The troops assigned to defend it moved as if there were no danger:

> . . . the cohorts escorting [the convoy] were proceeding as if in time of peace, that there were few soldiers with the standards, that their arms were being carried in carts (*vehicula*) while they all strolled along

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[28] Dio Cass. 56.19.1; Isaac (1992) 102–60.
[29] Jos. *BJ* 2.63; *AJ* 17.278. Emmaus was either the town of that name southeast of Lydda, or more likely, Nicopolis 20 miles west of Jerusalem: Isaac (1990) 104, 428–9.
[30] App. *Hisp.* 13,77.
[31] Note Livy 32.11.7 (198 B.C.): a tribune commands 4300 men.
[32] App. *Mith.* 12,80–81.

at will, he drew up his forces and attacked them, sending first some
troops to occupy the bridges and narrow parts of roads.[33]

The column was unable to make it to Novaesium and had to fight
its way back to Gelduba without fulfilling its mission.

In order to secure its supply lines, an army had to pacify the area
between the operational base and the tactical base. This is why
Vespasian did not immediately attack Jerusalem when he arrived on
the scene in 67 A.D.: if he left hostile forces behind him, in Galilee
and Samaria, the rebels would have been in a position to cut off
his supply lines. Therefore, he spent an entire campaigning season
taking important fortresses in the north of Palestine.[34]

Providing a series of depots between the operational and tactical
base was not only a question of "leap-frogging" supplies forward.
Depots were generally placed within fortifications, as at Rödgen and
South Shields and they served to secure provisions from enemy attack.
Therefore, the sources often refer to them as "forts" (*castella* or
phrouria).[35] Vegetius describes this practice:

> Among the things particularly incumbent upon a general ... is to see
> that the transportation of grain and other provisions ... is rendered
> secure from hostile attack. The only way to achieve this is to plant
> garrisons at suitable points through which our supply-trains pass. These
> may be cities or walled forts. If no old fortifications are available, tem-
> porary forts (*castella*) are established in favorable positions [and] a num-
> ber of infantry and cavalry stationed in them on outpost duty provide
> a safe passage for supplies.[36]

Brutus used fortified lines to protect his supply lines at Philippi (42
B.C.).[37]

The use of fortified depots considerably reduced the risk of attack
to supply lines.[38] Once a rear area had been pacified, though, the
danger of convoyed supplies, which at first glance seem very vulner-
able, was actually rather small. Lacking firearms or explosives, the
ambushing party in antiquity usually had to rely on superior numbers
to overwhelm a convoy. Even if the enemy knew the likely route of
a convoy, the exact time of its movement would not be predictable,

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[33] Tac. *Hist.* 4.35.
[34] Jos. *BJ* 3.29ff.
[35] Tac. *Ann.* 15.14; Front. *Strat.* 2.11.7; Dio Cass. 3.6; 12.2; Jos. *BJ* 4.446; 7.275.
[36] Veg. *Epit.* 3.8, tr. Milner.
[37] Plut. *Brut.* 41.1; App. *BCiv.* 4.16,121.
[38] Isaac (1992) 102–7.

so a large ambushing force would have had to wait in enemy territory, itself vulnerable to surprise attack.

Naturally, armies have a tendency to use their worst troops to garrison depots and operational bases, not to mention escort duty, leaving the best soldiers for combat. Livy explicitly states that after the consuls filled their legions with the best troops, they assigned the "surplus" (*ceteri*) to garrison duty.[39] In the Republican period, the Romans sometimes used their least reliable Italian allies to defend supply lines, sometimes with unfortunate results. In 218 B.C., Dasius of Brundisium commanded the garrison of Clastidium, in which a great quantity of grain had been stored for the Roman army. He betrayed the city to Hannibal for 400 gold pieces. The city's capture not only hurt the Romans, but relieved the Carthaginians of considerable supply difficulties.[40] When Manlius Vulso set up an operational base on the Lake of Timavus in his Istrian campaign of 178 B.C., he garrisoned it with a single reserve cohort (*repentina cohors*) and a few legionary centuries. The Istrians, seeing the weakness of the Roman defense, attacked the base and captured it. Only the barbarian drunkenness that followed, and the timely arrival of Gallic auxiliaries and of part of another legion (which had been foraging nearby) restored the situation, and the base, to the Romans.[41]

Since Roman marching camps also functioned as supply bases, camp security was especially important. The Romans were justifiably famous for their security measures while encamping. Such measures involved both fortification and maintaining the discipline necessary to proper security. This system sometimes broke down, as it did in Albinus's army in Numidia. Sallust notes that in this case:

> . . . [his] camps were not fortified, nor was watch kept in a military fashion, men absented themselves from duty whenever they pleased.[42]

It was no doubt at least partly for logistical reasons that the consul Caecilius Metellus reestablished security in his famous reform of the army in 109 B.C.[43]

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[39] Livy 44.21.9; cf. 44.38.6–7: the one-fourth of the army left to watch the baggage was not "the most cowardly," hardly a ringing endorsement.

[40] Polyb. 3.69; Livy 21.48.8–10; Zonaras 8.24.

[41] Livy 41.1.2–4.4.

[42] Sall. *Iug.* 44.4.

[43] Sall. *Iug.* 45.2.

Security of Foraging Operations

Foraging was an always risky, albeit unavoidable, business.[44] Parties seeking fodder, water and firewood had to leave camp daily, their route usually determined by the location of forage, springs, and timber. Naturally, these regular operations became the frequent targets of enemy attack, particularly by cavalry.[45] Our sources give many examples of foraging leading to fighting. Livy describes how, in 208 B.C., a group of Numidian cavalry lay in wait "to capture any men, who wandering about in search of fodder or firewood, had gone too far from the camp." A scout sprang the ambush, but instead of foragers, the attackers found a reconnaissance party led by both Roman consuls. Claudius Marcellus, one of Rome's greatest generals, was killed in this skirmish.[46] When L. Licinius Lucullus went to Spain as consul in 153 B.C. he attacked the Vacaei, although not authorized by the Senate to do so. Due to the lack of Senatorial support, Lucullus suffered from a lack of supplies and was forced to send out foraging parties. The Vaccaei attacked his foragers for wood and fodder, killing many, and driving the rest back into his camp.[47] The reliance on foraging made Lucullus's army particularly vulnerable: in 151 B.C., when operating against the city of Pallantia:

> [Lucullus] would not go away until the Pallantian horse, by incessantly harassing his foragers [*sitologoi*], prevented him from getting supplies. Being unable to get food, Lucullus withdrew his army.[48]

Since water sources make such obvious target for ambush, watering parties are particularly vulnerable. For example, when he was driven out of Spain in 82 B.C., Sertorius led an expedition of 3,000 men to Mauretania, but had to retreat because he took so many casualties while obtaining water.[49] Generally, there were more sources for wood than water, but gathering it was still dangerous. In 145 B.C. Viriathus attacked the woodcutters of Fabius Maximus in Spain, killing many and driving the rest into camp.[50]

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[44] Polyb. 3.101.9–10.
[45] Livy 25.34.4; Polyb. 3.111.3–4; App. *Hisp.* 9,55.
[46] Livy 27.27.3–7.
[47] App. *Hisp.* 9,51.
[48] App. *Hisp.* 9,55.
[49] Plut. *Sert.* 7.3; other examples: [Caes.] *BHisp.* 21; Dio Cass. 65.4.5.
[50] App. *Hisp.* 11,65; cf. *Pun.* 14,97.

The army needed enormous amounts of fodder, and heavily-loaded foraging parties were often attacked. In his commentary on the Gallic Wars (59–51 B.C.) Caesar frequently refers to the security problems of foraging, particularly the problem of enemy ambushes.[51] During Caesar's African campaign (46 B.C.), so many enemy cavalry roamed around the camp attacking soldiers who left the fortifications to gather fodder that it became effectively impossible to do so;[52] because he had laid in insufficient supplies, Antony's army besieging the Atropatanean city of Praaspa in 36 B.C. was forced to forage at increasing distances—and as a result suffered from enemy attacks.[53] It was clearly desirable, from a tactical perspective, to ambush a foraging party upon its return to camp, when it was burdened with gathered supplies. Appian puts the following words into the mouth of Scipio Aemilianus, arguing the army should take a circuitous route in returning from foraging in 134 B.C., well away from the city of Numantia:

> ... what I fear is coming back, when the enemy will be unencumbered and will have their town to start from and retreat to, while our troops will return from their foraging laden and tired, bringing with them animals and wagons and burdens. For this reason the fighting will be severe and unequal.[54]

Such attacks were not always successful. During the Second Macedonian War, one of Philip V's generals ambushed the legate Lucius Apustius returning from a plundering expedition. Apustius placed his army's baggage—including their plunder—in the center of the army and drove off the Macedonian attack.[55]

The Romans tried to lessen the risks of foraging by sending out their parties at different times and by different routes: Caesar explicitly states he followed this practice.[56] Of course, speed was important in foraging in order to reduce risk of attack. This is illustrated, from the point of view of civilian provincials, by a passage in the Mishnah:

> If foraging Romans [lit. "searching idol-worshipers"] entered a city, in a time of peace, [and] opened casks [of wine], they are [ritually] prohibited, [but] sealed ones are permitted. If it were a time of war, both

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[51] Caes. *BGall.* 5.17.2–5; 7.16.3, 20.9; *Aul. Hirt. BGall.* 8.10.3, 16.4.
[52] [Caes.] *BAfr.* 24.2.
[53] Dio Cass. 49.26.3; see also Tac. *Ann.* 12.38.
[54] App. *Hisp.* 14,87; other examples: *Hisp.* 13,78; Dio Cass. 49.27.2.
[55] Livy 31.27.1–7.
[56] Caes. *BGall.* 7.16.3.

the former and the latter are permitted since [the Romans] had no
time to manipulate the wine for libation.[57]

Clearly, in order to collect and move provisions as quickly as possible
the Romans ignored the niceties of pagan ritual in wartime, neglect-
ing to make the libations to the gods that would render the wine
not kosher.

A commander might order a separate fortified camp to be built
in front of the main camp, both to cover his own foragers and harass
the enemy's. Just before the battle of Cannae (216 B.C.), the consul
Lucius Aemilius Paullus set up a camp for two-thirds of his army on
the river Aufidius:

> For the remaining [one-third] of his army he fortified a position on
> the farther side of the river . . . at a distance of about ten *stadia* [1.8 km./
> 1.1 miles] from his own camp, and rather more from that of the
> enemy, intending thus to cover the foraging parties from his main
> camp . . . and harass those of the Carthaginians.[58]

Whenever possible, the Romans tried to conduct *frumentationes* in the
immediate vicinity of the army. Even close to camp, however, the
enemy frequently shadowed foraging troops, looking for the oppor-
tunity to attack.[59] Sometimes, circumstances forced the Romans to
forage for grain over a wide area. During the siege of Agrigentum
(262 B.C.), the Romans lacked a supply system sophisticated enough
to support a siege, so the army had to disperse in order to mow
the local harvest. The Carthaginians attacked the foragers and almost
took the Roman camp.[60] In other cases commander might scatter
his foragers as a stratagem: in 66 B.C. Mithridates sent out parties
to gather fodder far from his camp, and then, with Pompey's scouts
concentrating on the foragers, he slipped away with the rest of his
force.[61]

Despite these tactics, the Roman army needed to maintain large
numbers of troops to protect *pabulationes* in enemy territory, partic-
ularly when the fodder had to be obtained far from camp. These
forces were often quite substantial: an entire legion was assigned to

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[57] Mishnah *Avodah Zarah* 5:6; cf. *Sotah* 49b; *Nedarim* 3:4.
[58] Polyb. 3.110.10–11.
[59] E.g. Caes. *BGall.* 4.32; 7.16.3; *BCiv.* 1.48.7.
[60] Polyb. 1.17.6ff.
[61] Front. *Strat.* 1.1.7.

gather wood at the siege of Athens in 87–86 B.C.[62] At Ilerda (49 B.C.), Gaius Fabius, one of Caesar's generals, assigned two legions and his entire cavalry force to protect a *pabulatio*—this war, according to Caesar, the "usual practice" (*cotidiana consuetudine*).[63] On one occasion Caesar himself sent three legions and his entire cavalry, under the command of a legate, to get fodder.[64]

Grazing was in some respects even more dangerous than foraging, as the animals and accompanying personnel had to spread out over a wide area.[65] When Roman cavalrymen let their horses graze unbridled at the siege of Jerusalem (70 A.D.), Jews sallying from the city seized many of their horses. Although the incident did not lead to a prohibition on grazing, apparently necessary to provide sufficient forage, Vespasian ordered the Romans to bridle their horses and stay with them. In addition, he executed a cavalryman *pour encourager les autres*.[66]

Parties foraging for grain (*frumentatores*), like those searching for water, fodder and firewood, required the protection of a large number of troops. Metellus's officer Aquinus sent out a foraging party of 6,000 at the siege of Langobritae in 79 B.C.; later, Lucullus sent ten cohorts, the equivalent of an entire legion, to obtain grain supplies during his campaign against Mithridates (71 B.C.).[67] Caesar routinely deployed forces of between one-half a legion to three entire legions in large-scale foraging operations.[68] The Romans frequently used cavalry to protect foragers: Scipio Aemilianus sent a military tribune with about 2,000 horsemen to drive off a Pallantian force which had attack a Roman foraging party in 134 B.C. Such covering forces were themselves often the object of attack: on this and a subsequent occasion, Scipio had to send reinforcements to rescue his cavalry.[69]

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[62] App. *Mith.* 5,32.
[63] Caes. *BCiv.* 1.40.
[64] Caes. *BGall.* 5.17.
[65] Veg. *Epit.* 3.6; Polyb. 3.101.9.
[66] Jos. *BJ* 6.153.
[67] Plut. *Sert.* 13.6; *Luc.* 17.1. Sertorius, with only 3,000 men, ambushed Metellus's superior force and mauled it so badly that Metellus had to abandon the siege.
[68] Five cohorts: Caes. *BGall.* 6.36.2; one legion: Caes. *BGall.* 4.32.1; two legions: Caes. *BCiv.* 1.40.3; [Caes.] *BAfr.* 68; three legions: App. *BCiv.* 2.10,68.
[69] App. *Hisp.* 14,88–9.

Onasander includes an entire chapter on foraging expeditions (*Peri Pronomôn*), most of which is concerned with security. One passage is worth quoting in its entirety:

> The general should be cautious in the matter of foraging expeditions, and not allow troops, when invading a rich hostile country, to search for plunder in an undisciplined matter; for the greatest misfortunes befall men acting in this way, since it has often happened that the enemy, falling on men scattered and without order in their eager search for booty, have killed many as they were retreating, unable to give aid to their comrades or to use their arms. If any men do plundering without the command of the general himself, they should be punished. When the general himself sends out foraging parties, he should send with the light-armed men (*psiloi*) and unarmed men, (*anoploi*), guards (*phylakes*), both horse and foot, who shall have nothing to do with the booty, but are to remain in formation and guard the foragers, that their return to camp may be safely accomplished.[70]

Onasander's "unarmed men" probably refer to military slaves (*calones*) and his "light-armed men" are probably auxiliaries. By "guards" Onasander almost certainly means legionaries; Josephus uses the term this way.[71] Note that while collection was in progress, the troops maintained their tactical units (probably centuries) in order to respond quickly in case of attack. Livy describes the especially tight precautions taken by Q. Fabius Maximus in 217 B.C.:

> He would keep his men in camp, except for such necessary duties as obliged their leaving it; when they went out for fodder (*pabulum*) and firewood (*ligna*), they were neither few in number nor dispersed; a guard (*statio*) of cavalry and light infantry (*levis armatura*), drawn up and ready for sudden onsets, made everything safe for his own men and dangerous for the scattered pillagers of the enemy.[72]

Note that in this case Fabius used light infantry and cavalry, not legionaries to guard his foraging parties. What troops to use and how to arrange them was decided by the commander: Fabius Maximus Aemilianus operating in Spain in 145 B.C. used legionaries to guard his foragers.[73] Cavalry generally ranged around the guards to prevent unexpected attack.[74]

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[70] Onas. *Strat.* 10.7–8.
[71] Jos. *BJ* 5.43.
[72] Livy 22.12.8–9.
[73] App. *Hisp.* 11,65.
[74] App. *Pun.* 14,99; *Hisp.* 14,89; Sall. *Jug.* 55.5; Aul. Hirt. *BGall.* 8.11.

It was important to keep one's foraging parties concentrated and not too widely scattered. During the Second Macedonian War, Sulpicius Galba allowed his foragers to spread out too widely: Philip V launched a sudden cavalry attack, cut the Roman foragers off from their camp and inflicted heavy casualties.[75] Tired soldiers were also vulnerable: Aemilius Paullus arranged for guards to be changed at noon during day-long foraging expeditions.[76]

Caesar notes the importance of protecting his foragers in action.[77] According to Aulus Hirtius, Caesar's normal practice was to have both cavalry and lightly armed auxiliaries serve as an escort (*praesidio*) for the foragers, with legionaries bringing up the rear as a covering force.[78]

Good security measures paid off: during the Armenian campaign of 69 B.C., Tigranes's cavalry attacked Roman foragers, but were beaten off by their escort—as a result the Romans were able to forage freely, even near Mithridates's camp.[79] Conversely, the failure to adequately protect foragers could have disastrous results. In 171 B.C., for example, Perseus learned from a deserter that the Romans were foraging without guards. He struck with a force of 3,000 cavalry and light infantry, falling without warning on the Romans; the Macedonians captured 1,000 Roman wagons, along with their teams.[80]

Of course, the Romans also attacked the foraging parties of their enemies. Livy says Hannibal would normally send two-thirds of his army to gather grain; the other third guarded both the camp and the foragers.[81] When, Hannibal changed his disposition, foraging with one-third and using two-thirds as a covering force, the Romans attacked and dispersed the smaller force of foragers.[82] Less sophisticated foes were particularly vulnerable to attack against their foragers. Scipio Nasica, as propraetor of Farther Spain in 193 B.C., ambushed and destroyed a Lusitanian raiding party, which outnumbered his own force, as it was returning from the province loaded down with plunder.[83]

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[75] Livy 31.36.5–9.
[76] Livy 44.33.10–11.
[77] Caes. *BGall.* 6.39.
[78] Aul. Hirt. *BGall.* 8.17.2.
[79] App. *Mith.* 13,87; cf. Dio Cass. 47.37.2–3.
[80] Livy 42.65.1–3.
[81] Livy 22.23.9–10; cf. Polyb. 3.100.6.
[82] Livy 22.24.4–6; Polyb. 3.101.6–102.3.
[83] Livy 35.1.5; see also App. *Hisp.* 11,61.

Since requisition normally involved the local population convey-
ing supplies to the army (*vectura*), such civilian transportation was
naturally vulnerable to attack. When Hannibal ordered the Campanians
to bring grain stored in Iapygia to Campania, the Romans fell on
the civilians, killing many and seizing the grain.[84] The vulnerability
of such operations to attack is obvious, and while seldom mentioned,
it was doubtless normally performed well away from the enemy.

In the Imperial period, one finds *lixae*—in the sense of military
servants—traveling around provinces, gathering supplies for their
units. They sometimes found themselves under sudden attack, partic-
ularly during rebellions. During Julius Civilis's revolt of 69–70 A.D.,
the Frisians crossed the Rhine and attacked the Roman *lixae*, who
were, as Tacitus puts it "scattered about the country as if it were a
time of peace."[85]

Security of Trains

Protecting the army's train was very important. Tacitus comments
that "a lengthy baggage train is easy to ambush and awkward to
defend" and Polybius notes the particularly vulnerability of trains to
cavalry attack.[86] Livy describes how, in 188 B.C., the Thracians
ambushed the Roman baggage train as it passed through a narrow,
wooded road:

> . . . they fell upon the train (*impedimenta*) and the baggage (*sarcina*), and
> having killed the guards (*custodes*) some of them carried off what was
> in the wagons (*plaustra*), others drove off the pack animals loads and
> all.[87]

Order of march was an important element in proper security.[88]
Usually, in the presence of the enemy, the train travelled inside the
body of troops. Discussing order of march, Onasander advises:

> The general must place his non-combatants (*therapeia*), transport (*hupozu-
> gia*) and all his baggage (*aposkeuê*) in the center of his army, not out-
> side.[89]

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[84] App. *Hann.* 6,37.
[85] Tac. *Hist.* 4.15.
[86] Tac. *Ann.* 2.5; Polyb. 3.68.3; cf. Livy 35.28.4, 9.
[87] Livy 38.40.10–11.
[88] Le Bohec (1994) 128–30; Peddie (1994) 68–79; Goldsworthy (1996) 105–111.
[89] Onas. *Strat.* 6.6: In the Loeb edition, Pease and Tichener translate *therapeia* as

A Roman commander especially had to guard his train during battle. Poor security in regard to the train contributed to the disaster at Teutoburger Wald, where the Germans crushed three legions under Quinctilius Varus in 9 A.D.—troops were mixed in with the supply wagons which were spread throughout the column.[90]

   The daily marching camp served as a place to secure the baggage train before battle.[91] When a sudden battle made fortification impossible or undesirable, it was important to protect the train with troops.[92] Keeping the train well away from the battle line was particularly important. Tacitus remarks that at the Battle of Bedriacum (69 A.D.), the Othonian "wagons and camp followers were mixed in confusion with the troops," which contributed to their defeat.[93] Of course, a commander might decide to put the baggage at risk or even sacrifice it for the sake of victory. In Spain during the Second Punic War, the Romans stacked pack-saddles (*clitellae*) with their loads still tied to them as a rampart. When this proved insufficient defense, they put their packs (*sarcinae*) over them.[94] A commander might abandon his baggage and kill his pack animals—in order to speed a retreat, as Cestius Gallus did during his withdrawal from Jerusalem in 66 A.D.[95]

Foraging and Supply Lines in Strategy and Tactics

The practical limitations to the use of foraging are discussed above;[96] there were, however, also military ones.[97] Polybius notes that Fabius Maximus relied on supply lines for tactical reasons, when facing Hannibal in 217 B.C.:

"medical equipment." Though *therapeia* can have this meaning, as well as "body-guard" (Polyb. 4.87.8), in this case it clearly refers to the body of military servants and impressed civilians, for descriptions of Roman orders of march, see Caes. *BGall.* 2.17; Tac. *Ann.* 1.51; Jos. *BJ* 3.115–126; Arr. *Acies* 1–10.

[90] Dio Cass. 56.20.5; another example: Tac. *Ann.* 1.63.
[91] Peddie (1994) 59–71; Goldsworthy (1996) 111–113.
[92] Livy 39.30.11.
[93] Tac. *Hist.* 2.41. Ironically, the Vitellians suffered the same fate later the same year at the battle of Cremona: their troops becoming entangled in the baggage (*impedimenta*) and wagons (*vehicula*) was a factor the Flavians' victory (Tac. *Hist.* 3.25).
[94] Livy 25.36.7; Polyb. 8.38.1.
[95] Jos. *BJ* 2.545–6.
[96] See Chapter Three, pp. 123, 124, 129, 133.
[97] Lynn (1993) 23–5.

> Having always a plentiful store of provisions in his rear [Fabius] never
> allowed his soldiers to forage or to straggle from camp on any pre-
> text, but ke[pt] them continually massed together . . . continued to take
> or kill numbers of the enemy, who . . . had strayed far from their own
> camp in foraging.[98]

Foraging slows an army down considerably and reduces its ability
to take the offensive or to react to enemy action.[99] Because constant
foraging for provisions made it difficult to carry on tactical operations,
the Romans generally relied on supply lines, despite the problems
and costs involved in land transport. This logistical flexibility prob-
ably paid off more often than our sources mention. We do hear that
in 66 B.C., the use of supply lines allowed Pompey to move over
the devastated frontier of Pontus—where foraging was not possible—
and defeat Mithridates.[100]

Less sophisticated military forces lacked the infrastructure to organ-
ize supply lines and had to rely on foraging. Logistics often placed
barbarian forces at a disadvantage *vis-à-vis* the better organized Roman
military machine. Even after defeating Fabius Servilianus in 142 B.C.,
the Lusitanian rebel Viriathus had to retreat from Roman territory
due to "want of provisions" (*trophôn aporôn*).[101] The Lusitanians clearly
relied on foraging and pillaging to feed their warriors and could not
obtain sufficient supplies. The logistical problems faced by the Parthians
have been discussed above in the context of the administration of
their supply.[102]

Despite the strategic advantages of supply lines, a commander might
prefer foraging for tactical, strategic or even economic reasons. For
example, when Sulpicius was campaigning against Philip V in 200–
199 B.C.:

> he was leading the army through the territory of the Dassaretii, carrying
> with him untouched the grain he had brought from winter quarters,
> since the country supplied adequately the needs of his soldiers.[103]

Sometimes, of course, supply lines were simply not feasible: heavy
rains, flooding, or storms, among other natural causes, could interrupt
the transfer of supplies. More commonly it was enemy action that

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[98] Polyb. 3.90.2–3.
[99] Labisch (1975) 67.
[100] App. *Mith.* 15,99; Dio Cass. 36.47.1–2.
[101] App. *Hisp.* 12,68.
[102] See Chapter Six, p. 245.
[103] Livy 31.33.4–5.

cut supply lines forcing the Romans to forage. When Archelaus cut off Roman supply lines during the First Mithridatic War (88–85 B.C.), for example, Sulla was forced to retreat into Boeotia, where it was possible to maintain his army on local resources.[104] During his first invasion of Britain (55 B.C.), Caesar says he undertook large-scale foraging operations, specifically because regular routes of supply had been cut off.[105]

A Roman army also might eschew supply lines in order to move more rapidly on a strategically located city, counting on its rapid capture to provide provisions for the army. Domitius Corbulo clearly had not arranged for supply lines when, after razing Artaxarta in 58 A.D., he made a 275-mile dash to Tigranocerta over desolate terrain. The army suffered seriously from lack of food and water, but the strategy worked. The Romans reached a fertile region where they could forage, and the city of Tigranocerta, apparently surprised by the army's sudden appearance, surrendered. This gave Corbulo a base for further operations.[106]

Going on the offensive without organizing a supply line, though it meant rapid movement and gaining the element of surprise, was also very risky and could lead to disaster. The siege of Langobritae (79 B.C.) during Metellus's campaign against Sertorius illustrates this danger. The small town lacked a secure water supply, so Metellus planned a short siege and ordered his men to bring along only five days' provisions. But Sertorius managed to introduce more water into the city, thus lengthening the siege. Since Metellus had left his train behind, presumably in order to move quickly through the mountainous terrain, he lacked sufficient provisions. Forced to send 6,000 troops, a significant portion of his army, out on a foraging expedition, Metellus lost the large foraging party to ambush and had to withdraw.[107] Other examples of this sort of logistical gamble occurred during the Imperial period.[108]

In practice, the Roman army in the field generally used many sources of supply: requisition, foraging, and supply lines. Polybius explicitly states that the Romans used both supplies shipped from Italy and those obtained from Sicilian allies during the siege of

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[104] Plut. *Sulla* 15.2.
[105] Caes. *BGall.* 4.31.2.
[106] Tac. *Ann.* 14.23–26.
[107] Plut. *Sert.* 13.6.
[108] Tac. *Ann.* 15.8; Jos. *BJ* 2.528, 546–550; see Goldsworthy (1996) 87–90.

Lilybaeum.[109] At the siege of Numantia (134–133 B.C.), Scipio Aemi-
lianus obtained the bulk of his supplies for the siege over a supply
line, but also relied on local crops for fodder.[110] Caesar refers to differ-
ent sources of supply in describing the logistical difficulties brought
on by heavy rains during his Spanish campaign in 49 B.C.:

> As they were cut off by [swollen] rivers the allied states could not sup-
> ply grain, nor could those who gone a long distance for fodder return,
> nor could the great amount of supplies which had come from Italy
> and Gaul reach the camp.[111]

In this case, the army used fodder (as well as presumably water and
firewood) found in the immediate area, requisitioned from local allies
and established supply lines from neighboring regions (Italy and Gaul).
The principle of using various sources of supply continued to be an
important element of Roman military practice under the Empire.
Josephus describes the Romans using both local foraging within
Judaea and supply lines from "Syria and the adjacent provinces" to
provision the Roman army during the Jewish Revolt of 66–70 A.D.[112]
Relying on various sources of provisions was not necessarily more
economical or efficient: but it protected the army by duplicating
sources of supply, and was an important safeguard against blockade.

Logistical factors affected an army's ability to move, and thus
maneuver, in the tactical arena. A train not only slowed the army,
but restricted its movements. Crossing rivers, for example, become
more difficult: few fords over major rivers were suitable for pack
animals and even fewer for wagons.[113] Foraging also delayed the
army's progress, particularly the *frumentatio*, which might tie down
the entire army for a day or more.

Marching with their packs and equipment was an important part
of Roman military training.[114] As a result, the Romans could make
relatively rapid marches with their *impedimenta*. Caesar marched from
Rome to Spain in 27 days although, according to Appian "he was
moving with a heavily-laden army."[115] Mules did not necessarily slow
the army down. Suetonius says Caligula moved so fast in his German

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[109] Polyb. 1.52.5–8.
[110] App. *Hisp.* 14,86.
[111] Caes. *BCiv.* 1.48.
[112] Jos. *BJ* 2.528; 5.520–1.
[113] Livy 21.47.5–6.
[114] Horsmann (1991) 116–122.
[115] App. *BCiv.* 2.15,104.

"campaign" of 39 A.D., that in order to speed up their march, the Praetorian Guards tied their standards to their pack-mules "against their tradition (*contra morem*)".[116] This shows that the mules could keep up with a Roman forced march, which is quite in keeping with the animal's estimated march rate.[117] Wagons, on the other hand, did slow an army down considerably. After the lucrative campaign against Galatia in 189 B.C., the Roman army, overloaded with booty made barely five miles a day.[118] Herodian refers to the slow progress made by Maximinus Thrax from Sirmium to Aquilea in 238 because of the supply wagons accompanying his force.[119] There were also routes, particularly mountainous ones, which were unsuitable for wagons and *impedimenta*. After his defeat at Ottolobum (200 B.C.), for example, Philip retreated into mountains, "choosing a road which he knew the Roman with his heavy-armed column (*grave agmen*) would not take."[120] During a forced march, or in mountainous terrain, an ancient army often could not rely on its supply wagons, which could not keep up, nor could it take the time to forage. In such circumstances, the army would have to rely on rations prepared in advance and either placed along the army's route, carried in the soldiers' packs or transported on pack-animals.[121]

The heavy pack (*sarcina*) carried by the Roman soldier, after the Marian reform, slowed him down considerably. Tacitus notes that the Germans under Arminius could outmarch the Romans "weighted down with packs (*sarcina*) and armor (*arma*)."[122] Operating with packs (*expediti*) made soldiers more maneuverable and combat-ready.[123] This practice, however, had some negative effects. An army traveling *expediti* had to strike quickly or wait until supplies were brought up from the rear, and it was very difficult to take fortified positions without a train. Tacitus makes this latter point, while discussing the Cremona campaign of 69 A.D.[124]

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[116] Suet. *Cal.* 43. See *HA Sev. Alex.* 47.
[117] See Chapter Four, pp. 206–7.
[118] Livy 38.15.15.
[119] Hdn. 7.8.10–11.
[120] Livy 31.39.2–3.
[121] Livy 26.8.11, 9.5; 27.43.10; 34.12.6; 37.37.5; 44.35.13.
[122] Tac. *Ann.* 1.63.
[123] Sall. *Iug.* 46.7; 50.1; 90.2; Caes. *BGall.* 2.17; 6.5; *BCiv.* 1.79; Aul. Hirt. *BGall.* 8.34; Livy 27.18.10, 40.10; 32.6.3; 44.3.3; Tac. *Ann.* 13.40; *Hist.* 2.40, 45; 4.34; see the discussion on the *sarcina*, Chapter Three, pp. 71–7.
[124] Tac. *Hist.* 3.20.

The lack of a baggage train also had a negative impact on an army's logistics. After the battle of Cremona, the Flavians left their train at Verona and hastened to Rome in a "light column" (*expeditum agmen*). Although they were able to advance very rapidly, moving through a region devastated by the Civil War, they suffered from lack of provisions.[125]

Logistics and Strategy

There is a strong link between strategy and logistics.[126] Roman military manuals emphasize the need to secure the army's supply lines from enemy attack.[127] Ancient armies frequently blocked (*prohibere, intercipere*) or attempted to block an enemy's *commeatus*, that is, cut off its supply lines.[128] Caesar emphasizes that such blockades were commonplace.[129] Supply lines over both land and water were vulnerable to attack. Various means were employed to cut supply lines; indeed, the frequency with which this strategy was attempted emphasizes the reliance of the Roman and other ancient armies on supply lines.

Blocking Waterborne Supply

The Romans used sea blockade effectively from the Second Punic War onwards. Generally, a blockade involved patrolling waters in the hope of discovering enemy supply ships. In a speech attributed to Q. Fabius Maximus, Livy says that the Roman fleet based in Sicily had three functions: to plunder the African coast, to guard the Italian coast, but "above all to prevent reinforcements with pay and supplies (*commeatus*) from being brought over from Carthage for Hannibal."[130] Our sources note many other examples of naval blockade in Republican times.[131] At times, look-outs were stationed along the coast, in order to alert warships to the presence of supply ships.[132]

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[125] Tac. *Hist.* 3.50.
[126] Brown (1987) 5–13.
[127] Onas. *Strat.* 6.14; Veg. *Epit.* 3.3.
[128] Polyb. 5.52.1; 111.4; Caes. *BGall.* 1.49; *BCiv.* 3.111; Aul. Hirt. *BGall.* 8.47; [Caes.] *BAlex.* 26; Tac. *Hist.* 5.23; Plut. *Sulla* 15.1–2; *Luc.* 25.3.
[129] Caes. *BCiv.* 3.47.
[130] Livy 24.8.14.
[131] [Caes.] *BHisp.* 26; Livy 36.20.7–8; Plut. *Pomp.* 39.1; App. *Pun.* 6,36; *BCiv.* 4.11,86; Dio Cass. 37.3.3.
[132] Livy 44.29.3–5.

As Roman wars moved away from the Mediterranean in Imperial times, naval blockade became less important.

Blockade by sea was always difficult given ancient conditions, and often could be circumvented. Despite having 100 ships at his disposal, Otacilius found it impossible to prevent Carthaginian supplies reaching the besieged city of Syracuse during the Second Punic War.[133] In 48 B.C., Pompey tried unsuccessfully to use his naval superiority to block Caesar's movement of troops and supplies by sea.[134] Trying to institute a tighter blockade by keeping a fleet constantly athwart enemy supply lines was problematic, as Appian explains in his description of the siege of Carthage during the Third Punic War:

> Although Scipio's ships were blockading Carthage, they did not keep their place all the time, nor did they stand thickly together, as the sea was harborless and full of reefs. Nor could they ride near the city itself with the Carthaginians standing on the walls and the sea pounding on the rocks there worst of all . . . Thus the ships of Bithya [the Carthaginian admiral] and an occasional merchant . . . ran the blockade.[135]

Another of the problem with ancient sea blockade was that the blockading force consumed so many supplies itself when stationary. Livy relates the following incident, which occurred during the siege of Tarentum (211 B.C.):

> . . . a Carthaginian fleet was summoned from Sicily . . . to cut off the supplies (*commeatus*) of the Roman garrison . . . and it had indeed closed every approach to the citadel from the sea, but by lying there for a long time it was making the grain supply more limited for their allies than for the enemy. For it was impossible for such a quantity of grain to be brought to the townspeople . . . as the fleet itself was consuming, with its swarming crews. . . . In the end the departure of the fleet was more welcome than had been its coming.[136]

Although the Carthaginians did successfully ambush and capture a number of Roman convoys, lack of supplies eventually forced the besiegers to withdraw.[137]

Land operations also affected the security of sea routes. In the siege of Carthage (149–146 B.C.), Scipio Aemilianus was able to prevent

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[133] Livy 25.23.3; 26.1.12.
[134] Caes. *BCiv.* 3.5; Vell. Pat. 2.51.2.
[135] App. *Pun.* 18.120.
[136] Livy 26.20.7–11; cf. Polyb. 9.9.11. For the difficulty in supplying ancient warships see Casson (1995) 261–9.
[137] Livy. 26.39.3–20; App. *Hann.* 6,34.

sea-borne supplies from reaching the city by capturing all of the suitable ports along the African coast.[138] When Antonius Primus advanced into Italy in 69 A.D., he left a force at Altinum to prevent the Vitellian fleet at Ravenna from threatening his supply lines in the Adriatic. This turned out to be an unnecessary precaution as the Ravenna fleet defected to the Flavians. This defection, incidentally, put the Vitellians into serious logistical difficulties, since they had relied up to this point on supplies from overseas.[139]

Of course, the Romans themselves sometimes suffered from enemy forces cutting off their sea-borne supplies. Cutting off supply lines usually depended on having naval superiority. In 244 B.C., Hamilcar Barca cut off the supplies of the Roman forces on Mount Eryx: the Romans responded by putting pressure on *his* supply line. Finally the Romans succeeded in cutting off the Carthaginians supply definitively, this ended the siege of Eryx. The Carthaginians launched a naval expedition to resupply their troops, and its defeat by the Romans led to the end of the First Punic War.[140] Philip V's strategy during the First Macedonian War (214–205 B.C.) involved "cut[ting] off the resources and stepping-stones of the Romans in [the eastern Mediterranean]."[141] After the end of the Second Punic War, the Romans seldom faced an enemy who could challenge their naval superiority. There were, however, some cases of foreign fleets threatening Roman supplies. In the Alexandrian campaign (48–47 B.C.) the Egyptians stationed ships in the Delta and almost succeeded in cutting off Caesar's supply line (*commeatus*).[142] Julius Civilis, the rebel Batavian, built a fleet in 70 A.D., intending to block off Roman supplies being shipped from Gaul, but he was defeated by the Roman fleet under Cerialis.[143]

Military forces without a regular navy, such as rebels, might rely on pirates or privateers to attack Roman supply lines.[144] Sertorius made good use of pirates, whom he employed against the Sullan supply lines with good effect.[145] During the Jewish War (66–70 A.D.),

[138] App. *Pun.* 18,126; cf. Plut. *Brut.* 41.1; App. *BCiv.* 4.16,121.
[139] Tac. *Hist.* 3.6, 3.13.
[140] Polyb. 1.58.1–61.8.
[141] Polyb. 16.29.1; cf. 15.18.6.
[142] [Caes.] *BAlex.* 25.
[143] Tac. *Hist.* 5.23.
[144] App. *Pun.* 4,25; Livy 34.36.3; 37.13.11–12.
[145] Plut. *Sert.* 21.5; Pohl (1993) 166.

Jewish privateers operated from Joppa, a city that Strabo called "a pirate's nest (*epinea tôn lêstiôn*)."[146] Josephus says:

> . . . The Jews . . . rebuilt Joppa, recently devastated by Cestius; and then, finding themselves cut off from the country, which had passed into enemy hands, they resolved to take to the sea. They accordingly built themselves a fleet of piratical ships (*peiratika skaphê*) and made raids on the traffic along the coast of Syria and Phoenicia and the route to Egypt, rendering navigation on these seas quite impossible.[147]

When Vespasian took over the Roman army in Judaea in 67, he seized and garrisoned Joppa in order to protect his supply lines.[148] Sometimes, of course, pirates operated entirely for profit like the Hippagretans when they preyed on Roman supply ships sailing along the North African coast in 148 B.C.[149]

River-borne supplies could also be cut off. During his revolt against Rome in 69 A.D., the Gallic commander Julius Civilis took control of the Rhine river, cutting off that supply route to the Roman force at Gelduba. The Roman general C. Dillius Vocula was forced to rely on overland supply.[150]

Sometimes a dangerous logistical situation came about through circumstance, not enemy action. In 49 B.C., a sudden swell carried off a bridge over which Caesar was obtaining supplies near Ilerda. This accident cut off a large force, which was then defeated in detail by Petreius. The remaining Caesarian troops suffered from lack of supplies.[151] Aulus Gabinius, operating in Illyricum in 47 B.C. was beset by both a bad harvest and storms which prevented the importation of food. As a result, Gabinius was forced to take enemy strongholds by siege.[152]

Blocking Overland Supply

The Romans commonly cut off overland supply lines as early as the Second Punic War. Q. Fabius Maximus based his famous strategy

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[146] Strabo 16.2.28.
[147] Jos. *BJ* 3.416–7.
[148] Jos. *BJ* 3.429–31.
[149] App. *Pun.* 16,110.
[150] Tac. *Hist.* 4.35.
[151] App. *BCiv.* 2.6,42.
[152] [Caes.] *BAlex.* 43.

on this technique: in 217 B.C., he managed to interpose his army between Hannibal and the Carthaginian allies in Capua and Samnium.

> Hannibal now seemed to be hemmed in (*inclusus*), the road to Casilinum being blocked. The Romans had Capua and Samnium at their backs and all their wealthy allies to furnish them with provisions; but the Carthaginians faced the prospect of passing the winter between the cliffs of Fomiae and the sands and marches of Liternum, and amid tangled forests.[153]

Hannibal escaped using a famous stratagem, tying torches to the horns of cattle to confuse the Roman pickets: he succeeded in slipping away.[154] During Lucullus's attempt to break Mithridates's siege of Cyzicus in 74 B.C., Plutarch says:

> [Lucullus] stationed his army near the village called Thracia, in a spot best suited to command the roads and regions from which, and over which, the army of Mithridates must get its necessary supplies.[155]

Lucullus boasted to his soldiers that the use of such tactics would lead to a bloodless victory, and indeed, Mithridates was forced to withdraw to avoid starvation.[156]

Rome's enemies often tried to exploit its army's reliance on supply lines, with varying degrees of success.[157] Tacitus describes the unsuccessful attempt of Tiridates to cut off Roman supplies during the Armenian War of 58 A.D.:

> The king . . . [perhaps] hoping to cut off the supplies reaching [the Romans] by way of the Euxine and the town of Trapezus, left in haste. [But] he [was] powerless to molest the supplies, since they were conveyed over mountains occupied by our posts (*praesidia*).

Sometimes enemies succeeded in cutting Roman supply lines by maneuver. During the Parthian War of 61–63 A.D., the Parthian general Monaeses moved forward so rapidly that he cut off supply trains bringing up provisions to the Roman operational base at Tigranocerta.[158] In other cases, a static force cut off Roman supplies. For example, in 69 A.D., Julius Civilis, the Batavian rebel, set ambushes

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[153] Livy 22.15.4.
[154] Livy 22.16.7–8; Polyb. 3.92.3–93.6; Front. *Strat.* 1.5.28; App. *Hann.* 3,14–15.
[155] Plut. *Luc.* 9.2.
[156] Plut. *Luc.* 11.5.
[157] Livy 44.6.5–6, 12; App. *Mith.* 12,80–1; Plut. *Luc.* 26.3; cf. App. *Mac.* 19.
[158] Tac. *Ann.* 15.3.

along the bridges and roads between the Romans' operational base at Novaesium and their army at Gelduba. The Romans were unable to push a supply column through.[159]

Cutting off overland supply lines was a maneuver particularly attractive to tribal peoples, who were often unable to defeat the Romans in the field or strike at sea transport. The Helvetii, the Britons, Suebi, and the Gallic coalition led by Vercingetorix all used supply as a weapon against Caesar.[160] During P. Licinius Crassus's campaign against the Aquitanians (56 B.C.), the latter selected leaders who had served with Quintus Sertorius in Spain and who had "knowledge of military science" (*scientia rei militaris*). These Gallic chiefs knew how to cut off Crassus's supplies "in the Roman fashion" (*consuetudine populi Romani*).[161] At the siege of Andretium (9 A.D), the Dalmatians under Bato ambushed the Romans' provision trains (*sitopompia*), with the result that the besiegers, under the future emperor Tiberius, had serious supply problems and almost abandoned the siege.[162]

Attacking Operational and Tactical Bases

An ancient army might also strike at an enemy's operational or tactical base: the fact that an operational base stored a large proportion of an army's supplies made it a particularly tempting target. Once the army left the operational base, it had to leave a garrison there to provide security.[163] If the operational base was located in a city, the citizen body was responsible for housing and feeding both the garrison and the administrative personnel assigned there.[164] Such a garrison might be quite large: Pompey left fifteen cohorts under the command of Cato the Younger to guard his operational base at Dyrrachium.[165] Of course, a large garrison, though increasing security, was a considerable drain on an army's operational strength. When the consul Claudius Marcellus took the Samnite cities of Marmoreae and Meles (210 B.C.), which had been supplying Hannibal, he seized not only a large quantity of grain—some 350,000 *modii*—but also

[159] Tac. *Hist.* 4.35.
[160] Caes. *BGall.* 1.23.3; 4.29.32; 7.14.7–8.
[161] Caes. *BGall.* 3.23.
[162] Dio Cass. 56.12.4–5.
[163] Caes. *BGall.* 1.38; 7.10, 55; [Caes.] *BAfr.* 75.
[164] [Caes.] *BAfr.* 33.
[165] Plut. *Cato Min.* 55.1.

the 3,000 soldiers who had been guarding it. This garrison represented almost ten percent of the Carthaginian army's strength.[166] To guard against surprise attacks a good commander established posts forward of his base. Corbulo did so, garrisoning them with auxiliary cohorts during the Armenian War (58–9 A.D.).[167]

The loss of a operational base was a logistical disaster. When the Carthaginian general Hanno captured the Roman base at Herbesus in 262 B.C. it almost forced the Romans to raise the siege of Agrigentum.[168] A more devastating result occurred when the Carthaginians captured the Roman operational base at Cannae in 216 B.C. This loss led directly to the battle of that name, one of the greatest catastrophes of Roman military history.[169] Conversely, Scipio Africanus scored a tremendous strategic coup in 210 B.C. by capturing Hasdrubal's operational base in New Carthage, despite a garrison of 10,000 men under Mago. The Romans captured "vast stores" of all sorts and crippled the enemy's war effort.[170] A general might also strike at the enemy's operational base in order to force a battle—as Mithridates tried to do to the Romans in 67 B.C.[171]

Operational bases could also be endangered by revolt. In 153 B.C., during the Celtiberian uprising, the Romans' operational base at Ocilis, which was supporting the army in its attack on Numantia, went over to the Celtiberians. This forced the Roman commander Nobilior to go into winter quarters early causing his army to suffer a shortage of supplies.[172] The poor quality of base garrisons invited uprisings, particularly if the local population was sympathetic to Rome's enemy. In 190 B.C., during the war against Antiochus III (192–189 B.C.), the city of Phocaea, serving as a naval base, rose against the Romans. The revolt was initially successful, forcing the Roman fleet and garrison to withdraw. After the Roman naval victory at Myonessus, however, the city was reoccupied and again used as an operational base.[173]

[166] Livy 27.1.1–2; Plut. *Marc.* 24.3.
[167] Tac. *Ann.* 13.36.
[168] Polyb. 1.18.11.
[169] Polyb. 3.107.6–7; Seibert (1993) 188.
[170] App. *Hisp.* 4,19–23; other examples: Polyb. 21.15.7; Livy 25.31.14; 37.33.1–3; App. *Pun.* 3,18; *Syr.* 5.28–9; *BCiv.* 2.8,55; 5.12,118; Dio Cass. 43.33.2.
[171] Dio Cass. 36.12.2.
[172] App. *Hisp.* 9,47.
[173] Livy 37.9.2, 32.14.

The Strategy of Pillaging

At times the Roman plundered enemy territory for strategic purposes: in 209 B.C., the Senate went so far as to make pillaging along the African coast the *provincia* of the proconsul Marcus Valerius Laevinus.[174] Laevinus's attacks, which involved fifty to one hundred ships and lasted two weeks at a time, were very successful. He captured both people (who were enslaved) and booty.[175] This was not only a Republican practice. Marcus Aurelius's persistent ravaging of the lands of the Marcomanni (168–175) depleting their foods supplies and ultimately contributing to a negotiated settlement with his successor Commodus.[176] Those participating in these raids are called *praedatores*, which, although sometimes translated "foragers" actually means "pillagers."

The Romans' primary purpose of plundering was not to gather foodstuffs or even treasure, but rather to strike terror into an enemy, its allies or potential allies. For example, in 191 B.C., during the war against Antiochus III, Gaius Livius, prefect of the fleet, plundered Same and Zacynthus "because they preferred to join the Aetolian party."[177] Similarly, discussing the war against the Pannonians in 35–34 B.C., Appian says:

> . . . as long as Augustus hoped they would surrender voluntarily he spared their fields and villages. As none of them came in he devastated the country with fire and sword.[178]

Of course, plundering might provide supplies for the army indirectly: Caecilius Metellus so terrorized the Numidians in 109 B.C. with his laying waste of the countryside, that the population provided the army with grain to avoid the destruction.[179]

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[174] Livy 27.7.16.
[175] Livy 27.5.8–10; 28.4.5–7. Other examples: Livy 27.31.3; 31.45.12–13.
[176] Dio Cass. 73.2.1.
[177] Livy 36.42.5.
[178] App. *Ill.* 4,22; another example: Dio Cass. 62.20.1.
[179] Sall. *Iug.* 54.6.

Effects of Logistics on Tactics

The lack of supplies, whether provisions, fodder, firewood or water, could cripple an army in a relatively short period, rendering it incapable of fighting or even moving. Therefore, even on a tactical level, protecting one's own supply, and attacking that of the enemy, was an important element of ancient warfare. The Romans appreciated the skill of a commander who was able to win a bloodless victory on the tactical level by maneuver against an enemy's sources of supply.[180] Appian describes the use of hunger as a tactic by Marcius, one of Scipio Africanus's generals, during his operations in Spain during the Second Punic War:

> [Marcius] hemmed in 700 horse and 6000 foot of the same force [of Celtiberians and Spanish] of whom Hanno was in command, on a hill. When they were reduced to extremities by hunger they sent messenger to Marcius to obtain terms.[181]

In 180 B.C., during the Ligurian War, the consul Spurius Postumius blockaded the passes in the enemy-held mountains of Ballista and Letum, and, as Livy puts it, "cut the enemy off from supplies (*commeatus*) and subdued them because of their complete lack of everything."[182]

Another way to cut off an enemy's supply was to inhibit foraging and requisition, and try to prevent it from "living off the land."[183] An army could also strike at an enemy's supplies by destroying or spoiling crops in the field.[184] For example, when Fabius Maximus became dictator in 217 B.C., one of his first acts was, according to Livy, to give the order that:

> . . . all the inhabitants of that district where Hannibal was likely to be marching should abandon their farms, first burning the buildings and destroying the crops, that there might be no supplies for him of any kind.[185]

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[180] Polyb. 1.58.1ff.

[181] App. *Hisp.* 6,31.

[182] Livy 40.41.2. Other examples: Plut. *Sert.* 21.5; *Pomp.* 19.6; App. *Hisp.* 11,61; Dio Cass. 47.30.5; 69.13.3.

[183] Livy 91.18 (*frag. ex codice Vaticano*); Tac. *Ann.* 4.49; 6.41; App. *Hann.* 3,13; 6,40; *Hisp.* 13,76.

[184] Polyb. 18.20.3; Livy 34.26.8; Sall. *Jug.* 55.8; App. *Mith.* 13,90; 15,99; *BCiv.* 5.14,138; Dio Cass. 36.4.2.

[185] Livy 22.11.5.

Removing crops into cities denied them to the enemy, so in 215 B.C., the Senate ordered all Italians and Romans to bring their grain crops (*frumenta*) into fortified cities by the first of June. It authorized the consul to burn the farm of anyone not complying.[186] The Senate set the June date to allow for the harvest, and its order was intended both to supply the cities in case of siege, and to deny food to Hannibal's army. Caesar had cattle and crops gathered into strongholds during the campaign against the Suebi in 53 B.C., in order to deny them supplies.[187]

Ancient armies, highly dependent on animals, were very vulnerable to a lack of fodder. This had to be gathered daily, as enormous amounts were needed to sustain the army's myriad animals. If an enemy succeeded in cutting off fodder even for a short period, pack animals would soon start dying or losing their carrying capacity. In 71 B.C., Crassus built a ditch and wall across the peninsula of Rhegium specifically to prevent Spartacus's army from foraging, and at Dyrrachium (48 B.C.), both sides dug lines of circumvallation, in part trying to cut off each others' access to supplies of fodder.[188] Denying the animals themselves to the enemy could also hurt an enemy's logistics: just before leaving Italy for Africa in 203 B.C., Hannibal killed 4,000 horses and "a large number" of pack animals to prevent them from falling into Roman hands.[189]

Cutting off an enemy's water supply was the most effective logistical weapon on a tactical level. The lack of water affects both men and animals more quickly and more dramatically than a lack of either food or forage. A skillful general would try to force the enemy to encamp in a position without access to water supplies.[190] Another common tactic was to force the enemy away from water supplies by maneuver. A good example occurred during the Second Dalmatian War, in 34 B.C. Octavian seized the heights overlooking Promona, and threatened to cut off the barbarians's water supply; the threat alone was enough to cause the enemy to retreat into the city, which was taken by blockade.[191] In the Ilerda campaign of 49 B.C., cutting

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[186] Livy 23.32.15.
[187] Caes. *BGall.* 6.10.
[188] Caes. *BCiv.* 3.58; Plut. *Crass.* 10.4–5; App. *BCiv.* 2.9,60.
[189] App. *Hann.* 9,59.
[190] App. *Pun.* 7,40.
[191] App. *Ill.* 5,26–8.

off the enemy's water supplies played a key role in Caesar's victory.[192]
When possible, a general would deploy cavalry or other forces to
interfere with soldiers gathering water outside the camp.[193] A com-
mander might also try to cut the enemy's water supplies by build-
ing intervening fortifications, as Poppaeus Sabinus did during the
Thracian campaign of 26 A.D.[194]

   Destroying water sources was also an effective tactic, particularly
for a force on the defensive. Tacitus describes Corbulo's preparations
for the defense of Syria against the Parthians in 62 A.D.:

> Further, as the region is deficient in water, forts (*castella*) were thrown
> up to command the springs, a few brooks he buried under piles of
> sand.[195]

When Curio invaded Africa in 48 B.C., intending to defeat the
Pompeian forces there, the local inhabitants poisoned the wells.[196]
Pliny notes that the Romans had difficulty moving armies into the
Sahara in Imperial times because the local Garamantes filled the
wells with sand.[197]

   Faced with a lack of water supplies, whether due to enemy activ-
ity or nature, a skilled commander searched out alternate supplies.
Aemilius Paullus, for example, campaigning against Perseus in an
area near Mount Olympus that lacked good drinking water, noticed
greenery and dug successfully for underground springs.[198] Of course,
the availability of water was a particularly important factor in desert
warfare.[199] On a remarkable number of occasions Roman armies
fighting in desert regions carried their entire water supply with them
on pack-animals.[200] In some cases, the Romans even transported
water by ship to isolated forces.[201] Moving water is one of the most
difficult logistical problems even today; the Romans' ability to do so
is a tribute to the sophistication of the supply system.

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[192] Caes. *BCiv*. 1.73ff.; esp. 1.78; App. *BCiv*. 2.6,43. Other examples: [Caes.]
BAlex. 61; *BAfr*. 69.
   [193] Polyb. 3.111.3–4; [Caes.] *BAfr*. 24; [Caes.] *BHisp*. 21.
   [194] Tac. *Ann*. 4.49.
   [195] Tac. *Ann*. 15.3; cf. Polyb. 5.62.4.
   [196] App. *BCiv*. 2.7,44; cf. Zonaras 9.1.
   [197] Plin. *HN* 5.38. Other examples: [Caes.] *BAfr*. 51; *BAlex*. 9.; Plut. *Pomp*. 32.2.
   [198] Livy 44.33.1–3; Plut. *Aem. Paul*. 14.1.
   [199] Isaac (1992) 176, 236–7.
   [200] Sall. *Iug*. 75.2–3; 91.1–3; Strabo 16.4.24; Jos. *BJ* 1.395; Plut. *Pomp*. 35.2; *Cato
Min*. 56.3, App. *BCiv*. 4.13,103; Dio Cass. 37.3.6; 60.9.2–4.
   [201] Caes. *BCiv*. 3.15, 100.

A good commander took action to avoid such danger to his own supplies. In 134 B.C., Scipio Aemilianus returned from a foraging expedition by a long, circuitous and waterless route in order to avoid coming too near the city of Numantia and risk a raid against his supply-laden troops.[202]

Logistics and Battle

Logistical considerations frequently influenced when and where the Romans battle fought their battles.[203] The pivotal Cannae campaign of 216 B.C., for example, was profoundly affected by logistics. Appian says Hannibal needed to give battle due to a lack of supplies.[204] Polybius confirms this, saying that Lucius Aemilius Paullus, unsatisfied with the prospective battle ground, tried to wait out Hannibal, hoping lack of fodder would force him to move camps. Hannibal forestalled this tactic by interfering with Paullus's watering parties with his Numidian cavalry, which forced Paullus into fighting on ground of Hannibal's choosing.[205] In 145 B.C., Fabius Maximus Aemilianus wanted to avoid fighting Viriathus until his army was sufficiently trained and ordered it to remain in camp at Orso. While Fabius was in Gades (Cadíz), Viriathus attacked and killed a number of Roman woodcutters—the Roman legate at Orso sent out a rescue force, which Viriathus promptly defeated.[206] Caesar suggests, as a general rule, that once communication with rear areas was broken, either one had to suspend operations or the army had to fight a premature battle.[207] Indeed, during the Dyrrachium campaign (48 B.C.), Pompey's great advantage in the matter of supply forced Caesar into a precipitate offensive.[208]

Naturally, an army in a stronger logistical position should try to put off fighting—an enemy with insufficient supplies can only grow weaker. When Gnaeus Fulvius was on trial for losing a battle, Livy has him defend himself by saying that he had neither been forced to fight in an unfavorable place (*loca iniqua*) due to lack of supplies

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[202] App. *Hisp.* 14,87–8.
[203] Polyb. 5.51.11.
[204] App. *Hann.* 3,17.
[205] Polyb. 3.111.3–5.
[206] App. *Hisp.* 11,65.
[207] Caes. *BGall.* 3.3; 3.23.
[208] Plut. *Pomp.* 65.4; Vell. Pat. 2.51.2.

(*inopia commeatus*) nor had he been ambushed through a failure to reconnoiter, all the general's responsibility: rather his men had simply been defeated in a stand-up fight.[209] Utilizing a strategy of delay involved self-discipline on the part of the commander, and control over the soldiers. During the Philippi campaign (42 B.C.), the Republicans, under Brutus and Cassius controlled the sea lanes and enjoyed a clear logistical advantage over the army of Antony and Octavian. Although time was clearly on their side, and the Caesarian forces were already suffering from supply shortages, both Appian and Dio Cassius say that unruly Republican legionaries forced their commanders into a premature, and disastrous, battle.[210]

The renegade Roman general Quintus Sertorius was a master at using supply as a tactical weapon. Frontinus describes a stratagem Sertorius used to lure the government forces under Pompey into battle in 73 or 72 B.C.:

> When Pompey was near the town of Lauron in Spain, there were only two tracts from which forage (*pabulum*) could be gathered, one near by, the other farther off. Sertorius gave orders that the one nearby should be continually raided by light-armed troops, but that the remoter one should not be visited by any troops. Thus, he finally convinced his adversaries that the more distant tract was safer.[211]

The trap set, Sertorius sent 12,000 men to ambush the returning foragers. Pompey sent a legion to rescue the foraging party, which was promptly destroyed by the Sertorians.

Often a fight over supply led to an unplanned battle. The Battle of Pydna (168 B.C.), which decided the Third Macedonian War, began when a handful of Thracians seized some pack-animals from a Roman foraging party. An auxiliary unit of Ligurians issued out to protect them, the Thracians responded, both sides sent in reinforcements, and a general engagement ensued.[212] The battle of the Muthul river (109 B.C.), for example, broke out due to fighting over a water source, as did the battle of Aquae Sextae in 102 B.C.[213] Dio

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[209] Livy 26.2.4.

[210] App. *BCiv.* 4.14,108, 16,124–5; Dio Cass. 47.37.6. Plut. *Brut.* 47.2, 48.3 gives a different explanation for Brutus's delay.

[211] Front. *Strat.* 2.5.31; cf. Plut. *Sert.* 18; App. *BCiv.* 1.14,109.

[212] Livy 44.40.7–9; Plut. *Aem. Paul.* 18.1. Other examples: Livy 31.6.9–37.1; 39.30.2; Dio Cass. 64.11.4 (but cf. Tac. *Hist.* 3.22 where impatient legionaries start the battle without orders. The two versions are not necessarily incompatible); 79.26.5–6.

[213] Sall. *Jug.* 50.1; Plut. *Mar.* 19.1; Front. *Strat.* 2.7.12; see also Livy 35.28.10.

Cassius reports an incident during the siege of Mutina (43 B.C.), in which two foraging parties came to blows, and each side sent reinforcements. A sharp battle ensued, in which Antony was victorious.[214]

An accidental battle of this sort might find a significant part of an army deployed as foragers, and unavailable to fight until retrieved: this was an important element in Philip V's defeat by Flamininus at Cynoscephelae (197 B.C.).[215] At Pydna, Aemilius Paullus postponed fighting the Macedonians for a day to allow his foragers to return from the field.[216] Such accidental meetings could have other consequences. When a Carthaginian force in Spain stumbled on a Roman supply convoy, sent by Gnaeus Cornelius Scipio to his brother Publius, a fight naturally broke out. When Gnaeus personally led a rescue force made up of light-armed troops, he was killed.[217] If both sides wanted to avoid an accidental battle, they would send their foraging parties to the rear of their respective camps, "neither interfering with the other."[218]

Even when ancient battles were intended by both sides, they often began with skirmishing between watering and foraging parties.[219] The proximity of foragers could also tip the balance of a fight. When the Istrians took the Roman operational base at Lake Timavus in 178 B.C., a foraging party from the III legion happened to be nearby. The tribunes ordered the pack animals unloaded and two legionaries to ride on each. This *ad hoc* mounted infantry rode to the rescue and recaptured the base from the enemy.[220] Logistical considerations did not only lead to land battles. The sea battle of Myonessus (190 B.C.) began with the Seleucid admiral Polyxenidas planning a land and sea ambush of the Romans as they left the harbor of Teos loaded down with supplies. The ambush failed, and the subsequent battle was a decisive victory for the Romans.[221]

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[214] Dio Cass. 46.37.3; cf. Diod. Sic. 37.24.
[215] Polyb. 18.22.1; Livy 33.7.9.
[216] Livy 44.40.2.
[217] App. *Hisp.* 3,16.
[218] Livy 40.30.9.
[219] Polyb. 5.80.7.
[220] Livy 41.3.3–6.
[221] Livy 37.28.9, 29.1ff.

Logistics and Combat Capability

As noted in Chapter One, the ancients were well aware of the fact that armies fight better on a full stomach.[222] In Livy notes this explicitly, in his description of the Battle of Canusium in 209 B.C. He has Claudius Marcellus instruct his soldiers:

> to strengthen themselves by eating, so that if the battle should be prolonged, they might have sufficient endurance.[223]

Indeed, both Livy and Polybius attribute the disastrous Roman defeat at Trebia (218 B.C.) at least in part to the fact that the Carthaginians had eaten and the Romans had not.[224] Interestingly enough, Livy blames Sempronius for moving his troops out in haste, without giving them breakfast, whereas Polybius gives Hannibal the credit for forcing the Romans into the situation. At the battle of Baecula (208 B.C.), Scipio Africanus advanced suddenly on the army of Hasdrubal Barca, forcing the Carthaginians to arm themselves and form ranks without eating.[225] Tacitus criticizes the Vitellians for fighting the battle of Cremona (69 A.D.) without eating:

> The wise policy . . . was to revive their strength by food (*cibus*) and sleep . . . and then put to flight . . . their opponents who would be exhausted by cold and lack of food.[226]

Of course, there were circumstances in which tactical advantage was more important than convenience of supply. A commander might deprive his men of food or water temporarily, even to the point of malnourishment or dehydration, in order to gain a tactical advantage. During the Roman siege of Carthage (149–146 B.C.), the Roman admiral Mancinus saw a neglected part of the wall and landed some 3500 men immediately, without preparing supplies for them. They held this position for a considerable period without provisions.[227] Marius chose the site of the battle of Aquae Sextae (102 B.C.) for tactical reasons despite, or indeed because, of its poor access to water. As Plutarch describes it:

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[222] See Chapter One, pp. 53–4.
[223] Livy 27.13.13.
[224] Livy 21.54.8, 55.1; Polyb. 3.71.10–11.
[225] Polyb. 11.22.4; Front. *Strat.* 2.1.1; App. *Hisp.* 5,27; cf. Plut. *Sulla* 20.3.
[226] Tac. *Hist.* 3.15.
[227] App. *Pun.* 17,113.

> . . . he occupied for his camp a position that was strong, but poorly supplied with water, wishing, as they say, by this circumstance to incite his soldiers to fight. At any rate, when many of them were dissatisfied and said they would be thirsty there, he pointed to a river that ran near the barbarian fortifications, and told them they could get water there, but the price of it was blood.[228]

Plutarch's reasoning may only reflect Marian rationalization for the poor choice of camps, but it reflects the truth that an army sometimes had to fight for its supplies. Caesar's operations around Ilerda in Spain (49 B.C.) and during the siege of Dyrrachium (48 B.C.) are notable examples of military operations carried out under conditions of malnourishment.[229] Caesar was well aware of the ill-effects of short rations on his men: "the lack of grain diminished the soldiers' strength" he wrote in his commentary on the former campaign.[230] Caesar, however, also knew there were times when a general must continue to drive his men under such conditions.

The Romans normally enjoyed a sufficient and varied diet, even in the military; it took a disciplined and dedicated army to operate under conditions of malnourishment. Tacitus notes this in describing the difficult advance of Corbulo's army towards Tigranocerta during the Armenian War (58 A.D.):

> [The Roman] army, though they had sustained no casualties in battle, were yet beginning to feel the strain of short rations (*inopia*) and hardship—they had been reduced to keeping starvation at bay by a flesh-diet. Added to this was a shortage of water, a blazing of summer and long marches; the one mitigating circumstance being the patience of the general, who bore the same privations of the common soldier and even more.[231]

The general suffering along with his soldiers is certainly a *topos* of military literature, and this particular example probably comes from Corbulo's own memoir, but the attitude of the commander was another important factor in maintaining discipline.

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[228] Plut. *Mar.* 18.3.
[229] Caes. *BCiv.* 1.48–55, 62–87; 3.47–48.
[230] Caes. *BCiv.* 1.52; cf. App. *BCiv.* 2.8,55; 4.14,107.
[231] Tac. *Ann.* 14.24.

Logistics and Siege Warfare

Logistics played an especially important part in siege warfare: a siege, by its very nature, involved blockading a city to prevent the introduction of supplies. As Polybius notes that the Romans, faced with the siege of Syracuse (213–211 B.C.) decided:

> that owing to the large population of the town, the best way to reduce it was through famine, they . . . cut off supplies from the sea by their fleet and those from the land by their army.[232]

Unless the attackers were able to breach the wall or overcome it with a ramp, victory usually belonged to the side better able to marshal its supplies. The ancients appreciated the importance of properly stocking a city before a siege. The defenders had to store everything needed: Vegetius advocates transferring all local crops inside a city if a siege is impending.[233] Plutarch notes that Cato the Younger, in charge of the Pompeian base at Utica, collected "grain and requisite provisions for very many years." Accordingly, he was prepared to undergo a siege after the defeat of Scipio at Thapsus.[234] Similarly, when Decimus Brutus Albinus was preparing Mutina for a siege in 44 B.C., he "slaughtered and salted all the cattle he could find there in anticipation of a long siege."[235] Nevertheless, Brutus's army almost starved and was saved from surrender only when the Republican army under the consuls Hirtius and Pansa, along with Octavian, defeated Antony at the Battle of Forum Gallorum (43 B.C.)[236]

Generals did not always plan properly: Appian attributes the fall of Perusia in 40 B.C. to the fact that Lucius Antonius had not made sufficient preparations beforehand, though Dio Cassius, apparently relying on a different source, says the city was adequately stocked with provisions.[237] Of course, defenders did not always have sufficient warning of a siege to prepare properly. In 169 B.C., the Roman garrison of Uscana decided to surrender because "there was no supply even of grain or of anything else in the city, as was natural when the siege was unexpected."[238]

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[232] Polyb. 8.7.10–11.
[233] Veg. *Epit.* 4.7.
[234] Plut. *Cato Min.* 62.4.
[235] App. *BCiv.* 3.8,49.
[236] App. *BCiv.* 3.9,67–70.
[237] App. *BCiv.* 5.5,45; Dio Cass. 48.14.2.
[238] Livy 43.18.9.

Fortified camps also came under siege: since they did not have a city's supplies to draw on, storing sufficient provisions was particularly important. During the revolt of Julius Civilis (69 A.D.), the Batavians besieged two legions in a camp at Vetera. Tacitus criticizes the legates at Vetera, Munius Lupercus and Numisius Rufus, saying they:

> did not take sufficient care to have supplies (*copia*) collected; they allowed the troops to pillage so that in a few days the soldiers' recklessness exhausted what would have met their needs for a long time.[239]

Starvation finally forced the Romans to negotiate a surrender. Tacitus says they had "consumed their pack animals, their horses . . . [and] even tore up shrubs and roots and grasses."[240]

Water shortage was a real threat in sieges and no fortified place could hold out long without a sufficient supply.[241] Fortresses were usually located where natural water sources were available, but if no water sources existed, then cisterns and other hydraulic works would be built: Herod's fortress at Masada is a good example.[242] Defenders stored water in forts and encampments in anticipation of a siege,[243] indeed Vegetius wrote an entire chapter on the storage of water during sieges.[244]

Remarkably, cities sometimes had their water sources outside the walls. Although sometimes underground passages led to these sources, they were vulnerable to destruction by besiegers.[245] When the consul Gaius Claudius Pulcher was besieging the Istrian town of Nessatium, for example, he dug a channel to divert a river which flowed past the walls and served as the town's water supply.[246]

Water shortage could also be a danger to the forces attacking a city. Titus's forces besieging Jerusalem in 70 A.D. found it difficult to obtain water, which had to be carried from a distance.[247] During the siege of Aquilea (238), the defenders threw their dead into the Isonzo river that flowed under the city's wall and thus polluted the besiegers' only source of water.[248] Ancient armies rarely fought inside

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[239] Tac. *Hist.* 4.22; cf. *Ann.* 15.10–16.
[240] Tac. *Hist.* 4.60.
[241] Tac. *Ann.* 4.49.
[242] Jos. *BJ* 7.176; Netzer (1991) 644–6.
[243] Caes. *BCiv.* 3.12.
[244] Veg. *Epit.* 4.10.
[245] Polyb. 5.71.9.
[246] Livy 41.11.1–4.
[247] Dio Cass. 65.4.5.
[248] Hdn. 8.5.7.

of cities. When they did, however, they had to rely on the same water-system as the civilian population, which itself became a tactical tool. For example, during the Battle of Alexandria in 48 B.C., the Egyptians cut the city's water pipes to deny water to Caesar's army.[249]

Besiegers required enormous quantities of wood both to supply firewood needs and for siege-works. In 190 B.C., the Epirotes told the Romans that the city of Ambracia was easy to besiege, because the country had abundant material for the construction of siege ramps and other siege works.[250] The defenders might fell timber and bring the wood into a city about to undergo siege, to prevent its use by the enemy.[251] The taking of timber before and during a siege often caused significant deforestation. At the siege of Jerusalem (70 A.D.), Vespasian issued orders to all of his legions to collect timber in order to build earthworks, Josephus reports that the four-month siege consumed all the timber within 90 *stadia* (15 kilometers) of the Holy City.[252]

Siege works were intended to prevent sorties and the escape of the besieged, but they also served to prevent supplies from reaching the city. As Polybius explains, discussing the siege of Agrigentum (262 B.C.):

> [The Romans] fortified the ground between the camps on each side of the city . . . to prevent to secret introduction of supplies . . . which is usual in the case of beleaguered cities.[253]

Thus, in addition to the normal circumvallation raised during the siege of Numantia in 134–3 B.C., Scipio Aemilianus built an elaborate construction in order to prevent the Numantines from introducing supplies through the river Douro.[254] Circumvallations remained a feature of Roman sieges throughout the Imperial period. The stone walls the Romans built to surround the fortress of Masada can still be seen, but practically every siege involved the building of these siege walls.[255]

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[249] [Caes.] *BAlex.* 5–6; Dio Cass. 42.38.3–4; cf. Hdn. 7.12.3–4.
[250] Polyb. 21.26; Livy 38.3.9.
[251] Livy 24.1.2.
[252] Jos. *BJ* 5.263–4, 523; 6.5; cf. Caes. *BGall.* 5.39; Luc. *BCiv.* 3.426; Dio Cass. 65.4.2.
[253] Polyb. 1.18.3.
[254] App. *Hisp.* 15,91.
[255] Peddie (1994) 126; Le Bohec (1994) 136–7.

The extremities to which hunger drove besieged forces trying to hold out was a *topos* of ancient military writing. For example, Appian describes the plight of the Numantines, driven to starvation by Scipio Aemilianus's tight siege:

> . . . all their eatables being consumed, having neither grain, or flocks nor grass, they began, as people are sometimes forced to do in war, to lick boiled hides. When these also failed, they boiled and ate the bodies of human beings, first of those who had died a natural death, chopping them in small bits for cooking. Afterwards, being nauseated by the flesh of the sick, the stronger laid violent hands upon the weaker . . .[256]

Of course, forces under siege did not always hold out to the end. Tacitus criticizes L. Caesennius Paetus for negotiating a surrender of his legions besieged in their camp by the Parthians despite the fact that "the beleaguered forces were so well supplied with grain that they set fire to their granaries."[257]

Introducing supplies into a town surrounded by a besieging enemy was a challenge: some of the most famous stratagems of ancient warfare involved attempts to do so. At Hannibal's siege of Casilinum (216 B.C.), the Romans dropped jars of wheat and scattered edible nuts into the river Volturnus, which floated downstream to the besieged.[258] Likewise, when Metellus besieged the town of Langobritae in Spain in 79 B.C., and succeeded in cutting off its water supplies, Sertorius snuck in men with 2,000 water-skins, allowing the city to hold out until relief arrived.[259] When Marc Antony blockaded Mutina in 43 B.C., Aulus Hirtius placed jars of salt and sheep carcasses into the Scultenna River, which helped sustain the city.[260] Such attempts, of course, were not always successful.[261]

The besiegers also had to be careful of their supplies. Part of the reason for moving supplies within the city was to deny them to the enemy. During the rebellion against Maximinus Thrax (238), the defenders of Aquiliea were so successful in moving provisions into the city that the besiegers ran out of food before the city did.[262]

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[256] App. *Hisp.* 15,96.
[257] Tac. *Ann.* 15.16.
[258] Front. *Strat.* 3.14.1; Livy 23.19.
[259] Plut. *Sert.* 13.5–6.
[260] Front. *Strat.* 3.14.3–4.
[261] Polyb. 5.73.7.
[262] Hdn. 8.2.6–5.6.

Keeping the army in one place for a long period was a logistical challenge, particularly under ancient conditions. When Hanno seized the Roman supply depot at Herbesus during the siege of Agrigentum in 262 B.C., the Romans became "both the besieged and besieger," as Polybius put it.[263] They were only able to continue the siege due to the great exertions of their ally Hiero of Syracuse in supplying them.[264] Quinctius Flamininus had to abandon the siege of Atrax (198 B.C.) because winter was coming on and no suitable port on the entire Acarnanian and Aetolian coast was available to bring in supplies. Flamininus had to retreat and winter his force in Anticyra in Phocis, facing the Gulf of Corinth.[265] Three years later, Flamininus raised the siege of Sparta (195 B.C.), also because of logistical considerations. Livy quotes Flamininus as saying "[a] siege . . . often exhausts the patience of the besiegers sooner than that of besieged" and given Flamininus's experiences, this quotation may well be authentic.[266]

Sertorius was particularly noted for his skill in cutting off the supplies of those besieging a town.[267] If besiegers were forced to forage, they would have to fan out over a wider and wider area—making them vulnerable to attack. After surrounding Alesia with a circumvallation in 52 B.C., Caesar notes that:

> . . . in order that he might not be constrained to dangerous excursions from camp, he ordered all his men to have thirty days grain and fodder collected.[268]

Such stockpiled supplies were themselves vulnerable to attack. Lucius Antonius sent a cavalry force of 4,000 to pillage Octavian's supplies, although the attempt failed.[269]

A besieger's supplies often failed during a siege due to insufficient planning or the difficulty of overland supply, and good commanders made sure to organize their supplies well for sieges. Dio Cassius

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[263] Polyb. 1.18.10.
[264] Polyb. 1.19.1.
[265] Livy 32.18.1–4.
[266] Livy 34.34.2–6. It should be noted that this idea of besiegers becoming besieged was a literary commonplace. Polyb. 9.4.5 says the Romans "besieged the besiegers" at Capua (212–211 B.C.) and Dio Cass. 49.27.1 says that at Praaspa (36 B.C.) "although [Antony] was supposed to be the besieger, he was enduring the hardships of the besieged."
[267] Plut. *Sert.* 13.2.
[268] Caes. *BGall.* 7.74.
[269] App. *BCiv.* 5.4,32.

notes the careful preparations made by Septimius Severus for his siege of the desert city of Hatra (198)[270] Appian notes that during the siege of Pallantia (136 B.C.), the Romans had supply problems:

> The siege . . . being long protracted, the food supply of the Romans failed, and they began to suffer from hunger. All their animals perished and many of the men died of want.[271]

Pallentia lay far inland, 100 miles from the Ebro, the Romans' main water link to the Mediterranean. In addition, since the Roman Senate took a dim view of Aemilius Lepidus's operations, which he undertook without proper authorization, it presumably did not offer sufficient logistical support. Under the circumstances, the breakdown in Roman supply is not surprising. Lepidus abandoned the siege and the Roman army was lucky to escape.

Interestingly enough, the most renowned Roman siege, that of Masada (73 A.D.), did not involve starving out the defenders. Despite popular (and most scholarly) opinion, the siege was almost certainly a short one, lasting only a few weeks, and the fortress taken by building a siege ramp and smashing down the wall with a ram. The defenders' mass suicide made a final assault unnecessary. In any case, the Romans' ability to supply the besieging army of 15,000 for even a few weeks in such a desolate place, though, is a credit to their logistical system.[272]

Logistics and the City of Rome

The city of Rome itself was dependent on imported grain supplies: by Imperial times the annual provision of grain for the capital rose to an estimated 300,000 metric tons.[273] Already by the Second Punic War, protecting Rome's food supply had become important strategically. The defeat of the Carthaginian navy by the Roman fleet under the proconsul Marcus Valerius Laevinus in 207 B.C. secured Roman control of the seas. Livy notes that this resulted in "great

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[270] Dio Cass. 76.11.1–2; Hdn. 3.9.4ff.
[271] App. *Hisp.* 13,82.
[272] Jos. *BJ* 7.275–401; for the argument that the siege was a short one, see Roth (1995) 87–110.
[273] Rickman (1980) 120–134; Sippel (1987a) 42–3; Garnsey & Saller (1987) 84–5; Herz (1988) *passim.*

supplies of grain" being brought to Rome.[274] After the defeat of Car-
thage in 202 B.C., Rome's food supplies were never again seriously
threatened by foreign navies during the period under discussion.
Cutting off the capital's supplies, or threatening to, however, was an
important strategy during Rome's many civil wars, both under the
Republic and the Empire. The first attested instance was the capture
of Rome in 87 B.C. by Gaius Marius and Cinna. Plutarch says that
Marius, "by cutting off the grain-ships with his fleet and plundering
the merchants . . . made himself master of the city's supplies".[275]
Appian graphically describes the same incident:

> [They] threw bridges across the [Tiber] river in order to cut off the
> city's food supply. Marius captured and plundered Ostia . . . After
> Marius had stopped passage of food supplies from the sea, or by way
> of the river from above, he hastened to attack the neighboring towns
> where grain was stored by the Romans. He fell upon their garrisons
> unexpectedly and captured Antium, Aricia, Lanuvium and others. . . .
> Having in this manner obtained command of their supplies by land,
> he advanced boldly against Rome, by the Appian Way, before any
> other supplies were brought to them by another route.[276]

During the Civil Wars of 69 A.D., the prefect of Egypt, Tiberius
Julius Alexander went over to the Flavian cause. Vespasian stopped
the shipment of Egyptian grain and taxes to Rome in an attempt,
as Tacitus puts it, "to force the army of Vitellius to surrender through
lack of pay (*stipendium*) and provisions (*frumentum*)."[277] Vespasian also
planned to invade Africa to cut off another source of Italy's grain,
but the Flavian victory at Cremona (69 A.D.) made this unnecessary.[278]
If anything Rome's reliance on imported grain increased over the
course of the Empire making it particularly vulnerable to blockade
during civil war. According to the *Historia Augusta*, Septimius Severus
feared Pescennius Niger would invade Egypt in 193, specifically in
order to cut off Rome's grain supply.[279]

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[274] Livy 28.4.5–7.
[275] Plut. *Mar.* 42.1.
[276] App. *BCiv.* 1.8,69.
[277] Tac. *Hist.* 3.8; cf. Jos. *BJ* 4.605.
[278] Tac. *Hist.* 3.48.
[279] *HA Sev.* 8.8.

Logistics and Intelligence

Military intelligence was as important an element in ancient warfare as in modern.[280] In his excursus on "The Art of the Commander" Polybius states that the most important requisite for a general is "to have a notion of time and season and to be able to hit on the right ones. . . ."[281] He is referring, at least in part, to the importance of timing and season in providing the army with supplies. A good commander had to be aware of how much fodder and local crops he might expect, and when. When L. Aemilius Paullus was assigned the province of Macedonia in 168 B.C., he asked to Senate to send legates there to inspect, among other things:

> how large a supply of provisions (*commeatus*) had been prepared and whence they could be brought, by a land route or by ships respectively . . . From good information on these points sure decisions might be made for the future.[282]

Caesar also used intelligence reports to time his military operations.[283] An army which counted on foraging to support itself had to have some idea of what provisions were available to it, but obtaining reliable information on the availability of supplies was not an easy task for the Romans. For a large army in an area of marginal production, a bad harvest meant that there was little or no surplus for military use. In antiquity there was little in the way of statistical data, at least in the modern sense, on the availability of local resources.[284]

The Romans would have had some information on the area of operations from geographic texts, and in some cases from tax documents. Polybius makes note of the fertility of the Po valley and gives the very low price of wheat and barley to illustrate it. But even description, relatively detailed by the standards of ancient writing, gives almost no intelligence of logistical value.[285] Such information, moreover, could be rendered useless by the variable circumstances influencing the availability of provisions.[286] During the Armenian campaign

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[280] Breeze (1986/87) 14; Ezov (1996) 64–94.
[281] Polyb. 9.13.7.
[282] Livy 44.18.2–4.
[283] Ezov (1996) 69.
[284] Isaac (1993) 407–8.
[285] Polyb. 2.15.1ff.
[286] Perjés (1970) 41.

of 69 B.C., Lucullus was unable to forage although it was the height
of summer. As Plutarch notes:

> . . . after crossing the Taurus, [Lucullus] was discouraged to find the
> plains still covered with unripe grain, so much later are the seasons
> there, owing to the coolness of the atmosphere.[287]

It is striking that Lucullus apparently had no knowledge of the
different date of harvest in the region in which he was operating.
The inability to foresee accurately the sufficiency of local resources
available for campaigns was one factor which made supply lines an
attractive alternative to, or at least an addition to, foraging.[288]

Lack of knowledge about the availability of water also could lead
to a serious disaster—or as in the case of Cornificius's army in Sicily,
near disaster. One of Octavian's generals, Cornificius was leading
an army against Sextus Pompeius in 36 B.C. Due to lack of supplies
he was forced to retreat across central Sicily. Appian describes this
march, and the impact of Cornificius's lack of intelligence, quite
graphically:

> On the fourth day, with difficulty, they arrived at [a] waterless region . . .
> being ignorant of the roads and fearing ambushes, Cornificius and his
> men did not dare to march through it by night, especially as there
> was no moon, nor could they endure it by day . . . as it was now the
> hottest part of the summer, and since delay was impossible on account
> of the tormenting thirst, they no longer resisted their assailants.[289]

The force was saved from annihilation only by the timely arrival of
three Octavian legions under Laronius.

Tactical intelligence also played an important role in maintaining
the Roman army's logistical capabilities. Polybius's "Art of the Com-
mander" recommends that a general make a personal reconnaissance
into the area of operation, but the historian admits this was not
always possible.[290] Ancient generals usually made use of scouts in
order to ascertain the local availability of forage and other provisions.[291]
When they did not, the results could be catastrophic. In 201 B.C.
Gaius Ampius, a prefect of allies was ordered to take a force of 24
cohorts on a raid against the Boii. Though initially successful, Ampius

set out foraging parties without any reconnaissance (*exploratio*). This mistake was partly responsible for a disastrous Gallic surprise attack in which 7,000 allied troops, including Ampius, perished.[292] Without modern communication devices, the ancient "fog of war" could be quite thick. In 198 B.C., when Quinctius Flamininus had arrived in Thessaly, having marched overland from the Adriatic coast, he was unsure if the Roman supply fleet had headed for Leucas or the Ambracian Gulf. Flamininus had to send a scouting party (*exploratio*) to discover his own cargo ships at Ambracia; this allowed him to set up a supply line.[293]

In addition to gathering supplies, foragers had an intelligence function. Since they spread out over the countryside, foraging parties often functioned as scouts.[294] For example, it was *pabulatores* who captured messengers sent from Hasdrubal to his brother Hannibal in 207 B.C.[295] When the Ligurian Ingauni negotiated a cease-fire with Aemilius Paullus in 181 B.C., they requested that he refrain from sending foragers into their territory, ostensibly as an act of good faith, but actually to prevent the Romans from discovering the secret assault they were planning.[296] According to Sallust, it was a foraging auxiliary soldier who discovered a secret route inside the Numidian fortress at the Moluccha river, which allowed Marius to take it in 107 B.C.[297] Spies also took advantage of the fact that foragers often spread out widely in the countryside and were thus relatively easy to infiltrate. During the campaigns of Tiberius Sempronius Gracchus in Spain, in 179 B.C., a cavalry prefect named Cominius mingled with Spanish foragers to slip into the besieged town of Caravis.[298]

A Roman commander also had to gather intelligence about the enemy's supplies. Plutarch relates the following story about Lucullus in the context of his campaign against Mithridates in 74 B.C.:

> [Lucullus] ordered that one of the captives to be brought to him, and asked him first, how many men shared his mess, and then, how much food he had left in his tent. When the man answered these questions, he ordered him to be removed, and questioned a second and a third

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[292] Livy 31.2.5–9.
[293] Livy 32.15.5–7.
[294] See Zlattner (1997).
[295] Livy 27.43.2.
[296] Livy 40.25.4–5.
[297] Sall. *Iug.* 93.2.
[298] App. *Hisp.* 7,43.

in like manner. Then comparing the amount of food provided with
the number of men to be fed, he concluded that within three or four
days, the enemy's provisions would fail them.[299]

Foragers were relatively easy to capture and use as sources of tactical
intelligence. Just before the battle of the Metaurus River (207 B.C.),
Hasdrubal, suspecting the Romans had been joined by troops from
the south, ordered some *aquatores* to be captured, to see if some of
them were sun-burned after such a forced march.[300] Frontinus men-
tions that in the Spanish campaign of 49 B.C. Caesar learned of
the Pompeians's plan to break camp from a captured *aquator*.[301]

Intelligence might indicate weaknesses in the enemy's logistics,
which could be exploited. During the Second Macedonian War, for
example, an exiled Greek from Chalcis informed the Romans that
the Macedonian garrison was careless in guarding the city. A naval
raid took the city, and both the royal granaries (*horrea regia*) and the
arsenal (*armamentarum*) were burned, and a large amount of Macedonian
supplies of all kinds destroyed.[302] Intelligence about logistics could
also be very effective on the tactical level. During the siege of 87–
86 B.C., pro-Roman Athenians shot lead balls with messages to Sulla
about the arrival of supply convoys to the city. This allowed the
Romans to ambush and capture several such trains which consider-
ably shortened the siege.[303]

Since supply is such an important element in warfare, logistical
preparation provided an ideal opportunity to spread disinformation.
In 195 B.C., in order to convince an embassy from the Ilergetes
that he was sending them military assistance (which he had no inten-
tion of doing) Cato the Elder ordered the preparation of rations,
which were loaded onto ships in the presence of the Spanish ambas-
sadors.[304] In 168 B.C., Aemilius Paullus discussed in council a raid
to pillage the Macedonian coast and he ordered 10 days rations for
1,000 men prepared and shipped to the jumping-off point. This was
clearly intended to throw off Macedonian intelligence, for the actual
raid sent 5,000 men on a two-day mission to seize the strategic passes

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[299] Plut. *Luc*. 8.8.
[300] Livy 27.47.2–3.
[301] Front. *Strat*. 1.8.9.
[302] Livy 31.23.3–7.
[303] App. *Mith*. 5,34–5.
[304] Livy 34.12.6. The men and supplies were unloaded after the Spanish departed.

into Perrhaebia.[305] We have several other examples of logistical dis-information being used.[306]

Conclusion

The Romans enjoyed enormous military successes from the third century B.C. to the third century A.D. There were many factors involved in this accomplishment, but not the least of which was their ability to supply their armies at both at long distance and on the long term. Roman military leaders recognized not only the importance of supply in supporting their armies, but its use as a weapon, both strategically and tactically.

Concern for logistics began at the very beginning of a campaign. When possible, the Romans carefully laid the groundwork for campaigns, and paid particularly close attention to logistical needs. Of course, some wars broke out unexpectedly and arrangements had to be made hastily. The flexibility and sophistication of the Roman supply system, made such *ad hoc* preparations possible and often successful.

Fundamental to military success was protecting ones' own supplies. This was equally important whether provisions were moving over supply lines or being obtained locally through requisition and forage. Since sea-borne transport was so important to Roman warfare, both in the period of conquest and in defending their Empire, its security was vital. The Roman fleet only occasionally fought naval battles, but its role in defending supply lines was constantly important from the First Punic War down through Imperial times. Of course, such naval convoys sometimes failed, but in general, the Roman fleet succeeded in protecting the vital sea-lanes that supported the armies in the field.

The Romans also needed to protect their overland supply lines. Considerable numbers of troops were assigned to convoy duty to protect from ambush. In order to protect supply lines, a commander needed to make sure that the area between his army and his operational base had been completely pacified. Even so, the Romans normally fortified the depots that made up the supply lines. Naturally, there was (and is) a tendency to use one's worst troops to protect

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[305] Livy 44.35.13–15.
[306] App. *Hisp.* 13,81; *Mith.* 11,72; Front. *Strat.* 3.15.4.

supply lines and to garrison depots and bases. While this is under-
standable from the commanders' perspective, it sometimes led to lo-
gistical disasters.

The tactical base served to protect the army's supplies directly in
the face of the enemy. Under normal circumstances, the Romans'
daily marching camp served as their tactical base. It is at least in
part in order to protect their supplies that Roman commanders (at
least the good ones) paid such attention to camp security.

Ancient armies needed to forage daily for fodder, firewood and
water. Such foraging parties were very vulnerable to enemy attack,
and their security was a prime concern. Since water sources are
fixed, water parties were particularly vulnerable, and were often am-
bushed. Firewood and fodder parties, although they had a wider
availability of sources, also frequently suffered attacks.

In order to lessen risk, the Romans sent foraging parties out at
different times and different routes whenever possible. Roman foraging
parties normally operated close to camp, and as speedily as possible,
to reduce the dangerous time in the field. Fortifications were sometimes
built to protect foragers, but in any case, they were almost always
accompanied by guards. *Frumentationes*, while less frequent that daily
foraging, also needed protection. Escorts for such large scale provi-
sioning operations were often substantial, from several cohorts to sev-
eral legions in size. The organization of such escorts was an important
element of foraging security.

When provisions were requisitioned in the Republican period, the
civilian population was generally expected to move it to the army
(*vectura*). Usually, such operations were performed well away from
the enemy, as they were quite vulnerable to attack, and particularly
difficult to defend. Under the Empire, one finds *lixae* traveling through
the countryside, collecting supplies. These individuals were also sub-
ject to enemy ambush and attack, particularly when an unexpected
rebellion broke out.

Both the army- and the troop-trains that carried so much vital
equipment and supplies needed to be protected. Proper order of
march, that is, placing baggage and trains within a protective cover-
ing of troops, is frequently discussed in military literature, both the-
oretical and historical. Normally the train was protected within the
daily marching camp, but when this was not possible, it particularly
had to be shielded during battle.

The interface of logistics and warfare went beyond the realm of

security. The Romans often relied on several different sources of supply, which gave them strategic flexibility. The Romans' skill in setting up supply lines gave them a maneuverability sometimes denied to their enemies. At times, though, a Roman commander might march beyond his supply lines in order to gain an advantage over the enemy. This sort of move took disciplined troops, but even in that case could be risky.

The very Roman word for train, *impedimenta*, indicates the problem it presented to the army. The baggage carried in the train, as well as that carried by the soldiers themselves, slowed the army down. The Romans, however, were capable of remarkably rapid movements even with their baggage, and their training allowed them to jettison their baggage, and travel *expediti*, when necessary or desirable.

The Romans also used logistics as a weapon: the good commander attempted to cut or block the enemy's supplies, while protecting his own. Attacking the enemy's logistics might involve blocking waterborne or overland supply lines, as well as interfering with foraging or requisition. Operational and tactical bases were also targeted— indeed, the loss of such a base was a logistical, and military, disaster of the highest order. Of course, the Romans themselves were vulnerable to such blockades and interference.

The purpose of pillaging was to destroy enemy supplies as much as to seize them for ones' own use. Pillaging and destruction are, of course, an integral part of ancient, and modern, warfare. The Romans, however, controlled pillaging, when the discipline of their armies were intact, and used it as a method of raising morale as well as harming the enemy.

The availability of supplies had an important impact on the tactical, as well as the strategic, level. Cutting off or restricting supply on a tactical level could force an enemy into an unwanted battle or even into surrender. Preventing foraging for fodder could lead to starvation among an enemy's animals, crippling its transportation. An army's constant need for water made an attack on its water sources a very effective tactic. Without water an army could be rendered incapable of combat within a few days. In such situations, a commander would search for alternate sources of supply, and we find the Romans being quite ingenious in finding or creating them.

Logistical needs of various types also influenced the place, time and course of battles. An army in a weak logistical position might be forced into precipitate battle, a situation often exploited by the

Romans and their enemies. In other circumstances, conflict over supply, particularly over sources of water or forage, might lead to fights that escalated into unexpected, or even unwanted, battle. Even battles contemplated by both sides, however, often commenced with the skirmishing of foraging parties. How well-, or ill-fed the soldiers were could have an impact on the outcome of the battle itself. Ancient combat required short spurts of intense physical activity, and hungry troops tired easily. The Romans were well aware of the need to feed soldiers before fighting. There are some tactical, as well as strategic, situations, however, in which the soldiers might be asked to operate with less than optimum diet, and even under conditions of malnutrition. Naturally only loyal and disciplined troops will succeed under such conditions—and it is one of the secrets of Roman military success that they often had such soldiers in their legions.

Siege warfare was important to Roman success throughout the period under discussion. Logistics is a key element in sieges, both on the offense and the defense. Proper logistical preparations were necessary to success in siege warfare. Water sources often played a key role, for both sides. The need for timber was enormous for the attacker, and often led to the destruction of suburbs and the deforestation of a considerable area around the besieged city. While the Romans often took cities with siege ramps, battering rams and siege towers, the traditional method of starving out cities was sometimes used. While descriptions of the extremes to which hunger-maddened defenders were driven was a literary *topos*, both ancient and modern military history make it clear that such starvation was a real part of many sieges. The city of Rome itself grew to be dependent on imported grain to feed its enormous population. This dependence was a military liability, that although never used by a foreign enemy after the Romans won naval dominance in the Mediterranean, nevertheless played a role in its many civil wars.

Military intelligence was an important element in logistical planning. Proper knowledge of the sources of supply, or the lack thereof, could mean the difference between victory and defeat, both on the strategic and tactical levels. Since foragers spread out in the army's area of operations, they could provide important tactical intelligence, both for their own, and if captured, for the enemy side. Spies could also be infiltrated into the enemy camp among foragers. Finally, disinformation about logistics was both easy to spread and often an effective way of disguising intentions.

CONCLUSION

This book began with George Thorpe's comparison of logistics to the stage management of a play. Unlike the deliberately hidden action of stage hands, however, those providing logistical support do occasionally take center stage or are at least visible in the historical narrative of the literary sources. Such mention occurs mostly under exceptional circumstances, for example, when the supply system breaks down or is responsible for a dramatic success. This tends to skew our understanding of the routine activity of supplying armies are war, and even with the addition of our non-literary sources, such a papyri and archaeological finds, understanding the workings of the logistics of the Roman army is an exercise in extrapolation. For this reason, researchers can, and do, often develop very different models of Roman logistics based on the same evidence. Nevertheless, I have argued that it is possible to come to certain conclusions as to the nature of Roman logistics, if not all its details.

The ability of the Romans to project force over long distances of land and sea gave them a tremendous strategic advantage in war. The Romans were by no means the first to organize logistical support of large armies. In the 5th century B.C. the Persians gathered an enormous fleet to support an invasion of Greece by the largest army assembled up to that time—perhaps as many as 180,000 men. Herodotus puts the size of this fleet as 1200 warships and 1800 supply ships.[1] This may be an exaggeration but the Persians were certainly able to gather well over 1000 ships together in one fleet. This gigantic effort however failed and was not repeated by the Persians. It is noteworthy that the classical Greek city states were unable to project forces of more than a couple of hundred ships and a few thousands of men overseas. The original Sicilian expedition of 415 B.C. involved less than 135 warships and 130 transports, of which only 30 were large grain ships. Organizing this fleet, which moved less than 6000 soldiers, was an enormous effort for Athens.[2] The Hellenistic period did see an increased use of ships to transport and supply

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[1] Hdt. 7.97.
[2] Thuc. 6.44.

armies, but this was still not done routinely or on a large scale. While Rome is generally seen as a land power, it was the first ancient power to routinely transport and supply armies on a large scale by sea. Indeed, over the course of the five centuries covered in this book, the Romans created and maintained a military the like of which had not been seen before and would not be again until modern times. If nothing else, this study has shown that logistics played a vital role in the creation and maintenance of the Roman Empire.

Some Roman logistical practice was quite different from that of other militaries, either ancient and modern. The *contubernium* of eight Roman soldiers normally prepared and cooked their own meals from issued grain, rather than relying either on a central kitchen, as do almost all modern armies or on individual purchase of food, as did the classical Greek hoplite. While the estimates given in Chapter One are just that, I have calculated the Roman ration as being slighter smaller, and thus lighter, than most scholars have done. What is clear is that the Roman ration was sufficient in both quantity and quality to make the legionary a well-fed soldier by historical standards. In some cases, of course, the army had to rely on prepared rations, such as biscuit, and in other cases, even reduced the soldier's rations for tactical advantage. It is the discipline of the Roman army that allowed such logistical flexibility. As far as the officer corps is concerned, despite occasional martinets, Roman commanders ate as befitted members of the highest social class. Nevertheless, a good Roman commander was willing, and able, to share in his soldiers' privations when necessary, an important quality of Roman leadership.

The question of fodder is one of the key elements in reconstructing ancient logistics. If an army relied solely on its pack animals to carry fodder, that they must consume as well as transport, it would have a very limited area of operations, as Engels has pointed out.[3] The Romans, however, like every army that used pack or draft animals, relied on grazing to provide at least part of their nutrition. This practice made long-distance overland military supply possible under ancient conditions. The Roman army also was the first to use the individual soldier as a load carrier beyond his weapons and armor. The development of the Roman pack system, whether invented by Gaius Marius or not, set the Roman legionary apart as a soldier and not a warrior. The use of the soldier to carry a significant logistical

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[3] Engels (1978) 19–22.

burden signifies the way that the Romans viewed warfare systematically, even on the level of the private soldier.

One can best gauge the professionalism of a military force by looking, not at the soldiers themselves, but at the train that follows them. Tribal warriors either travel without trains, in which case they are incapable of sustained operations or literally bring their homes and families with them, as the Helvetii did in 58 B.C.[4] In more complex societies, the needs of the soldiers can create "private sector" trains, made up of sutlers, camp followers and families. Such trains support an army's needs but their lack of discipline is an impediment to its movement and combat efficiency. While the Romans used the term "*impedimenta*" to refer to their train, both the troop-train and army-train that accompanied Roman forces were better organized than those of any previous army, and indeed of all subsequent armies until modern times. The question of the nature and role of the military servants—the *calones* and *lixae*—is a difficult one, but Josephus' claim that "[they] may properly be included in the category of combatants whose military training they shared"[5] ought not to be dismissed lightly. Whatever their exact status, the Romans' military servants were certainly much more than mere attendants and reflect the Roman army's professionalism in matters of logistics.

One of the elements that made Roman logistics so effective was its very mixture of the organized and the spontaneous. Roman forces seldom relied exclusively either on supply lines, requisition or foraging, but combined all three continuously throughout campaigns. This was made possible by the very fact that logistical responsibility was not separated out by the Roman military but was intrinsic in every unit at every level of command. It is characteristic of the Roman attention to discipline that foraging expeditions were well-organized military operations. Even pillaging was strictly controlled and limited, with the proceeds going to the army for distribution, rather than being retained by the individual soldiers. Such practice again attests the professionalism of the Roman military.

Both in the Republican and Imperial periods, the Roman state developed efficient means of obtaining staple foodstuffs on an enormous scale for the army's use. The Romans ability to move these supplies was dependent to a large extent on the technology and infrastructure

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[4] Caes. *BGall.* 1.29.
[5] Jos. *BJ* 3.69.

of the civilian transportation system. Particularly in the movement
of provisions over seas and rivers, the Romans normally utilized civil-
ian ships under contract. There was, however, a symbiotic relation-
ship between the army and the network of sea and land trade which
grew up around the empire. War was itself a catalyst for the growth
of trade and the development of the infrastructure necessary to sup-
port Roman logistics. During the Republic, the Romans were at war
almost continuously.[6] Merchant fleets under contract to the Roman
state shipped thousands of tons of wheat, oil, wine and other supplies
year after year. The army's demand for supplies was certainly an
important element in creating and maintaining the Mediterranean-
wide marketplace. The standing fleets of the imperial period sup-
pressed piracy so successfully that there is no mention on piracy in
our sources during the entire period of the Principate. This was
important in fostering trade—but the navy's primary purpose was
to protect the transportation of the army and its supplies. A similar
process involved roads and overland transport. The Romans had
been building roads since the fourth century B.C., and the roads
and the garrisons which guarded them certainly facilitated overland
trade by suppressing banditry. However, the roads' primary function
was to supply the Roman army.

The Romans raised the use of tactical and operational bases to a
fine art. Particularly noteworthy is the Roman army's practice of
building a fortified camp every day, partly to defend the army itself,
but also to serve as a tactical base for logistics. Roman operational
bases, especially in their form as "winter quarters" (*hiberna*) effectively
supported military operations over long periods. It is this Roman
staying power, more than any tactical advantage, that led to Roman
success over the long term. Effective use of bases and depots was
an important element in this accomplishment.

One can see the Roman army as possessing an elaborate and
permanent logistical infrastructure or as dealing with logistics on an
ad hoc basis. While each of these models reflects certain elements of
the Romans' logistical system, neither defines its essence. Roman
logistics developed slowly over the course of time and it cannot be
characterized in a single way. The institutional continuity that was
a feature of the Roman army maintained and passed on the skills
necessary to plan and organize large armies over long distances from

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[6] Harris (1979) 9–10.

generation to generation of Roman soldier. On the other hand, some of the features of modern organized logistics, such as a separate Quartermaster Corps and supply units are absent in the Roman military scheme. This study comes down on the side of a more *ad hoc* administration, as opposed to Kissel's model of a supply staff organized under the Prefect of the Annona. Over the course of the early empire, however, logistical practice does seem to have become more standardized. This trend toward bureaucratization continues and increases in the Late Empire, but that is a subject for another study.

Of course, the whole point and purpose of logistics is the support of an army potentially or actually at war. Roman culture and, in particular, Roman senatorial culture was infused with the study of, and making of, war. Throughout the history of Roman arms, the commanders of Rome's armies understood the vital importance of supply both strategically and tactically. Protecting one's own supplies was a high priority and threatening or destroying those of the enemy a vital military mission, often preferable to deciding an issue through battle. Rome's great military leaders—Scipio, Sertorius, Caesar, Corbulo and others—understood the use of supply as a potent military weapon both on the defense and the offense. This same attention to the importance of logistics ought to be paid by modern commentators: Roman military success often depended more on bread than iron.

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APPENDIX
LOGISTICS AND THE ORGANIZATION
OF AUXILIARY UNITS

Obviously, the problems involved in reconstructing the size of various auxiliary units are very complex, and require further work.[1] Nevertheless, accepting the hypothesis that Augustus probably created standard centuries of 80 men, and standard *turmae* of 30 men aids considerably in the reconstruction of unit sizes.

Most Roman auxiliary cavalry units were "500-man wings" *alae quingenariae*, made up, according to Pseudo-Hyginus, of sixteen squadrons (*turmae*), and totaling, according to Arrian, 512 men.[2] If these figures are correct, there were 32 men per *turma*, a number confirmed by Vegetius.[3] There is some question, however, whether the figure 512 should include or exclude officers. If there were four *contubernia* of eight in a cavalry *turma*, with the squadron commander (*decurio*) and second-in-command (*duplicarius*) included within the strength of the *contubernium*, the total strength of the unit would be 512. This reconstruction retains the eight-man *contubernium* as a standard sized unit for ration calculation, but the ration strength of the *ala* would be slightly higher than that of the cohort (a ratio of 1.066 to 1). If, conversely, officers are added to the four eight-man squadrons, then a quingenary *ala* would have 544 officers and men, excluding the prefect or wing commander. Alternatively, the *turma* might have contained five *conturbernia* of six men each, including the junior offices, such as the standard bearer (*signifer*), *curator*, and *sesquiplicarius*.[4] In this reconstruction, the *decurio* and *duplicarius* were not included in the ration strength of the *contubernium*, despite Vegetius' statement to that effect. Thus, there would have been 480 troopers in an *ala* or wing, only counting those assigned to a *contubernium*, the same number of soldiers as in an infantry cohort. This would have made a cohort and an *ala* exactly equivalent in terms of rationing, as far as the

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[1] Davison (1989) 168.
[2] [Hyg.] *De mun. castr.* 16; Arr. *Tact.* 18.
[3] Veg. *Epit.* 2.14, see Davison (1989) 166.
[4] Webster (1985) 148; Kennedy (1985) 182.

rank and file soldiers' rations were concerned. The number of 512 would have then been made up by the decurions and *optiones*. In this case, Vegetius would be counting the officers in the strength of the *turma*, and Arrian in the strength of the *ala*, although strictly speaking they would not have been carried on the rolls nor counted for rationing purposes. Other members of the *ala*'s staff, including the standard-bearer (*vexillarius*), trumpeters (*tubicines*) and clerks (*librarii*), were certainly carried on the muster rolls of the various *turmae*, as was the practice in the legions. The wing commander, the prefect, would certainly not have been included in the unit's strength.[5]

If one follows the logic of ration calculation, it is simpler to count an army's size in "cohort equivalents" than in *contubernia*. Thus, for rationing purposes, a legion would be 10 cohort equivalents (11 with a double first cohort), a millarian cohort or *ala*, two, and a quingenarian cohort or *ala* a single cohort equivalent. This method of calculations eliminates the slight difference in the ration strength of the *ala* and cohort. Therefore, it is most likely that the cavalry *turma* was made up of five six-man *contubernia*, plus two officers for a total of 480 troopers and 32 officers, 512 total, in the quingenarian *ala*.

The "1000-man wing" (*ala milliaria*) had, according to Ps.-Hyginus, twenty-four *turmae*.[6] If this is correct, and the *ala milliaria* had 32 men per *turma*, then it numbered 768.[7] With a 30-man *turma*, however, the total would be 720 troopers and 48 officers. In either case, the milliarian *ala* is some 50 percent larger than the regular one.[8] It is possible, though, that the figure 24 given by Ps.-Hyginus is corrupt: the numeral XXXII might easily have become XXIIII. If one doubles the number of *turmae* in the quingenarian *ala*, then 32 *turmae* of

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[5] Davies (1989) 275, note 2. The matter is further more complicated by [Hyg.] *De mun. castr.* 16, who gives the total number of horses in a *ala quingenaria* as 564, including three horses for each decurion and two each for the *duplicarii* and *sesquiplicarii*. If, however, his assigning of extra horses to officers is correct, the total for the *ala* should be 592, if decurions are not included in the *turma*, and 576 if they are. This does not include reserve horses, which are to be expected due to attrition on campaign, so the *ala* probably contained around 600 horses. The problem with the figures might be due to inaccuracy on Pseudo-Hyginus' part, on mistransmission, or both.

[6] [Hyg.] *De mun. castr.* 16.

[7] Kennedy, (1985) 182.

[8] Pseudo-Hyginus, however, also states that there are 1096 horses in the *ala milliaria*, and in order to explain this, Domaszewski, cited in Kromayer-Veith (1928) 497–8, postulated a larger *turma* of 42 men and 46 horses, giving a total of 1033 men, (including the decurions and prefect) and 1104 horses. There is, however, no evidence for a 42-man *turma*.

30 men gives a strength of 960, plus 64 officers, a total of 1024 for the milliarian *ala*. The additional 72 horses would be accounted for by spares for the officers. One hesitates to solve organization anomalies by emendation, but this seems to be the best solution, as it allows a *turma* of uniform size in all cavalry units.[9]

The auxiliary infantry was organized into several varieties of cohort. The most basic was the "500-man cohort" (*cohors quingenaria*), which, like the legionary cohort, was made up of six centuries of eighty men, for a total of 480 infantry, and commanded by a prefect.[10] The organization of the "1000-man cohort" or *cohortes milliariae* is more problematic than that of the quingenarian. Ps.-Hyginus allocates a total of ten centuries and 100 tents to the milliarian cohort. Veith and Birley take this to mean ten one-hundred man centuries, for a total of 1000 infantry (even though Ps.-Hyginus explicitly says that a tent held eight individuals).[11] Given the Roman rationing system, as hypothesized in Chapter One, Davies is probably correct, in insisting that all infantry centuries, auxiliary and legionary, were made up of 80 men. Thus, the milliarian cohort was created by increasing the number of centuries from six to ten. This would produce a total of 800 infantry for the milliarian cohort.[12] A recently published strength report from Vindolanda suggests that the milliary cohort stationed there had six, presumably double sized, centuries.[13] If so, then the milliarian cohort had 960 infantry, a number which better corresponds to its name. This would mean, however, postulating a very serious corruption in Ps.-Hyginus' text, so the question must remain open.

The mounted cohort, or *cohors equitata*, was a unit composed of both infantry and cavalry. Ps.-Hyginus says the *cohors equitata milliaria* contained ten centuries of infantry, and 240 cavalry.[14] Veith, apparently wanting a unit of exactly 1,000 men, estimates that there were 760 infantry in centuries of 76 each, plus 240 cavalry.[15] Davies, however, again insisting on a standard century of 80 men postulates a

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[9] See Davison (1989) 167.
[10] [Hyg.] *De mun. castr.* 28; Kromayer-Veith (1928) 495; Birley (1967) 54; Davis (1967) 111; Goldsworthy (1996) 22.
[11] [Hyg.] *De mun. castr.* 1.2, 28.6; Kromayer-Veith (1928) 495; Birley (1967) 54.
[12] Davies (1967) 111. See Hassell (1984) 96–113; Goldsworthy (1996) 22.
[13] Bowman & Thomas (1991) 67.
[14] [Hyg.] *De met. castr.* 24.1–2: *habet itaque cohors equitata miliaria centurias X peditum, equites CCXL . . .*
[15] Although it is often stated that Pseudo-Hyginus attests 10 *turma*, the text has been emended. [Hyg.] *De met. castr.* 27 reads: "*equites CCXL turmas decuriones.*" In the

total of 1040 men.[16] As in the case of the milliarian cohort, my view
of the Roman rationing system makes this latter solution more likely.
There was also a quingenarian mounted cohort (*cohors equitata quin-
genaria*), which Ps.-Hyginus divides into six centuries. If these cen-
turies were of eighty men each, then quingenarian mounted cohort
would have contained 480 infantry. Veith, however, postulates that
there were 380, and Birley 360, infantry in the six centuries.[17] Ps.-
Hyginus goes on to say "the rest [i.e. the cavalry] are reduced by
half [from that of the milliarian cohort]."[18] This appears to mean
that the unit had 120 cavalry. Hassall notes that in addition to Ps.-
Hyginus there is some papyrological evidence on this point. The ros-
ters, or *pridiana*, of three part-mounted quingenary cohorts support
the idea of four *turmae* of thirty men each. The issue is still ambigu-
ous, though: the rosters of the *Cohors XX Palmyrenorum* at Dura Europus
suggest it had five *turmae*.[19] If each of the *cohors equitata*'s centuries
consisted of 64 men (8 *contubernia* of 8 each) or 72 men (9 *contubernia*
of 8 men), in the former case there would be an infantry total of
384, and a grand total of 512 (same as a quingenary *ala*) or 504,
depending on whether there were 128 or 120 cavalry. In the case
of 9 *contubernia* of 8 men, there would be an infantry total of 432
and grand totals of 552 or 560, again depending on the number of
cavalry. Another way of reducing the century's total would be to
reduce the men per *contubernium* to 6, getting centuries of 60, an
infantry total of 360 for grand totals of 480, or 488.[20] Although these
solutions have the advantage of keeping the total number of the unit
around 500, they go against the idea of standard size centuries. The
six centuries of the *cohors quingenaria equitata* would contain 480 men
if the unit had 80 man centuries. Adding the 120 cavalry, one gets
a grand total of 600. While this is considerably over the nominal
strength of 500, but it is an attractive solution. Josephus, while agree-

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16th century Schele suggested reading "*turmas decem*". The reading is widely accepted,
most recently in the Teubner edition, Grillone (1977) 11. As Kromayer-Veith (1928)
495 points out, a standard *turma* of 32 men would produce eight *turmae*. See Hassall
(1984).

[16] Birley (1967) 54; Davies (1967) 111.
[17] Kromayer-Veith (1928) 495; Birley (1967) 54.
[18] [Hyg.] *De met. castr.* 24.4–5. See Cheesman (1914) 29; Davies (1967) 110;
Keppie (1984) 184.
[19] E.g. *P. Dur.* 82 [= Fink (1971) no. 47].
[20] Hassall (1984) 97–8.

ing with the figure of 120 for the cavalry, gives 600 as the number of infantry, which would yield centuries of 100 men each.[21] It is possible that Josephus is mistaken or that a figure "480" has dropped out of the text, and that he originally wrote that the *total* strength "was 600, (480) infantry and 120 cavalry."[22]

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[21] Jos. *BJ* 3.67–8.

[22] Kennedy (1983) 253 n. 6. *BGU* 696 (Thebais, 156 A.D.) gives the strength of the *cohors I Augusta Lusitanorum equitata* as 3 centurions, 3 decurions, 363 *pedites*, 114 *equites* (as well as 19 *dromedarii*) for a total of 505 men. It is unlikely that this unit is at full-strength, and these figures are not incompatible with the suggested strength of 480 plus 120. In this case, not all the centurions and decurions were present.

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BIBLIOGRAPHY

Adams, Colin E.P., 1995. "Supplying the Roman Army: *O. Petr.* 245," *Zeitschrift für Papyrologie und Epigraphik* 109, 119–124.

Adams, John Paul, 1976. *Logistics of the Roman Imperial Army: Major Campaigns on the Eastern Front in the First Three Centuries A.D.*, dissertation: Yale University.

——, 1979. "The Roman Imperial Army in the East: Social and Governmental Problems," *The Ancient World* 2/4, 129–137.

Anderson, Fred, 1984. *A People's Army: Massachussetts Soldiers and Society in the Seven Years' War*, New York: W.W. Norton & Company.

Anderson, J.K., 1970. *Military Theory and Practice in the Age of Xenophon*, Berkeley: University of California Press.

Anderson, James D., 1992. *Roman Military Supply in North East England*, Oxford: British Archaeological Reports, British Series 224.

André, Jacques, 1961. *L'alimentation et la cuisine à Rome*, Paris: C. Klinksieck.

Angel, John Lawrence, 1968. "Ecological Aspects of Paleodemography," in Don R. Brothwell, *Skeletal Biology of Earlier Human Populations*, New York: Pergamon Press.

——, 1971. *The People of Lerna: an analysis of a prehistoric Aegean population*, Washington, D.C.: Smithsonian Institution Press.

Applebaum, Shimon, 1974. "Economic Life in Palestine," in S. Safrai and M. Stern (eds.), *Compendia Rerum Iudaicarum ad Novum Testamentum, Section 1: The Jewish People in the First Century*, vol. I, Assen: Van Gorcum.

Arlin, Marian Thompson, 1977. *The Science of Nutrition*, New York: Macmillan.

Atkinson, D. & L. Morgan, 1987. "The Wellingbourough and Nijmegen Marches," in M. Dawson (ed.), *Roman Military Equipment: The Accoutrements of War* [= BAR International Series 336], Oxford: British Archaeological Reports, 99–108.

Aubert, Jean-Jacques, 1994. *Business Managers in Ancient Rome: A Social and Economic Study of Institores, 200 B.C.–A.D. 250* [= Columbia Studies in the Classical Tradition 21], New York: E.J. Brill.

Austin, N.J.E., & Rankov, N.B., 1995. *Exploratio: Roman Political and Military Intelligence from the Second Punic War to the Battle of Adrianople*, London: Routledge.

Avi-Yonah, Michael, 1976. *Gazeteer of Roman Palestine* [= Qedem Monographs of the Institute of Archaeology 5] Jerusalem: Hebrew University Press/Carta.

Aymard, Maurice, 1979. "Toward a History of Nutrition: Some Methodological Remarks" in Forster G., Robert & Ranum, Orest (eds.), *Food and Drink in History Selections from the Annales Économies, Sociétés, Civilisations*, Baltimore: Johns Hopkins University Press, 1–16 [= *Annales Économies, Sociétés, Civilizations* 30 (March–June 1975) 431–44].

Bachrach, Bernard S, 1993. "Animals & Warfare in Early Medieval Europe" in Bernard S. Bachrach (ed.), *Armies and Politics in the Early Medieval West*, Aldershot, Hampshire: Variorum, 708–751.

Badian, Ernst, 1972. *Publicans and Sinners*, Ithaca: Cornell University Press.

——, 1979. "Alexander's Mules" (review of Engels, 1978), *New York Review of Books*, 26:20, 54–6.

Bagnall, Roger S., 1976. *The Florida Ostraka: Documents from the Roman Army in Upper Egypt*, Durham: Duke University Press.

——, 1985. "Agricultural Productivity and Taxation in Later Roman Egypt," *Transactions of the American Philological Association* 115, 289–308.

Beebe, H. Keith, 1983. "Caesarea Maritima: Its Strategic and Political Significance to Rome," *Journal of Near Eastern Studies* 42, 195–207.

Benario, H.W., 1986. "Legionary Speed of March before the Battle with Boudicca," *Britannia* 17, 359–62.

Bennett, Julian,1982. "The Great Chesters Pilum Murale," *Archaeologia Aeliana* 5/10 (1982), 200–205.

Bérard, François, 1984. "La Carrière de Plotius Grypus et Le Ravitaillement de l'Armée Impérial en Campagne," *Mélanges de l'École Française de Rome Antiquité*, 96/1, 259–311.

Birley, A.R., 1981. "The Economic Effect of Roman Frontier Policy," in A. King & M. Henig (eds.), *The Roman West in the Third Century* [= BAR International Series 109], Oxford: British Archaeological Reports, 39–53.

Birley, Eric, 1966. "*Alae* and *cohortes milliariae*" in *Corolla Memoriae Erich Swoboda Dedicata*, [= Römische Forschungen in Niederösterreich 5], Graz, 54–67.

——, 1982. "The Dating and Character of the Tract *De Munitionibus Castrorum*" in Gerhard Wirth, et al. (ed.), *Romanitas-Christianitas*, Berlin: W. de Gruyter.

Birley, Robin and Anthony Birley, 1994. "Four New Writing-Tablets from Vindolanda," *Zeitschrift für Papyrologie und Epigraphik* 100, 431–445.

Bisel, Sara, 1986. "The people of Herculaneum, A.D. 79," *Helmantica* 37, 11–23.

Blázquez, José Martínez and José Remesal Rodríguez, 1983. *Produccion y commercio del Aceite en la Antigüedad*, Madrid: Universidad Complutense.

Blázquez, José Martínez, 1992. "The Latest Work on the Export of Baetican Olive Oil to Rome and the Army," *Greece & Rome* 39, 173–188.

Borowski, Oded, 1987. *Agriculture in Iron Age Israel*, Winnona Lake (IN): Eisenbrauns.

Bowman, Alan K. & Thomas, John David, 1984. *Vindolanda: the Latin writing tablets*, Gloucester: A. Sutton.

Breeze, David J., 1969. "The Organization of the Legion: the First Cohort and the '*Equites legionis*'," *Journal of Roman Studies* 59, 50–55.

——, 1984. "Demand and Supply on the Northern Frontier," in R. Micket & C. Burgess (eds.), *Between and beyond the walls: essays on the prehistory and history of northern Britain in honour of G. Jobey*, Edinburgh, 264–286.

——, 1986/87. "The Logistics of Agricola's Final Campaign," *Talanta* 18/19, 7–28.

Brogan, Olwen, 1954. "The Camel in Roman Tripolitana," *Papers of the British School in Rome*, 22, 126–131.

Brothwell, Don and Patricia, 1969. *Food in Antiquity*, New York: Frederick A. Praeger.

Broughton, T. Robert, 1968. *The Magistrates of the Roman Republic*, 2 vols., Cleveland: Case Western University Press.

Brown, Kenneth, 1987. *Strategics: the logistics-strategy link*, Washington, D.C.: National Defense University Press.

Brunt, P.A., 1971. *Italian Manpower 225 B.C.–A.D. 14*, Oxford: The Clarendon Press.

Bülow-Jacobsen, Adam, 1994. "Stone for Bread: An Early Second-Century Bread-Weight," *Zeitschrift für Papyrologie und Epigraphik* 103, 91–92.

Burford, A., 1960. "Heavy Transport in Classical Antiquity," *Economic History Review* 13/1, 1–18.

Burton, G.P., 1993. "Provincial Procurators and the Public Provinces," *Chiron* 23, 13–28.

Campbell, J.B., 1984. *The Emperor and the Roman Army 31 B.C.–A.D. 235*, Oxford: Clarendon Press.

Caprino, C. (et al.), 1955. *La Colonna di Marco Aurelio*, Rome: Bretschneider.

Carlsen, Jesper, 1991. "Dispensatores in Roman North Africa," *L'Africa romana* 9/1, 97–104.

Carp, E. Wayne, 1984. *To Starve the Army at Pleasure*, Chapel Hill: University of North Carolina Press.

Cary, M, 1949. *The Geographic Background of Greek & Roman History*, Oxford: The Clarendon Press.

Casson, Lionel, 1951. "Speed Under Sail of Ancient Ships," *Transactions of the American Philological Association* 82, 136–48.

——, 1959. *The Ancient Mariners: Seafarers and Sea Fighters of the Mediterranean in Ancient Times*, New York: Macmillan.

——, 1971. *Ships and Seamanship in the Ancient World*, Princeton: Princeton University Press.

——, 1995. "The Feeding of Trireme Crews and an Entry in *IG* ii² 1631," *Transactions of the American Philological Association* 125, 261–9.

Chandler, D.G., 1981. "The Logistics of Military History," *History Today* (Feb. 1981), 47–8.

Cheesman, G.L., 1914. *The Auxilia of the Roman Imperial Army*, Oxford: Clarendon Press.

Chevallier, Raymond, 1976. *Roman Roads*, (tr. N.H. Field), Berkeley: University of California Press.

Coles, John, 1979. *Experimental Archaeology*, New York: Academic Press.

Consolazio, C. Frank, 1976. "Nutritional and Physiological Basis of Military Rations" in K.K.P.N. Rao, *Food Consumption and Planning* [= *International Encyclopedia of Food and Nutrition*, volume 5] New York: Pergamum Press, 221–314.

Corbier, M., 1974. *L'aerarium Saturni et l'aerarium militare: Administration et prosopographie sénatoriale*, Rome: L'École Française de Rome.

Cotton, Hannah & Joseph Geiger, 1989. *Masada II, Yagael Yadin Excavations, 1963–5, Final Reports, The Latin and Greek Documents*, Jerusalem: Israel Exploration Society.

Coulston, J.C., 1985. "Roman Archery Equipment," in M.C. Bishop (ed.), *The Production and Distribution of Roman Military Equipment* [= BAR International Series 275], Oxford: British Archaeological Reports, 220–337.

Crawford, M.H., 1975. *Roman Republican Coinage*, Cambridge: The University Press.

Crump, G.A., 1975. "Ammianus Marcellinus as Military Historian," *Historia Einzelschriften* 27, Wiesbaden, 1975.

Curtis, Edward E., 1914. "The Provisioning of the British Army in the Revolution," *The Magazine of History* 18 (1914), 232–241.

——, 1926. *The British Army in the American Revolution*, New Haven: Yale University Press.

Daniel, Hawthorne, 1948. *For Want of a Nail: The Influence of Logistics on War*, New York: Whittlesley House (McGraw-Hill).

Daniel, Robert W., 1994. "Neither Do They Put New Wine in Old Skins," *Zeitschrift für Papyrologie und Epigraphik*, 101, 61–66.

David, Jean-Michel, 1977. "Réformes des administration de l'annone et des domaines en Numidie, pendent la persécution de Valérian (257–260), A propos de *C.I.L.*, VIII, 2757," *Antiquités africaines* 11, 149–160.

Davies, Roy W. 1967. "A Note on 'P. Dura'" 64, *Latomus* 26 (1967) 67–72.

——, 1969. "The Supply of Animals to the Roman Army and the Remount System," *Latomus* 28, 429–59.

——, 1971. "The Roman Military Diet," *Britannia*, 2, 122–42.

——, 1974. "The Daily Life of the Roman Soldier under the Principate" in H. Temporini (ed.), *Aufstieg und Niedergang der Römischen Welt*, 2.1, 299–337.

——, 1989. *Service in the Roman Army*, New York: Columbia University Press.

Davison, David P., 1989. *The Barracks of the Roman Army from the 1st to the 3rd Centuries A.D.* [= BAR International Series 275], Oxford: British Archaeological Reports.

De Meo, Cesidio, 1986. *Lingue Tecniche del Latino*, Bologna: Pàtron Editione.

De Saint-Denis, E., 1981. "Le Rhône vu par les Grecs et les Latins de l'antiquité." *Latomus* 40, 545–570.

Dent, A., 1972. *Donkey: The Story of the Ass from East to West*, London.

Develin, R., "The Army Pay Rises under Septimius Severus and Caracalla and the Question of Annona militaris," *Latomus* 30 (1971) 687–695.

K.R. Dixon and P. Southern, 1992. *The Roman Cavalry from the First to the Third Century A.D.*, London.

Dobson, Brian, 1978. *Die Primipilares: Entwicklung und Bedeutung, Laufbahnen und Persönlichkeit eines römischen Offizersranges*, Cologne: Rheinland Verlag.

Domaszewski, Alfred von, 1927. "Die Annona des Heeres im Kriege," *EPITUMBION, Heinrich Swoboda dargebracht*, Reichenberg, 17–18.

——, 1967. *Die Rangordnung des Römischen Heeres*, revised ed. by B. Dobson, [= Beihefte der Bonner Jahrbücher, Band 14], Cologne: Bohlau.

Duncan-Jones, Richard, 1974. *The Economy of the Roman Empire: Quantitative Studies*, 2nd ed., Cambridge: Cambridge University Press.

——, 1976, "The Price of Wheat in Roman Egypt under the Principate," *Chiron*, 241–62.

Eckstein, A.M., 1980. "Unicum subsidium populi Romani: Hieron II and Rome, 263–215 B.C.," *Chiron* 10, 175–190.

Ellmers, Detlev, 1978. "Shipping on the Rhine during the Roman period: The pictorial evidence," in J. du Plat Taylor & H. Cleere (eds.), *Roman shipping and trade: Britain and the Rhine provinces* [= CBA Report 24], London, 1–14.

Elton, Hugh, 1995. *Warfare in Roman Europe, A.D. 350–425*, Oxford: The Clarendon Press.

Engels, Donald, 1978. *Alexander the Great and the Logistics of the Macedonian Army*, Berkeley: University of California Press.

Erdkamp, Paul, 1995. "The Corn Supply of the Roman Armies During the Third and Second Centuries B.C.," *Historia* 44/2 (1995) 168–191.

Essin, Emmett M., 1970. "Mules, Packs, and Packtrains," *Southwestern Historical Quarterly* 74/1, 52–63.

——, 1997. *Shavetails and Bell Sharps: The History of the U.S. Army Mule*, Lincoln: University of Nebraska Press.

Ezov, Amiram, 1996. "The 'Missing Dimension' of C. Julius Caesar," *Historia* 45/1, 64–94.

Falk, Stanley L., 1986. Introduction to George C. Thorpe, *Pure Logistics: The Science of War Preparation*, 2nd ed., Washington, D.C.: National University Press.

Ferrill, Arthur, 1985. *The Origins of War: From the Stone Age to Alexander*, London: Thames & Hudson.

Figueira, Thomas J., 1984. "Mess Contributions and Subsistence at Sparta," *Transactions of the American Philological Association* 114, 87–109.

Fink, R.O., 1971. *Roman Military Records on Papyrus* [= American Philological Association Monograph 26], Case Western University Press.

Flores, Marina, 1976. "Food Consumption: Levels and Patterns-Variation by Geographical Regions and Socio-economic Groups," in K.K.P.N. Rao, *Food Consumption and Planning* [= International Encyclopedia of Food and Nutrition, volume 5], New York: Pergamum Press, 63–138.

Florescu, Florea, 1965. *Das Siegesdenkmal von Adamklissi: Tropaeum Traiani*, Bucharest: Akademie Verlag.

——, 1969. *Die Trajanssäule: Grundfragen und Tafeln*, Bucharest: Akademie Verlag.

Forni, 1953. *Il Reclutamento delle legioni da Augusto a Diocleziano*, Milan: Bocca.

Forster G., Robert & Ranum, Orest (eds.), 1979. *Food and Drink in History Selections from the Annales Économies, Sociétés, Civilisations*, Baltimore: Johns Hopkins University Press.

Fortescue, John W., 1928. *Royal Army Service Corps: Early History of Transport and Supply in the British Army*, Cambridge: The University Press.

——, 1930. *The Royal Army Service Corps: A History of Transport and Supply in the British Army*, vol. 1, Cambridge: The University Press.

Foxhall, L. & Forbes, H.A., 1982. "*Sitrometreia*: The Role of Grain as a Staple Food in Classical Antiquity," *Chiron* 12, 41–89.

Frank, Tenney, 1959. *Economic Survey of Ancient Rome*, Paterson, N.J.: Barnes & Noble.

Frazer, Robert W., 1983. *Forts and Supplies: The Role of the Army in the Economy of the Southwest, 1846–1861*, Albuquerque: University of New Mexico Press.

Frere, S.S., 1980. "Hyginus and the First Cohort," *Britannia* 9, 51–60.

Fuentes, N., 1991. "The mule of a soldier," *Journal of Roman Military Equipment Studies* 2, 65–99.

Gabba, Emilio, 1976. "The Origins of the Professional Army at Rome," in E. Gabba, *Republican Rome, the Army and the Allies*, (tr. P.J. Cuff), Berkeley: University of California Press 1–19.

Gallant, Thomas W., 1989. "Crisis and Response: Risk-Buffering Behavior in Hellenistic Greek Communities," *Journal of Interdisciplinary History* 19:3, 393–413.

Garlan, Yvon, 1972. *La Guerre dan L'Antiquité*, Paris: Fernand Nathan.

Garnsey, Peter, Tom Gallant and Dominic Rathbone, 1984. "Thessaly and the grain supply of Rome during the second century B.C.," *Journal of Roman Studies*, 74, 30–44.

Garnsey P. & R. Saller, 1987. *The Roman Empire: Economy, Society and Culture*, Berkeley: University of California Press.

Gauer, F., 1977. *Untersuchungen zur Trajanssäule: Darstellungensprogramm und künstlerischer Entwurf* [= *Monumentum Artis Romae* 13], Berlin.

Gentry, Anne P., 1976. *Roman military stone-built granaries in Britain* [BAR British Series 32], Oxford: British Archaeological Reports.

Glover, Michael, 1977. *Wellington's Army in the Peninsula 1808–1814*, New York: Hippocrene.

Goff, Richard, 1969. *Confederate Supply*, Durham: Duke University Press.

Goffart, Walter, 1989. "The Date and Purpose of Vegetius' De Re Militari" in Walter Goffart (ed.) *Rome's Fall and After*, London: Hambledon, 45–80.

Goldberg, Niel J. & Frank J. Findlow, 1984. "A Quantitative Analysis of Roman Military Operations in Britain, ca. A.D. 43–23 8" in *Warfare, Culture and Environment*, Academic Press.

Goldsworthy, Adrian, 1996. *The Roman Army at War, 100 B.C.–A.D. 200*, Oxford: The Clarendon Press.

Gordon, Colin Douglas, 1974. "Vegetius and his proposed reform of the army" in J.A.S. Evans (ed.) *Polis and imperium: Studies in Honor of Edward Togo Salmon*, Toronto: Hakkert, 35–58.

Grillone, Antonino, 1977a. "Sul *De metatione castrorum* dello pseudo-Igino," *Latomus* 36, 794–800.

—— (ed.), 1977b. *Hyginus qui dicitur de metatione castrorum liber*, Leipzig: Teubner.

——, 1980. "Pseudo-Hyginus *de metatione castrorum*," *Klio* 6/2, 389–403.

Groenman-van Waateringe, W., 1989. "Food for soldiers, food for thought," in J.C. Barrett, A.P. Fitzpatrick and L. Macinnes (eds.), *Barbarians and Romans in north-western Europe* [= BAR International Series 471], Oxford: British Archaeological Reports, 96–107.

Habermann, Wolfgang, 1990: "Statistische Datenanalyse an den Zolldokumenten des Arsinoites aus römischer Zeit II," *Münsterische Beiträge zur antiken Handelsgeschichte* 9/1 (1990), 50–94.

Hammond, N.G.L., 1980. "Logistics of the Macedonian Army." [review of Donald Engels, *Alexander the Great and the Logistics of the Macedonian Army*], *Journal of Hellenic Studies* 100, 256–7.

——, 1983. "Army transport in the fifth and fourth centuries," Greek, Roman and Byzantine Studies 24 (1983), 27–31.

Hanson, A.E. and P.J. Sijpesteijn, 1991. "*P. Oxy.* XVI 1919 and Mule-breeding," *Zeitschrift für Papyrologie und Epigraphik* 87, 268–274.

Hanson, W.S., 1978. "The Organization of Roman Military Timber Supply," *Britannia* 9, 293–308.

Harris, William V., 1976. "The development of the quaestorship, 267–81 B.C.," *Classical Quarterly* 26, 92–106.

——, 1979. *War and Imperialism in Republican Rome 327–70 B.C.*, Oxford: Clarendon Press.

——, 1989. "Trade and the River Po: A Problem in the Economic History of the Roman Empire" in Jean-François Bergier (ed.), *Montagnes, Fleuves, Forêts dans L'Histoire*, St. Margareten: Scripta Mercaturae Verlag, 123–133.

——, 1993. "Between archaic and modern: some current problems in the history of the Roman economy," in W.V. Harris (ed.), *The Inscribed Economy: Production and distribution in the Roman empire in the light of* instrumentum domesticum, [= *Journal of Roman Archaeology*, Supplementary Series 6], Ann Arbor.

Hatton, G.S. 1956. "The Influence of Logistics on Military Strategy," *Army Quarterly* 2, 173–181.

Hauben, Hans, 1986. "'Onagres' et 'Hémionagres' en Transjordanie au IIIe Siècle avant. J.-C.," *Ancient Society* 17, 89–111.

Haverfield, F., 1922. "The Provisioning of Roman Forts" in Henry Furneaux and J.G.C. Anderson (eds.), Tacitus, *Agricola*, Oxford: Oxford University Press.

Heichelheim, F.M., 1962. "Roman Syria" in Tenney Frank, *An Economic Survey of Ancient Rome*, 2nd ed., New York: Cooper Square Publishers.

——, 1944. "Supply Bases for Caracalla's Parthian Campaign," *Classical Philology* 39, 113–5.

Herz, Peter, 1988. *Studien zur römischen Wirtschaftsgesetzgebung: die Lebensmittelversorgung*, Wiesbaden: Steiner Verlag.

——, 1988b. "Der praefectus annonae und die Wirtschaft der westlichen Provinzen," *Ktema* 13, 69–85.

——, 1989. "Organization und Finanzierung der spätantiken annona," in Giovannini, A. (ed.) *Nourrir la plèbe. Actes du Colloque tenu a Genève les 28 et 29. IX. 1989 en Hommage à Denis van Berchem*, [= *Schweizerische Beiträge zur Altertumswissenschaft*, Heft 22], 161–188.

——, 1992. "Der Aufstand des Iulius Sacrovir (21 n. Chr.). Gedanken zur römischen Politik in Gallien und ihren Lasten," *Laverna* 3, 42–93.

Holder, P.A., 1982. *The Roman Army in Britain*, New York: St. Martin's Press.

Hopkins, Keith, 1980. "Taxes and Trade in the Roman Empire (200 B.C.–A.D. 400)," *Journal of Roman Studies* 70, 101–26.

——, 1982. "The Transport of Staples in the Roman Empire" in P. Garnsey & C.R. Whittaker, *Trade and Staples in Antiquity (Greece and Rome)*, Budapest: Akadémiai Kiadó, 80–87.

——, 1983. "Models, Ships and Staples" in P. Garnsey & C.R. Whittaker, 1983. *Trade and Famine in Classical Antiquity*, London: Cambridge University Press, 84–109.

Horsfall, Nicolas, 1989. "Atticus Brings Home the Bacon," *Liverpool Classical Monthly*, 14/4 (Apr. 1989) 60–62.

Horsmann, Gerhard, 1991. *Untersuchungen zur militärischen Ausbildung im republikanischen und kaiserzeitlichen Rom*, Boppard am Rhein: Harald Boldt Verlag.

Houston, George W., 1988. "Ports in Perspective: Some Comparative Materials on Roman Merchant Ships and Ports," *American Journal of Archaeology*, 92, 553–564.

Howgego, Christopher, 1992. "The Supply and Use of Money in the Roman World, 200 B.C.–A.D. 300," *Journal of Roman Studies* 82, 1–31.

Huston, James, 1966. *Sinews of War: Army Logistics: 1775–1953*, Washington, D.C.

Hyland, Ann, 1990. *Equus: The Horse in the Roman World*, New Haven: Yale University Press.

Isaac, Benjamin, 1992. *The Limits of Empire: The Roman Army in the East*, revised edition, Oxford: Clarendon Press.

Ivanov, Rumen, 1990. "*Lixa Legionis V Macedonicae* aus Oescus," *Zeitschrift für Papyrologie und Epigraphik* 80, 131–6.

Johnson, Anne, 1981. *Roman Forts of the 1st and 2nd Centuries A.D. in Britain and the German Provinces*, London: Adams & Charles Black.

Jones, A.H.M., 1974. "Taxation in Antiquity" in A.H.M. Jones, *The Roman Economy: Studies in Ancient Economy and Administative History*, (ed. P.A. Brunt), Oxford: Basil Blackwell.

Junkelmann, Marcus 1986. *Die Legionen des Augustus: Der römische Soldat im archäologische Experiment*, Mainz: Philipp von Zabern.

——, 1997. *Panis Militaris: Die Ernährung des römischen Soldaten oder der Grundstoff der Macht*, Mainz: Verlag Philipp von Zabern.

Keegan, John, 1993. *A History of Warfare*, New York: Vintage Books.

Kennedy, D.L., "Mililiary Cohorts: The Evidence of Josephus BJ III.4.2 (67) and of Epigraphy," *Zeitschrift für Papyrologie und Epigrafik* 50, 181–5.

Keppie, Lawrence, 1984. *The Making of the Roman Army*, Totowa: Barnes and Noble.

King, Anthony, 1984. "Animal Bones and the Dietary Identity of Military and Civilian Groups in Roman Britain, Germany and Gaul," in T.F.C. Blagg and A.C. King, *Military and Civilian in Roman Britain: Cultural Relationships in a Frontier Province* [= BAR British Series 136], Oxford: British Archaeological Reports, 187–217.

Kissel, Theodor K., 1995. *Untersuchungen zur Logistik des römischen Heeres in den Provinzen des griechischen Ostens (27 v. Chr.–235 n. Chr.)* [= *Pharos Studien zur griechisch-römischen Antike 6*], St. Katharinen: Scripta Mercaturae Verlag.

——, 1995b. Review of Jonathan Roth, *The Logistics of the Roman Army in the Jewish War*, diss. Columbia University, 1991, in Münsterische Beiträge zur antiken Handelsgeschichte, 14, 109–116.

Knights, B.A. (*et al.*), 1983. "Evidence Concerning the Roman Military Diet at Bearsden, Scotland in the 2nd Century A.D.," *Journal of Archaeological Science* 10, 139–52.

Kromayer, Johannes and Georg Veith, 1928. *Heerwesen und Kriegsführung der Griechen und Römer* [= *Handbuch der Altertumswissenschaft* 4.3.2], Munich: C.H. Beck.

Kubitschek, W., 1924. "legio (republikanische Zeit)," *Pauly-Wissowa Real-Encyclopädie der klassischen Altertumswissenschaft* 21/1, Stuttgart: A. Druckenmuller, 1196.

Labisch, Anton, 1975. *Frumentum Commeatusque: Die Nahrungsmittelversorgung der Heere Caesars* [= Beiträge zur Klassischen Philologie 69], Meisenheim an Glan: Verlag Hain.

Landels, J.G., 1978. *Engineering in the Ancient World*, Berkeley: University of California Press.

Langdon, John, 1986. *Horses, Oxen and Technological Innovation*, Cambridge: Cambridge University Press.

Lapedes, Daniel N. (ed.), 1977. *McGraw-Hill Encyclopedia of Food, Agriculture and Nutrition*, New York: McGraw-Hill.

Le Bohec, Yann, 1989: *Légion Auguste*, Paris: Editions du Centre National de la recherche scientifique.

——, 1994, *The Imperial Roman Army*, London: B.T. Batsford.

Lefebvre des Noëttes, Richard, 1931. *L'Attelage et le Cheval de Selle à Travers les Ages*, Paris: A. Picard.

Lenoir, M., 1979. *Pseudo-Hygin: des fortifications du camp*, Paris.: Les Belles Lettres.

Leone, Aurora, 1988. *Gli Animali da Transporto nell'Egitto Greco Romano e Bizantino*, Rome: Papyrologica Castroctaviana.

Lepper, Frank A. & Frere, Sheppard S., 1988. *Trajan's Column: A New Edition of the Cichorius Plates*, Gloucester: Allan Sutton.

Le Roux, Patrick, 1994. "Le revitaillement des armées romaines sous L'Empire," in R. Etienne (ed.), *Du latifundium au latifundo*, Paris: Diffusion de Boccard, pp. 394–416.

Levine, Lee, 1975. *Caesarea under Roman Rule* [= Studies in Judaism in Late Antiquity 7], Leiden: E.J. Brill.

Lonie, I.M., 1977. "A Structural pattern in Greek dietetics and the early history of Greek medicine," *Medical History* 21, 235–60.

Luttwak, Edward N., 1976. *The Grand Strategy of the Roman Empire*, Baltimore: Johns
    Hopkins University Press.
——, 1993. "Logistics and the Aristocratic Idea of War," in John Lynn (ed.), *Feeding
    Mars: Logistics in Western Warfare from the Middle Ages to the Present*, Boulder: Westview
    Press, 3–7.
Lynn, John 1993. "The History of Logistics and *Supplying War*," in John Lynn (ed.),
    Feeding Mars: Logistics in Western Warfare from the Middle Ages to the Present, Boulder:
    Westview Press, 9–27.
MacMullen, Ramsay, 1963. *Soldier and Civilian in the Later Roman Empire*, Cambridge:
    Harvard University Press.
——, 1976. *Roman Government's Response to Crisis A.D. 235–337*, New Haven: Yale
    University Press.
——, 1984. "The Legion as Society," *Historia* 33, 440–456.
——, 1988. *Corruption and the Decline of Rome*, New Haven: Yale Unversity Press.
Major, Duncan K. & Roger S., Fitch, 1911. *Supply of Sherman's Army During the Atlanta
    Campaign*, Fort Leavenworth: Army Services Schools Press.
Marasco, G., 1988. "La guerra annibalica e lo svillupo economico di Pozzuoli," in
    Geografia e storiografia nel mondo classico a cura di Marta Sordi [= CISA 14], Milan,
    205–216.
McDonnell, Myles, 1990. *Virtus as a Social, Religious and Political Concept in Republican
    Rome*, Dissertation, Columbia University.
Meijer, Fik, 1986. *A History of Seafaring in the Classical World*, New York: St. Martin's
    Press.
Middleton, Paul, 1979. "Army Supply in Roman Gaul: an hypothesis for Roman
    Britain" in B.C. Burnham & H.B. Johnson, *Invasion and Response: The Case of Roman
    Britain* [= BAR British Series 73], Oxford: British Archaeological Reports, 81–97.
——, 1983. "The Roman Army and Long Distance Trade" in Garnsey P. & C.R.
    Whittaker, 1983. *Trade and Famine in Classical Antiquity*, London: Cambridge University
    Press, 75–83.
Millar, Fergus, 1977. *The Emperor in the Roman World (31 B.C.–A.D. 337)*, London:
    Duckworth.
——, 1993. *The Roman Near East, 31 B.C.–A.D. 337*, Cambridge: Harvard University
    Press.
Milner, N.P., 1993. *Vegetius' Epitome of Military Science*, Liverpool: Liverpool University
    Press.
Mitchell, Stephen, 1976. "Requisitioned Transport in the Roman Empire," *Journal
    of Roman Studies* 66, 106–131.
——, 1978, "R.E.C.A.M. Notes and Studies No. 3—A Latin Inscription from
    Galatia," *Anatolian Studies* 28, 93–6.
Neesen, Lutz, 1980. *Untersuchungen zu den direkten Staatabgaben der römischen Kaiserzeit
    (27 v. Chr.–284 n. Chr.)*, Bonn: Rudolf Habelt Verlag.
Netzer, Ehud, 1991. *Masada III, The Yigael Yadin Excavations, 1963–65, Final Reports,
    The Buildings, Stratigraphy and Architecture*, Jerusalem: Israel Exploration Society.
Nichols, James L., 1964. *The Confederate Quartermaster in the Trans-Mississippi*, Austin:
    University of Texas Press.
Nicolet, Claude, 1976. *Tributum: Recherches sur la fiscalité directe sous la république romaine*
    [= *Antiquitas*, Reihe 1, *Abhandlungen zur Alten Geschichte*, Band 24], Bonn: Rudolf
    Habelt Verlag.
——, 1994. "Economy and Society, 133–43 B.C.," in J.A. Crook, A. Lintott &
    E. Rawson, *The Cambridge Ancient History, 2nd Ed., Vol. 9: The Last Age of the Roman
    Republic*, 146–43 B.C., Cambridge: Cambridge University Press, 599–643.
Nicols, John, 1978. *Vespasian and the Partes Flavianae* [= *Historia Einzelschriften* 28],
    Wiesbaden: Franz Steiner.
O'Connor, Colin, 1993. *Roman Bridges*, Cambridge: Cambridge University Press.

Olck, Franz, 1907. "Esel," *Pauly-Wissowa Realencyclopädie der Classichen Altertumswissenschaft* 6.1, Stuttgart: Alfred Druckmüller, 626–675.

Ørsted, Peter, 1985. *Roman Imperial Economy and Romanization: A Study in Roman imperial administration and the public lease system in the Danubian provinces from the first to the third century A.D.*, Copenhagen: Museum Tusculanum Press.

Ott, Joachim, 1995. *Die Beneficiarer*, [= *Historia Einzelschrift* 92], Stuttgart.

Parker, H.M.D., 1971. *The Roman Legions*, New York: Barnes & Noble.

Peacock, D.P.S. & Williams, D.F., 1986. *Amphorae and the Roman Economy*, New York: Longman.

Peddie, John, 1987. *Invasion: The Roman invasion of Britain in the year AD 43 and the events leading to their occupation of the West Country*, New York: St. Martin's Press.

——, 1994. *The Roman War Machine*, Conshohocken (Pa.): Combined Books.

Perjés, G., 1970. "Army Provisioning, Logistics and Strategy in the Second Half of the 17th Century," *Acta Historica Academiae Scientiarum Hungaricae* 16, 1–51.

Petrikovits, H. von, 1975. *Die Innenbauten der römischen Lagionslager während der Prinzipatzeit*, Opladen: Westdeutscher Verlag.

——, 1980. "Lixae," in W.S. Hanson & L.J.F. Keppie, *Roman Frontier Studies XII, 1979* = BAR International Series 71], Oxford: British Archaeological Reports, 1027–1035.

Pharr, Clyde (tr.), 1969. *Codex Theodosianus: The Theodosian Code and Novels, and the Sirmondian Constitutions*, New York: Greenwood.

Pitts, L.F. & J.K. St. Joseph, 1985. *Inchtuthil: The Roman Legionary Fortress*, [= Britannia Monograph Series 6], London: Society for the Promotion of Roman Studies.

Pohl, H, 1993. *Die römischen Politik und die Piratie im östlichen Mittelmeer vom 3. bis 1. Jh. v. Chr.*, Berlin.

Prestwish, M., 1967. "Victualling Estimates for English Garrisons in Scotland during in Early 14th Century," *English Historical Review* 82 (1967), 536–543.

Price, Jonathan J., 1992. *Jerusalem Under Siege: The Collapse of the Jewish State, 66–70 C.E.*, New York: E.J. Brill.

Pritchett, W. Kendrick, 1971. *The Greek State at War, Part I*, Berkeley: University of California Press.

Remesal-Rodríguez, José, 1986. *La annona militaris y la exportación de aceite bético a Germania*, Madrid: Editorial Universidad Complutense.

——, 1990. "Die Procuratores Augusti und die Versorgung des römischen Heeres," in H. Vetters & M. Kandler, 14. *Internationalen Limeskongressen 1986 in Carnuntum, Wien*, 55–65.

Richardson, John, 1994. "The Administration of the Empire," in J.A. Crook, A. Lintott & E. Rawson (eds.), *The Cambridge Ancient History, 2nd Ed., Vol. 9: The Last Age of the Roman Republic*, 146–43 B.C., Cambridge: Cambridge University Press, 564–598.

Richmond, Ian A., 1982. *Trajan's Army on Trajan's Column*, London: British School at Rome.

Rickman, Geoffrey, 1971. *Roman Granaries and Store Buildings*, Cambridge: Cambridge University Press.

——, 1980. *The Corn Supply of Ancient Rome*, Oxford: Oxford University Press.

Risch, Erna, 1989. *Quartermaster Support of the Army*, 2nd. ed., Washington, D.C.: Center of Military History, United States Army.

Rossi, Lino, 1971. *Trajan's Column and the Dacian Wars*, Ithaca: Cornell University Press.

Rotberg, Robert I. & Theodore K. Rabb, 1985, *Hunger and History*, New York: Cambridge University Press.

Roth, Jonathan, 1991. *The Logistics of the Roman Army in the Jewish War*, diss. Columbia University.

——, 1994. "The Size and Organization of the Roman Imperial Legion," *Historia* 43, 346–362.

——, 1995. "The Length of the Siege of Masada," *Scripta Classica Israelica*, 14, 87–110.

Rougé Jean, 1981. *Ships and Fleet of the Ancient Mediterranean*, Middletown (CT): Wesleyan University Press.

Rouland, Norbert, 1977. *Les Esclaves Romains en Temps de Guerre* [Collection Latomus 151], Brussels: Latomus.

Rowland, Robert, 1990. "The Production of Sardinian Grain in the Roman Period," *Mediterranean Historical Review* 5, 14–20.

Ruge, Friedrich, 1965. "Logistik," in Carl Andersen (ed.) *Lexikon der Alten Welt*, Zürich and Stuttgart: Artemis, 1762–3.

Rüpke, J., 1990. Domi militiae: die religiösen Konstruktion des Krieges in Rom, Stuttgart.

Saddington, D.B., 1982. *The Development of the Roman Auxiliary Forces from Caesar to Vespasian (49 B.C.–A.D. 79)*, Harare: University of Zimbabwe Press.

——, 1996. "Early Imperial *Praefecti Castrorum*," Historia 45/2, 244–252.

Sartorio, Giuseppina, 1988. *Mezzi di trasporto e traffico* [= *Vita e Costumi die Romani Antichi* 6], Rome: Edizioni Quasar.

Savory, Theodore, 1970. "The Mule," *Scientific American*, 223/6, 102–109.

Schlippschuh, Otto,1987. *Die Händler im römischen Kaiserreich in Gallien, Germanien und den Donauprovinzen Raetien, Noricum und Pannonien*, Amsterdam: Hakkert.

Scholz, Udo W. 1973. "Suovetaurilia und Solitaurilia," *Philologus*, 117 (1973) 3–28.

Schönberger, B.H., 1985. "Die römischen Truppenlager der frühen und mittleren Kaiserzeit zwischen Nordsee und Inn," *Bericht der Römisch-Germanischen Kommission des Deutscher Archaeologischen Instituts* 66, 321–497.

Segré, Angelo, 1942/3. "The Annona Civica and the Annona Militaris," *Byzantion* 16.1, 393–444.

Seibert, Jakob, 1986. "Die Logistik der Feldzüge Alexander des Großen" in Horst Boog (et al.), *Die Bedeutung der Logistik für die militarische Führung von der Antike bis in die neuste Zeit* [= Vorträge zur Militärgeschichte 7], Herford: E.S. Mittler & Sohn, 11–33.

——, 1993. *Hannibal*, Darmstadt.

Shatzman, Israel, 1972. "The Roman general's authority over booty," *Historia* 21, 177–205.

Shean, John, 1996. "Hannibal's Mules: The Logistical Limitations of Hannibal's Army and the Battle of Cannae, 216 B.C.," *Historia* 45/2, 159–187.

Silhanek, David Kent, 1972. *Vegetius' Epitoma, Books 1 and 2: A Translation and Commentary*, dissertation, New York University.

Sippel, Donald V., 1987a. "Some Observations on the Means and Cost of the Transport of Bulk Commodities in the Late Republic and Early Empire," *Ancient World* 16, 35–45.

——, 1987b. "Dietary Deficiency Among the Lower Classes of Late Republican and Early Imperial Rome," *Ancient World* 16, 47–54.

Speidel, Michael P., 1973. "The Pay of the Auxilia," *Journal of Roman Studies*, 63, 141–7.

——, 1978. *Guards of the Roman Armies: an essay on the Singulares of the provinces*, Bonn: Rudolf Habelt.

——, 1984. "Lixa of the Third Thracian Cohort in Syria: A New Inscription," *Roman Army Studies*, Vol. I, Amsterdam: J.C. Gieben, 203–5.

——, 1989. "The Soldiers' Servants," *Ancient Society* 20, 239–247.

——, 1992. *The Framework of the Imperial Legion*, Cardiff.

——, 1994. *Riding for Caesar: The Roman Emperors' Horse Guards*, Cambridge: Harvard University Press.

Sperber, D. 1969. "Angaria in the Rabbinical Literature," *L'Antiquité Classique* 38, 164–168.

Starr, Chester, 1989. *The Influence of Sea Power on Ancient History*, Oxford: Oxford University Press.

Stolle, Franz, 1914. *Der Römische Legionär und sein Gepäck (Mulus Marianus): Eine*

Abhandlung über den Mundvorrat, die Gepäcklast und Tornister des Römischen Legionärs und im Anhang Erklärung der Apokolypse 6.6, Strassburg: K.J. Trubner.

Syme, Ronald, 1939. *The Roman Revolution*, Oxford: The Clarendon Press.

Thompson, Julian, 1991. *The Lifeblood of War: Logistics in Armed Conflict*, London: Brassey's.

Thorpe, George C., 1917. *Pure logistics. The Science of War Preparation*, Kansas City: Franklin Hudson.

Toussaint-Samat, Maguelonne, 1992. *A History of Food*, (tr. Anthea Bell), Oxford: Basil Blackwell.

U.S. Army, 1916. *Manual for the Quartermaster Corps*, Washington, D.C.: Headquarters Department of the Army.

——, 1917. *Manual of Pack Transportation*, Washington, D.C.: Government Printing Office.

——, 1935. *The Army Cook* (TM 2100–152), Washington, D.C.: War Department.

——, 1961. *Nutrition* (TM 8–501), Washington, D.C.: Headquarters Department of the Army.

Van Berchem, Denis, 1937. "L'annone militaire dans l'empire romain au IIIᵉ siècle," *Mémoires de la Société nationale des antiquaires de France*, 8:10, 117–202.

——, 1977. "L'annone militaire est-elle un mythe?" in M. Corbier (ed.), *Armées et Fiscalité dans le Monde Antique*, [= Colloques Nationaux de C.N.R.S. 936], Paris: Éditions du C.N.R.S., 331–6.

——, 1985. "Le port de Séleucie de Piérie et l'infrastructure logistique des guerres parthiques," *Bonner Jahrbücher* 185 47–87.

Van Creveld, Martin, 1977. *Supplying War: Logistics from Wallenstein to Patton*, New York: Cambridge University Press.

——, 1989. *Technology and War: from 2000 B.C. to the Present*, New York: Free Press.

Van Driel-Murray, C., 1985. "The Production and Supply of Military Leatherwork in the First and Second Centuries A.D." in M.C. Bishop (ed.), *The Production and Distribution of Roman Military Equipment, Proceedings of the Second Roman Military Equipment Research Seminar* [= BAR International Series 275], Oxford: British Archaeological Reports, 43–75.

Van Minnen, Peter and Joshua D. Sosin, 1996. "Imperial Pork: Preparations for a visit of Severus Alexander and Julia Mamaea to Egypt," *Ancient Society* 27, 171–181.

Vittinghoff, Friedrich, 1974. "Das Problem des Militärterritoriums in der vorseverischen Kaiserzeit," in *I diritti locali nelle province romane con particolare riguardo all condizioni giuridiche del suolo Accademia Nazionale dei Lincei*, 194, Rome, 109–124.

Walbank, Frank W., 1957–79. *A Historical Commentary on Polybius*, Oxford: Clarendon Press.

Walde, Alois, 1939. *Lateinisches Etymologisches Wörterbuch*, Heidelberg: Carl Winter's Universitätsbuchhandlung.

Walker, Henry P., 1966. *The Wagonmasters*, Norman: University of Oklahomas Press.

Walker, Robin, 1974–5, "Roman Cavalry Rations: A Calculation of the Ration of Barley Issued to the Troop Horse," *Veterinary History* 4, 16–19.

Watson, George R., 1969. *The Roman Soldier*, Ithaca: Cornell University Press.

Webster, Graham, 1985. *The Roman Imperial Army*, 3rd edition, Totowa (N.J.): Barnes & Noble.

Wells, Colin, 1977. "Where Did They Put the Horses? Cavalry Stables in the Early Empire," *Acts of the XLIII Limes Congress*, Budapest, 659–665.

Welwei, K.-W., 1988. *Unfreie im antiken Kriegsdienst, III: Rom*, Wiesbaden: Steiner.

Wheeler, Everett L., 1979., "The Legion as Phalanx," *Chiron* 9, 303–318.

——, 1997a. "Why the Romans Can't Defeat the Parthians: Julius Africanus and the Strategy of Magic," in W. Groenman-van Waateringe *et al.* (eds.), *Roman Frontier Studies 1995: Proceedings of the XVIth International Congress of Roman Frontier Studies*, Oxford, 1997, 575–579.

——, 1997b. "The Chronology of Corbulo in Armenia," *Klio*, 79/2, 383–397.

White, K.D., 1970. *Roman Farming*, Ithaca: Cornell University Press.

——, 1984. *Greek and Roman Technology*, Ithaca: Cornell University Press.

Wierschowski, Lothar, 1984. *Heer und Wirtschaft: Das römische Heer der Prinzipatzeit als Wirtschaftsfaktor*, Bonn: Habelt.

Wilkes, J., 1972. *The Roman Army*, Cambridge: Cambridge University Press.

Wille, Fritz (tr.), 1986. *Flavius Vegetius Renatus, Epitoma Rei Militaris: Das Gesamte Kriegswesen*, Frankfurt am Main: Sauerländer.

Wolfe, Ethyl R., 1951. "Transportation in Augustan Egypt," *Transactions of the American Philological Association* 83, 80–99.

Yadin, Yigael, 1966. *Masada: Herod's Fortress and the Zealots' Last Stand*, New York: Random House.

Yeo, C.A., 1946. "Land and Sea Transportation in Imperial Italy," *Transactions of the American Philological Society* 77, 221–44.

Ziolkowski, Adam, 1993. "*Urbs direpta*," in John Rich & Graham Shipley, *War and Society in the Roman World*, New York: Routledge, 69–91.

Zlattner, M., 1997. Hannibals Geheimdienst in Zweiten Pünischen Krieg [= *Xenia* Band 39], Constance.

Zuckerman, Constantine, 1988. "Legio V Macedonica in Egypt: *CPL* 199 Revisited," *Tyche* 3, 279–287.

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