STUDIES ON THE REPRESENTATIONAL AND LINEAR B DOCUMENTARY EVIDENCE FOR THE EXISTENCE AND TECHNOLOGY, AND THE MILITARY USE OF THE CHARIOT IN MAINLAND GREECE AND CRETE DURING THE LATE HELLADIC AND LATE MINOAN PERIOD

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Dedicated with gratitude
to my supervisor and mentor
Professor Lydia Baumbach

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Whatever faults or misinterpretations my work may be found to contain are of my own making.

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SUMMARY

This dissertation traces the technological and military history of the chariot in Mycenaean Greece and Minoan Crete, from around the beginning of the Aegean Late Bronze Age, c. 1600/1550 B.C. to the final collapse of Mycenaean civilization on the Greek Mainland at the end of the Late Bronze Age, c. 1100/1050 B.C. It as consolidates existing archaeological and linguistic studies in this field. The evidence and argumentation rely primarily on chariot representations in Minoan and Mycenaean funerary art, glyptic, pictorial vase-painting and frescoes, and documentary sources in the form of Linear B tablets primarily from Knossos (Crete) and Pylos (Messenia). In order to study the technological history of the chariot the representational and documentary sources are treated separately. This arrangement is necessitated by the fact that the data need to be placed in a proper historical and geographical perspective through archaeological and chronological analyses before it is possible to draw any firm conclusions. It is shown that diachronically four typologically distinctive Aegean chariots are evidenced in the sources. These were essentially in use during the 16th and 15th centuries B.C. (Box and Quadrant types), the 14th and 13th centuries B.C. (the Dual type), and the 13th and 12th centuries B.C. (the Open-Rail type). Discussion of the Linear B documentary evidence pertains exclusively to the Dual chariot and is aimed at supplementing the technological information gleaned from the representational sources. The Linear B tablets also give valuable insight into

the complexity and extent of the industrial and administrative organization involving chariotry at Knossos and Pylos. Reconstruction of the military history of the chariot, both as it appears in representations and in theory, relies first and foremost on the consolidation of the representational and documentary evidence. In view of the relative paucity of actual military scenes and the fact that the representations cannot always be taken at face value, its military history requires consideration of a broader spectrum of archaeological and inferential evidence, such as the existence of a network of roads in the regions under consideration. It is argued that in contrast to the tactical role of chariots in massed attack at speed in contemporary Near Eastern and Egyptian warfare, the Aegean chariot served a strategic role in overland communications and in a Homeric fashion as a taxi service for transporting warriors to and from the battle field.

ABBREVIATIONS

A. Abbreviations for Archaeological Periods

BA	:	Bronze Age
MBA	:	Middle Bronze Age
LBA	:	Late Bronze Age
EH	:	Early Helladic
MH	:	Middle Helladic
LH	:	Late Helladic
EM	:	Early Minoan
MM	:	Middle Minoan
LM	:	Late Minoan
LH I , II , III (A,B,C)	:	Indicate chronological subdivisions within the LH period, with further chronological subdivisions alphabetically and numerically denoted A:1 , A:2, B:1 , B:2 etc.

LM I , II , III (A,B,C) : Indicate chronological subdivisions within the LM period, with further chronological subdivisions alphabetically and numerically denoted A:1 , A:2 , B:1 , B:2 etc.

LM I/II or LH I/II : Indicate LM or LH material not closely assignable to either LM I or LM II , or LH I or LH II.

LM III A-B or LH III A-B : Indicate that material date within the LM III A-B , or LH III A-B chronological range.

B. Bibliographic Abbreviations

All Bibliographic Abbreviations are given in the Bibliography.

C. Museum Collections

Athens , NM	National Archaeological Museum
Heidelberg	Heidelberg University Museum
Heraklion , HM	Heraklion Museum
London , BM	British Museum

Nauplion	Archaeological Museum and store-rooms in Medrese
Nicosia , C.M.	Cyprus Museum
Oxford , Ashm.	Ashmolean Museum

LIST OF ILLUSTRATIONS

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INTRODUCTION

The subject of the studies presented here is not a new one; the study of Aegean chariotry dates back more than a century to the publication by Heinrich Schliemann in 1878 of the cultural assemblage at Mycenae, which included a number of relief-sculptured chariot scenes on figured grave stelae from Shaft Grave Circle A.

Early scholarship, notably the publications of H.W. Helbig (1887; 1904) and W. Reichel (1893; 1901), prompted by Schliemann's firm belief that he had discovered the royal graves of the dynasty of Agamemnon, focused largely on the relationship of these and other representations to the material culture of the Homeric epic tradition. However, the availability of additional evidence uncovered by archaeologists soon paved the way for more extensive research into the significance of the material culture evidenced by these finds in the broader context of the Aegean Late Bronze and Early Iron Age in general. As a result E. von Mercklin (1909; 1916) was able not only to study the historical development of the chariot in the region during the Late Bronze and Early Iron Age, but also to do a typological classification of chariots on the basis of differences in their coachwork in the representational sources.

Apart from Von Mercklin's study important findings were

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consistently published from 1900 onwards, including reconstructions of fresco fragments from Mycenae and Tiryns by G. Rodenwaldt (1911a; 1911b; 1912; 1921) and W. Lamb (1921-23). An exemplary re-examination and classification of Schliemann's stelae by W.A. Heurtley (1921-23) was followed by a thorough reappraisal of the Shaft Graves in the context of Aegean archaeology by G. Karo (1930-33), who also considered the relationship between the Mainland and Crete, which had become a focus of attention in consequence of Sir Arthur Evans' excavations at Knossos from 1900 onwards. Evans produced fresh evidence of the existence and use of the chariot there in the form of ideograms on tablets inscribed in the syllabic script Linear B. These were incorporated in a comparative typology of Aegean chariots, taking into account also the Near Eastern and Egyptian evidence, in the 4th volume of Evans' Palace of Minos (1935). Shortly thereafter A. Furumark (1941) published a broad spectrum of chariot representations in Mycenaean pictorial pottery in a definitive study which formed the basis of the generally accepted Aegean Late Bronze Age chronology. Having examined comparative representations in non-Mycenaean sources as well, Furumark concluded, as had Rodenwaldt before him, that the Mycenaean chariot originated in the Levant, a view contested by F. Schachermeyr (1951), who held that it was introduced to Greece not from the Levant, but from Egypt.

Since the early 1950's, along with the study and publication of

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existing and new material - notably H.L. Lorimer's (1950) in depth study of Bronze Age and Early Iron Age chariots as part of a definitive study of Aegean archaeology in the light of the Homeric epic - the literature on Aegean chariotry has steadily increased. Of particular importance during this period were the discovery of tablets, similar to those excavated by Evans at Knossos, by C.W. Blegen (Blegen and Rawson, 1966) at Pylos in the south-west Peloponnese, and the decipherment of the language of the tablets by M. Ventris, on the basis of which the ideograms and texts relating to chariots and wheels from both Knossos and Pylos were re-examined and fully dealt with in the first edition of M. Ventris and J. Chadwick's Documents in Mycenaean Greek (1956). Within a decade of the decipherment the archaeological remains of possible Bronze Age roads were discovered as a result of an archaeological and geophysical survey of Messenia, by a research team associated with the University of Minnesota in the early 1960's (McDonald, 1964; 1967; 1972; McDonald and Hope Simpson, 1964); similar discoveries were also made elsewhere in Greece, notably the Argolid (Hope Simpson, 1962; McDonald, 1964; McDonald and Rapp, 1972).

Subsequent studies which contributed much to our knowledge of both the construction and the use of chariots include those by J.K. Anderson (1961; 1965; 1975), T.G.E. Powell (1963), J. Wiesner (1968) and H. W. Catling (1968). M.A. Littauer (1972) then addressed the contentious issue of the military role of the

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chariot in Bronze Age Greece, and more recently, a detailed study of the chariot and wheel tablets by C.J. Ruijgh (1976), was followed by the contribution of F.Vandenabeele and J-P. Olivier (1979) of a comprehensive classification and study of the Linear B "military" ideograms. Of importance also are articles on Aegean chariotry in general by Littauer and J.H. Crouwel jointly (1973b; 1982); both scholars had already contributed similar studies on Near Eastern and Egyptian chariotry (1979). Crouwel's published doctoral dissertation (1981) forms the basis of the present study.

Although the outline of scholarship above is by no means exhaustive, it is evident that existing research on the chariot is extensive. However, whereas general consensus exists in regard to the typological classification of Aegean chariots, systematic studies in the field of Aegean chariot technology are relatively recent (notably Lorimer (1950) and Crouwel (1981)); its military use and role in Late Bronze Age warfare, moreover, remain subjects of controversy. In this dissertation it is attempted to consolidate the range of the evidence, both material and documentary, for the existence and technological development of the chariot in the archaeological horizon generally referred to as Late Minoan (LM) in Crete and Late Helladic (LH) on the Greek Mainland, and to consider in particular the evidence, both material (direct) and inferential (indirect), for its use and role in the context of Late Bronze Age (LBA) warfare in the

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The geographic scope of this study is limited to archaeological sites in Mainland Greece and Crete. Comparative evidence from outside these areas, mainly from Egypt, the Levant and Anatolia is, however, introduced when relevant to a subject or period under discussion. In regard to the Near East and Egypt discussion is based primarily on M.A. Littauer and J.H. Crouwel's definitive study (1979), and on illustrations in Y. Yadin (1963). The evidence from Crete and the Mainland will be dealt with separately throughout; but this does not imply that the development and use of the chariot in the two regions can be regarded as mutually exclusive, since commercial and cultural interaction between Crete and the Mainland did exist throughout the Aegean Bronze Age (Hooker, 1976).

As noted previously, the foundation of a Bronze Age chronology for the Aegean has been set out in detail by A. Furumark (1941); it relies primarily on the ceramic sequence in terms of style and decoration and in general has remained virtually unchanged, except for the attribution of 'years B.C.' to specific cultural sequences. The revised chronology published by V. Hankey and P.M. Warren (1974), which differs from Furumark mainly in the absolute dating of the transitional LM and LH IIIB - IIIC period - the beginning of the latter has been revised to c. 1190 B.C., instead of Furumark's c. 1230 B.C. - is given below and forms the basis of the chronology used in this dissertation:

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conclusions as may be arrived at largely inferential. This does not imply that the representations are necessarily an inaccurate index of early Greek chariotry. The Minoan and Mycenaean artistic repertoire is conservative and it is possible to arrive at some positive conclusions through an understanding of the artistic conventions used.

The Linear B evidence, on the other hand, constitutes a more accurate source in so far as the technical terminology is an important source for their construction, and the numbers of chariots and wheels, where these survive, give valuable insight into the logistics of Aegean chariotry during the 14th and 13th centuries B.C.

Chapter 1 examines the earliest evidence for the existence of the chariot in Greece and Crete from c. 1600 - 1450 B.C. The typological classification of the earliest Aegean chariots as either the Box or Quadrant type is demonstrated on the basis of the representational sources.

Chapter 2 deals with the representational evidence during the period from c. mid-15th century to c. end-13th century B.C. It is demonstrated that a standard chariot type, the Dual chariot was widely used throughout this period. Since the evidence is more extensive and generally more detailed than the sources dealt with in chapter 1, its technology is discussed in greater detail.

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association of Aegean chariots with military activity.

Although the chronological periods dealt with in the respective chapters cannot be regarded as an accurate indication of absolute phases in the development of the chariot and overlaps may occur, it is believed that the general typological sequence of Box, Quadrant, Dual and Open-Rail chariots is correct.

Although the sources cited include vehicles drawn by animals other than horses, which consequently do not subscribe to the definition of chariot given above, it is believed that their inclusion as evidence is warranted by their importance as sources for the technology of the respective chariot types.

In chapter 5 the representational and documentary source material is consolidated in a discussion of the evidence for the military use and the role of the chariot in warfare in the Aegean during the Late Bronze Age. It is demonstrated that, in contrast to the use of massed chariots at speed by the Egyptians and Western Asiatic peoples, the role of the Aegean chariot was primarily strategic, for the transport of military personnel and for overland communications. In this regard the broader spectrum of archaelogical research is considered. Discussion includes the evidence for the existence of an extensive network of roads, notably in Messenia and the Argolid, and the arms and armour of the Mycenaean charioteer, which are briefly dealt with on the basis of the representational and documentary sources.

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All terms indicated by q.v. in the text are explained in Appendix A, a glossary of technical terms used.

Appendix B, briefly considers the Aegean harnessing system and control of the chariot, a subject not specifically dealt with in the main text.

The illustrations appear in the concluding pages of this dissertation, after the Bibliography.

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CHAPTER 1

THE EARLY EVIDENCE: REPRESENTATIONS OF CHARIOT TYPES I AND II - BOX AND QUADRANT CHARIOTS

Introduction

The origins and introduction of the chariot in Greece and the Aegean are uncertain. The only statement about its early history which can be made with reasonable certainty is, as H.L. Lorimer[1] rightly remarks in the introduction to her section on chariotry, that it was probably introduced from the Levant at some time during the later part of the first half of the 2nd millennium B.C. Its first documented occurrence in the region is on relief-sculptured grave stelae from Schliemann's Grave Circle A at Mycenae, more or less coincidental with its adoption as a tactical weapon in warfare by the Egyptians and western Asiatic peoples, c. 1600 B.C.[2] The following representations are our earliest sources:[3]

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1. 1950 : 307 - 9.
2. A comprehensive survey of the early history of the chariot is beyond the scope of this dissertation. It is generally agreed that it cannot have preceeded the introduction of the chariot in the Near East and Egypt - probably also from the Levant - where some early documentary references occur in the 17th century B.C. battle-records of the Hittite kings, Hattusilis I (c.1650 B.C.) and Mursilis I (c. 1600 B.C.), with the use of the term <u>gišGIGIR</u> (syllabic equiv. <u>narkabtu</u>) in connection with warfare; in Egypt early representations about the mid-16th century B.C. include the 6-spoked chariots of Amenophis I (c. 1549-1529 B.C.). For detailed coverage, see Littauer and Crouwel 1979: 64 ff., 68f.; cf. Powell 1963: 153 ff. with fig. 37; also Yadin 1963: 75. While the foreign origin of Aegean chariots is widely accepted, no <u>communis opinio</u> exists as to an exact location: Schachermeyr's (1951: 729 ff., 740 esp.) arguments in favour

* For nn.2 (cont.) and 3, see below p. 13.

1.1 Sources

MAINLAND GREECE

- Mycenae (Argolid) : Complete and fragmentary chariot positions occur on five of the eleven relief-sculptured grave stelae and on an engraved gold signet ring excavated <u>in situ</u> from Shaft Circle A[4], c. LH I/IIA (c. 1550 - 1440 B.C.)[5] as follows -

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2. (cont). of an Egyptian origin have been criticised and seems unlikely (Hooker 1976 : 46 ff.); an European origin seems equally unlikely (cf. Powell 1963: 162 ff.); Anatolia and the Levant seem to be the most likely alternatives (Lorimer 1950: 307 ff.; Crouwel 1981: 148 and refs.), but although a Levantine origin is preferred by many scholars, the arguments are not conclusive. In terms of chronology, Lorimer (1950: 307) is no doubt correct in linking the history of chariot with that of the horse, but the difficulties of establishing such a chronology with any degree of certainty has most recently been pointed out by J.H. Crouwel (1981: 32 ff. and refs.). In so far as the horse is concerned the problem is essentially two-fold - species (osteological) identification and archaeological visibility of the faunal evidence. Osteology has only recently made its debut as an archaeological science and there remains the problem of assigning such faunal evidence as may be excavated to datable contexts; besides this the faunal evidence at a particular site may be biased in favour of species more appropriate to human diet for example, than to agricultural or social use. It can, however, be reasonably assumed that its appearance in Greece and the Aegean cannot have been much earlier than a generation or so before the ascendancy of the Shaft Grave Circle A dynasty, towards the end of MH on the Mainland and end of MM in Crete. For a detailed survey, with refs., see Crouwel 1981: 32 ff; cf. Renfrew 1972: 354 ff.
3. See Lorimer 1950: 309 ff.; Catling 1968: 42 ff. Greenhalgh 1973: 30-1; Crouwel 1981: 59 ff.
4. Shaft Grave Circle A is located on the south-west slope of the acropolis in the area immediately south of the Lion Gate. It contained 6 graves - 5 were excavated by Schliemann in 1876, and a 6th by Stamatakis in 1878 - with multiple burials of about 17 individuals. Comprehensive surveys of the Grave Circle, the graves and their contents can be consulted in Schliemann 1878; Karo 1930-33; Wace 1949: 59 ff esp.; Mylonas 1957: 103 ff. esp.; ibid. 1966: 190 ff. esp.; more recently, Dickinson 1977: 39-40, 46 ff. with refs. For a detailed description and classification of

* For nn. 4 (cont.) and 5, see below p. 14.

- Stele I (Athens, NM 1427) (Pl. 1)[6] : Compositionally it is the most complex of the engraved stelae; although incomplete and damaged at crucial points it shows a chariot scene in the upper part of the compositional section. A man in a chariot, apparently unarmed except for what may be a dagger or broad-bladed sword, seemingly tied around his waist, drives over what Sir Arthur Evans[7] interpreted as a fallen warrior under a figure-8 shield.

- Stele IV (Athens, NM 1429) (Pl. 2)[8] : The chariot composition, in the upper register of the stele, is dominated by a charioteer, unarmed and holding the reins, driving at or in the direction of a man on foot, who, according to Tsountas,

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4. (cont.) the stelae, see Heurtley 1921-23. It must be noted, however, that the original position of the stelae may have been different; it is agreed that a thorough reconstruction of Grave Circle A, which had by then probably fallen into ruin through disuse, was undertaken in LH III B, when the West Cyclopean Wall and the section in the vicinity of and including the Lion Gate were constructed as part of a refortification of the citadel. The date of these building operations has been firmly established by the ceramic sequence below the lowest course of the Western Cyclopean Wall (in the vicinity of the Lion Gate). For full details, see Wace 1949 : 50 ff. and Appendix 2; also Mylonas 1966: 94-96.
5. It is generally agreed that the Grave Circle was founded towards the end of MH and continued in use until at least the end of LH I, with at least one burial, in Grave I dating to LH IIA (c. 1490 - 1440 B.C.) See Dickinson 1977: 46 ff. and refs.
6. Schliemann 1878: 90, 92 with no. 24; Heurtley 1921-23: 127-29, no. I: Pl. XIX; Lorimer 1950: 140-1, fig. 3; Mylonas 1951: 141-2, fig. 6; also Vermeule 1964: 91, fig. 17(b); for full bibliography, see Crouwel 1981: 160 no. S 3: Pl. 37.
7. 1929: 54 ff.
8. Schliemann 1878: 100 ff. with no. 141; Heurtley 1921-23: 127, 131, no. IV: Pl. XX; Lorimer 1950: 309-10, Pl. XXIV (right); Mylonas 1951: 138 ff., fig. 3; for full bibliography, see Crouwel 1981: 160 no. S 2: Pl. 36.

"is making at the mounted man with a spear"[9]. The chariot itself is severely curtailed, and a triangular object, probably a sword, is seen in an unrealistic position at the rear of the box (q.v.), as if tied to the floor and dangling from it.

- Stele V (Athens, NM 1428) (Pl. 3)[10] : The content of this stele is similar to that on NM 1429; the main differences are that the charioteer seems to be armed with a round-pommelled, broad-bladed sword, held in his left hand or strapped around his waist; the footman brandishes what Heurtley and Karo compared to typologically similar contemporary bronze knives.[11]

The traditional interpretation of the scenes on these, the three best preserved stelae, which stood over Grave V, is that they are scenes of battle in which the charioteer, presumably the deceased, took an active part; although this view has been challenged by G.E. Mylonas[12] who enjoys the support of a number of other scholars, the probability that these are scenes of war cannot be rejected, as is obvious in the case of the two remaining chariot-stelae:

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9. Tsountas and Manatt 1897: 92.
10. Schliemann 1878: 92 ff. with no. 142; Heurtley 1921-23: 127, no. V : Pl. XX; Lorimer 1950: 309-10, Pl. XXIV (left); Mylonas 1951: 136-8, fig. 2; Vermeule 1964: 91, fig. 17(a); for full bibliography, see Crouwel 1981: 160 no. S 1; Pl. 35; cf. also Holoka 1980: 38-40; with Pl. I.
11. Heurtley 1921-23: 132; Karo 1930-33: 169.
12. 1951 : 134 ff.; see also below, pp. 110ff. and nn. 2ff.

- Stele VIII, fragments (incl. in Athens, NM 1434 - 66) (Pl. 13 4) : Although highly fragmented and incomplete, it shows, as Heurtley comments, "In the upper register, to the left, two-thirds of a chariot-wheel, below it, to the right, the head of a spear, pointing to the left and resting on the ground".[14]

- Stele IX, fragments (incl. in Athens, NM 1434 - 66) (Pl. 15 5) : The scenes in these fragments are conjecturally assigned to the same stele by Heurtley; contextually and compositionally they seem to depict motifs similar to those on NM 1429 (Stele IV), NM 1428 (Stele V) and the fragment of Stele IX above. Heurtley[16] comments on their contents as follows: (IX.a) "This shews the lower rim of a wheel(?) and below it to the left the legs of a man, falling head foremost; to the right the head and upper part of a man who is leaning forward to the right ... The object to the right of his head is perhaps the point of a spear or sword held by an adversary ..."; (IX.b) "... to the left, part of curved chariot box and two wheels, one not quite complete. To the right the hind-quarters of a horse, ... Above, part of the reins ..."

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13. Heurtley 1921-23: 133, 135, no. VIIIa: fig. 30 (top left); cf. Crouwel 1981: 74- 5, 160 no. S 4: Pl. 38; also Vermeule 1964: 91 fig. 17(d) (wrongly assigned to Stele IX).
14. 1921-23: 135.
15. ibid. 1921-23: 135-6, no. IX. a-b: fig. 30 (right); cf. Crouwel 1981: 74-5, 160 no. S 5: Pl. 39; also Vermeule 1964: 91 fig. 17(c) (incorrectly assigned to Stele VIII).
16. 1921-23: 135.

In spite of their poor preservation the stelae VIII and IX fragments are, as mentioned, important evidence for the contextual association of chariots with military equipment. Contrary to Mylonas' arguments in favour of the non-military use of the chariot they seem to support the notion of its active role in early LH warfare.[17]

- A chariot scene on the engraved gold signet ring (Athens, NM 240) (Pl. 6)[18] from the LH I (c. 1550-1490 B.C.) artefactual assemblage in Shaft Grave IV, shows "two men in a chariot hunting a stag";[19] the figure in front, presumably the passenger, is armed with a bow.

- Vapheio (Laconia) : Chariots are engraved on two LH II A (c. 1490 - 1440 B.C.) seal stones - an amygdaloid carnelian (Athens, NM 1796),[20] and on a lentoid sardonyx (Athens, NM 1770) (Pl. 7)[21], which shows two men, one presumably holding the reins and the other apparently armed with a spear, in a chariot pulled by two horses and apparently travelling at speed.

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17. see below, p. 113.
18. Schliemann 1878: 257 ff., no. 334; Lorimer 1950: 310 ff., fig. 38; Catling 1968: 43 no. 2; Crouwel 1981: 59, 158 no. G 2: Pl. 10, with full bibliography.
19. Schuchhardt 1974: 220-1, with no. 220.
20. Crouwel 1981: 158 no. G 4: Pl. 12, with full bibliography.
21. Evans 1925: 34 ff.; ibid. 1935: 820; Lorimer 1950: 310 ff., fig. 39; Catling 1968: 43 no. 3; Crouwel 1981: 59, 158 no. G 3: Pl. 11, with full bibliography.

- Kazarma (Argolid): The composition, engraved on a LH II A (c. 1490 - 1440 B.C.) cylinder of amethyst (Nauplion Mus., no inv. no.)[22] is exceptional in that the chariot, which has only one occupant - he holds a two-pronged whip in one hand and the reins in the other - is pulled by two lions instead of horses.

CRETE

- Chariot groups are reported on several complete and incomplete LM I B, c. 1500-1490 B.C. sealings and seal impressions from Hagia Triadha[23] and Sklavokambos,[24] as well as an engraved gem reportedly from Knossos[25] (Pl. 8).

1.2 Discussion

Given the paucity of these early sources and their stylistic and compositional brevity, the amount of precise information which can be gleaned from them is necessarily limited. Although none of the chariot groups - except those from Mycenae - occur in association with other narrative elements, some positive conclusions can, however, as already noted, be arrived at through

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22. ibid. 1981: 59, 158 no. G 1; Pl. 9.
23. Heraklion, HM 516A; Evans 1935: 828; cf. Hood 1978: 222-3, fig. 224 G; for full bibliography, see Crouwel 1981: 158, no. G 8; Pl. 18 and refs.
24. Heraklion, HM 632-5; Marinatos 1939-41: 90, Pl. 4 no. 8; cf. Catling (1968: 43-4), who rightly notes that the Sklavokambos sealings are ambiguous in showing in many cases a team and driver, but not the chariot itself.
25. Evans 1935 : 815; Lorimer 1950 : 312, fig. 41; for full bibliography, see Crouwel 1981 : 159 no. G 13; Pl. 18.

an understanding of the artistic conventions used in their execution.[26]

All these sources are two-dimensional and the compositions in strict profile. The wheels (q.v.) are consistently depicted as 4-spoked, an Aegean characteristic which almost without exception persisted throughout the Bronze Age. Even though only one wheel is shown a second - a technical necessity - must be assumed.[27] As far as the position of the wheels and the axle (q.v.) is concerned, the positioning of the wheels in a position unrealistically low relative to the floor of the box (q.v.) in the majority of the sources must be attributed to convention and cannot be realistic. If the round, ring-like hub (q.v.) visible in the Kazarma amethyst and the Vapheio sardonyx (Pl. 7) is anything to go by, it can with reasonable certainty be assumed that the wheels revolved around a fixed axle (q.v.), mounted in its position directly below the floor of the chariot box (q.v.). The wheels may consequently be assumed to have been held in position by means of linchpins. In the absence of more realistic representations and as a result of the convention of showing the wheels in this unrealistically low position, speculation about the position of the axle would be futile, but a central axle position can be assumed. The same principle as that applied in

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26. Cf. Introduction, above p.8.
27. On the two wheels in the Stele IX fragments, see Heurtley 1921-23 : 135-6.

the case of the wheels must, furthermore, be assumed in respect of the draught team (q.v.) as well, so that in the majority of the representations - for example the Mycenae grave stelae (Pls. 1-3) - where only one animal is depicted, the presence of a second is implicit. One-horse teams are not attested in the Aegean.

As for the occupant(s) the chariots are depicted as carrying either one man - in the grave stelae (Pls. 1-3), Knossos gem (Pl.8) - or two, as in the Mycenae gold ring (Pl. 6) and the Vapheio sardonyx (Pl. 7).[28] Where two figures are shown it can be assumed that, although they appear to be standing one behind the other,[29] they actually stood abreast. Although some of the men appear to wear short, belted(?) chitons - most clearly in the Mycenae gold ring (Pl.6) - or long robes, as in the Vapheio sardonyx (Pl. 7), and perhaps even helmets - the Kazarma amethyst, the Knossos gem (Pl.8) and (?) the Mycenae gold ring (Pl. 6) - no distinctive clothing can be discerned in the majority of the early representations. It is, therefore,

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28. One-man chariots are certainly attested in civilian scenes, but there may be reason to doubt the probability of only one occupant in scenes or activities involving the hunt or warfare; in the grave stelae the single occupants may be due to artistic liberty - if we are correct in postulating that these were honorific scenes, we may assume that the same artistic principle as that used in Egyptian monumental art, where it was the purpose of the artist to record the exploits of the deceased and he therefore illustrated only one occupant, applies also in the case of Stelae. Cf. below, p. 113.
29. Crouwel 1981 : 60.

unfortunately impossible to draw firm conclusions with regard to their identity. Notable exceptions are the Mycenae ring (Pl.6), in which they are obviously hunters, and the stelae (Pls. 1-5) and possibly also the Vapheio sardonyx (Pl. 7), in which the charioteers are probably warriors.[30]

Assuming that similarities and differences with regard to structural details in the representational sources are correctly interpreted to indicate realistic technological differentiation, at least two distinct chariot types can be demonstrated to have existed in Greece and the Aegean during the 16th and 15th centuries B.C.:

TYPE 1 : THE BOX CHARIOT[31]

In this category are included some of the earliest chariot representations - the Mycenae gold ring (Pl. 6) and stelae (Pls. 1-3), as well as the Vapheio sardonyx (Pl. 7). Lorimer, commenting on the stelae, notes that, "It is roughly rectangular in profile ... and without the high breastwork of the Sumerian type".[32] These chariots show little variation in the profile of the box (q.v.), although the rail in the Mycenae ring seems to follow a curved 'wavy' outline, and in the Vapheio sardonyx

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30. See below p. 113.
31. Evans 1925 : 34 ff. (Class A, Box Body); Lorimer 1950 : 309 ff. Catling 1968: 42 ff. (Stage I); Greenhalgh 1973: 30 (M 1 : Square-bodied type); Crouwel 1981 : 59 ff. (Chariot type I, the Box chariot).
32. 1950 : 310.

shows a rounded downward curve in the rear section of the box (q.v.). The height of the vertical rail in the front of the box seems at its highest point to have extended approximately waist high relative to the standing occupants. This is seen most clearly in the Vapheio sardonyx (Pl. 7), and the Knossos gem (Pl. 8).

It is evident from the solid appearance of the box - the front section should be assumed to be structurally similar to that of the sides - and from the fact that the legs of the occupants are generally not visible, that these chariots had an essentially solid superstructure and lacked the fenestrated coachwork of contemporary Egyptian and Near Eastern chariots.[33] Crouwel is certainly correct in postulating a superstructure of wood - covered with some kind of filling material, such as interlaced leather thongs or wickerwork (Pl. 7). In the Mycenae gold ring (Pl. 6) the presence of what appear to be vertical and horizontal supports seem to suggest that a superstructure of wooden struts in combination with wickerwork cannot be excluded.[34]

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33. 1981 : 60 ff.
34. Evans 1935 : 820 ff. (wickerwork); Lorimer 1950: 311 (wicker or leather thongs); Greenhalgh 1973: 30 (wickerwork, or thongs?). There is no evidence to suggest that any of the Aegean chariots had the moulded gesso and gilded (painted) screening of Egyptian chariots; Crouwel 1981: 60 and note 11.

TYPE II : THE QUADRANT CHARIOT[35]

A second category is represented in the Knossos gem (Pl. 8) - and possibly also in an unprovenanced LM II / IIIA:1 (c. 1440 - 1375 B.C.) lentoid seal, a cast of which is held in the Ashmolean Museum, Oxford[36] - and is commonly referred to as the Quadrant chariot; the rail is highest in the front of the box, from where it slopes downward towards the floor in the rear. In profile the box resembles the upper quadrant of a circle. On the analogy of typologically similar vehicles from the Near East and Egypt,[37] where they occur in representations from c. the 17th century B.C. onward and also in actual examples excavated in 15th and 14th century B.C. Egyptian tombs, a light superstructure of heat-bent wood and a D-shaped floor-plan can be assumed. If the Knossos gem (Pl. 8) can be considered realistic, the rail at its highest point would have been about hip high. There are, as in the case of Box chariots, no grounds for assuming that the sides were either open or fenestrated in the oriental fashion.[38] Covering material, perhaps hide, which apparently becomes standard during the 14th and 13th centuries B.C., interwoven thongs or wickerwork can be assumed. Although only one occupant is shown in the Knossos gem (Pl. 8), the Near Eastern and Egyptian

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35. Lorimer 1950 : 312 ff.; Greenhalgh 1973 : 30 ff. M2 : Quadrant type); Crouwel 1981 : 62 ff. (Chariot type II, the Quadrant chariot).
36. Cf. Crouwel 1981: 62, 159 no. G 15 ; Pl. 19.
37. For detailed discussion, see Littauer and Crouwel 1979: 76 ff. and refs.
38. It must, however, be noted that the Hittite chariots at the Battle of Kadesh - both Box and Quadrant types - have solid sides; see Littauer and Crouwel 1979: 77, fig. 45; cf. Yadin 1963 : 104-5.

vehicles suggest that there almost certainly was room enough for a second.[39] In contrast with the evidence for Box chariots, there is nothing visibly military about the two extant representations of the Quadrant type; both vehicles are without accompanying motifs and carry only one occupant, apparently unarmed.[40]

Although the evidence for the Quadrant type relies on one, or possibly two sources, confirmation of the validity of the typological differentiation in early chariot representations can, as Crouwel points out,[41] be supported by typologically similar vehicles in c. 18th / 17th century B.C. Syrian glyptic. The latter, however, also raise the important question of whether early Aegean chariots were a local development, or originated in areas outside of Crete and the Mainland.

It has been argued that they were introduced to the region by foreign immigrants, possibly through invasion. With regard to Mycenae in particular, Stubbings[42] for instance, proposed that

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39. The Hittite chariots at Kadesh (above, n. 38) have three warriors to the chariot. Whether the same can be inferred for Quadrant chariots in Greece and the Aegean must, however, remain uncertain, not only in view of the fundamental differences in warfare (see below, p.127) in the respective regions, but also in view of other structural differences, such as the position of the axle and the absence of a pole-support in the Oriental vehicles, which were primarily designed as vehicles for warfare and consequently suited the particular needs of the military. See further, below pp. 127 ff.
40. Cf. above p.23 and n.36.
41. 1981: 60-62, with Pls. 124-26.
42. 1973: 633 ff.

the Shaft Grave dynasty were none other than the Hyksos, expelled from Egypt at about the same time;[43] Wyatt on the other hand has argued in favour of Indo-European settlers. The transition from MH to LH is, however, as yet not fully understood. While the theories in favour of the introduction of a foreign element towards the end of MH cannot be outrightly dismissed, Oliver Dickinson[44] has recently plausibly argued that the militarism and wealth in archaeological culture of the Shaft Graves represent the ascendancy and domination of a vigorous local element, probably local chieftains or families.

If Dickinson's arguments are accepted, the possibility of chariot types I and II being local developments cannot be excluded. This does not necessarily imply that no foreign influence existed,[45] but merely that direct importation is unlikely.

The strongest arguments in favour of local development are technological. The traction system in both chariot types displays characteristics peculiar to the Aegean. In both Box and Quadrant chariots -the Vapheio sardonyx (Pl. 7) and the Knossos gem (Pl. 8) - the traction system is depicted as a composite structure composed of the pole (q.v.) and pole-stay (q.v.); the latter is not attested in chariots outside of the Aegean. Four-spoked

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43. 1970 : 107 esp.
44. 1977: 107 ff.; cf. Hooker 1976: 54 ff.
45. For commercial contact between Crete and the Eastern Mediterranean during this period, see Branigan 1974: 122 ff.; cf. Cadogan 1979 : 60 ff.

wheels too were retained in the Aegean while elsewhere the movement was towards the six-spoked wheel.

Conclusions

The chariot is first documented c. 1550 B.C. in profile representations in the Mycenae Shaft Grave Circle A stelae and in glyptic ranging in date from c. 1550 to 1375 B.C. Although its ultimate origins are uncertain, it can be assumed that knowledge of its technology reached the Greek Mainland within a generation or so before the ascendancy of the Shaft Grave dynasty, c. 1600 B.C. Although a Levantine origin is preferred by most scholars, Marinatos has found support for a European origin based on excavations of a Mycenaean tholos tomb at Marathon; the evidence was presented in a paper delivered at the 2nd International Colloquium on Aegean Prehistory held at Athens in 1972. Aegean chariots were locally developed and during the first 200 years or so of its history in the Mainland and Crete, at least two distinct chariot types can be discerned in the sources. Both chariot types seem to have been used concurrently and display technological characteristics peculiar to the region. They were put to both civilian and military use.

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CHAPTER 2

CHARIOT REPRESENTATIONS DURING THE FOURTEENTH AND THIRTEENTH CENTURIES B.C. - CHARIOT TYPE III: THE DUAL CHARIOT

Introduction

From c.mid-late 15th century B.C. onwards the sources are both more extensive and representational themes varied. Apart from the availability of documentary evidence in the form of Linear B records[1] of chariots and wheels from Knossos, Pylos and Tiryns, the range of representational sources is extended to include several terra cotta chariot models, reconstructed fragments of fresco from Knossos, Mycenae, Tiryns and Pylos, painted terra cotta larnakes and a profusion of chariot compositions in LH III A-B pictorial vases. The majority of these representations are, moreover, on a larger scale and more detailed than those considered in regard to chariot types I and II in the previous chapter and the amount of information which can be gleaned from them correspondingly more accurate.

In this chapter the representational sources during the period from about end LM II - end LM IIIB in Crete, and about end LH II - end LH III B on the Mainland respectively, from c.1405 - c.1190 B.C. will be examined and the technology of the chariot during this period reconstructed on the basis of the sources. It will be demonstrated that a distinctive third chariot type, the so-called

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1. As stated in the Introduction, the documentary evidence will be separately dealt with in ch. 3, below, pp. 45 - 97.

Dual chariot in terms of Evans' classification,[2] was the standard and only vehicle used on the Mainland and presumably in Crete also at the time. The sources are :

2.1 Sources

CRETE

- Chariot compositions on several LM II/IIIA:1 engraved seal stones: a LM II haematite cylinder seal from Astrakhous (Heraklion, HM 1460) (Pls. 9a, b),[3] in which the two chariots, engraved in separate registers, each carry one occupant and are drawn by horses (Pl. 9b) and winged griffins (Pl. 9a)[4] respectively; a LM II/IIIA:1/2 agate signet ring from Avdhu, (Oxford, Ashm. 1938,1051) (Pl. 10)[5] near Lyktos

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2. IV 1935: 821 ff. (Type C); Lorimer 1950: 314 ff.; Catling 1968 : 44 ff. (Stage II chariots); Greenhalgh 1973 : 31 (M 3, Dual type); Crouwel 1981 : 63 ff. (Chariot type III, the Dual chariot). It must be noted with caution that the bulk of the source-material for the period derives from Mainland sites. The Cretan sources, including the Linear B tablets from Knossos (see below, p. 97 ff.) are usually dated to the early to mid-14th century. It must be stressed, therefore, that the assumption that the Dual chariot was in use on Crete as well from c. end LM III A until the end of LM III B is unsupported by the evidence, and is based entirely on the assumption that the LM III period on was one of Mycenaean influence and that characteristics of Mainland culture can be assumed for Crete as well. Cf. Hallager 1977 : 89 ff. esp.
3. Evans 1935 : 425 ff. fig. 351; Kenna 1968 : 330 ff., Pl. 107 : fig. 17; cf. Crouwel 1981 : 64, 158 no. G 6: Pls. 14 a-b. It is assumed that, in accordance with artistic convention during the earlier period (above, p.20), two draught animals to a chariot are implied even though only one may be illustrated.
4. Kenna 1968 : 330 identifies the griffins as a "winged sphynx".
5. Evans 1935 : 822 ff., fig. 803; Lorimer 1950 : 311 ff. (gives a date LM IB), fig. 40; See also Crouwel 1981 : 61, 158 no. G 7: Pl. 15.

showing, as Evans rightly observed, a chariot " ... drawn by long-horned Cretan wild goats in place of horses", and, "the principal person, seated behind the driver - holding the reins and a forked whip - seems to be laying his hands ... on the hilt of his sword".[6]

- Two chariot scenes on the opposite narrow sides of a LM IIIA painted limestone sarcophagus from Hagia Triadha (Heraklion, HM 1617) (Pl. 11).[7] The two chariots are drawn by agrimi (Pl. 11.a) and winged griffins (Pl. 11.b) respectively and each carries two occupants, probably goddesses. The compositions are finely detailed in respect of the construction of the chariot box (q.v), yoke-and-pole assemblage and harnessing (q.v). The chariots are typologically comparable to those in

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6. 1935 : 822-3.

7. Comprehensive coverage of the sarcophagus can be consulted in Long 1974 : 29 ff., 54 ff., Pls. 11, 27 esp. For the chronology of this larnax, see Hood 1978: 70; also Crouwel 1981: 64, 160 no. L 5 ; Pls. 32 a-b. It must be noted that chariots also occur on at least three other LM III A-B terra cotta larnakes - from Zafer Papoura (Oxford, Ashm. AE 1128), Kalochorafitis (Heraklion, HM) and Episcopi (Hierapetra, Hierapetra Mus. IEE 336); for bibliography and illustrations, see Crouwel 1981: 160 nos. L 6-8; Warren and Postgate 1976: 108 (lower) (Episcopi). In the latter the chariot takes on a semi-circular, almost boat-like construction with the two wheels in position directly below the 'box', which carries three occupants. Although it is not possible to know exactly what the artist intended, it may be that a frontal instead of the usual profile perspective was intended or attempted; the position of the horse(s) in relation to the vehicle seems to support such a notion. It would, moreover, seem that the box in this case at least was broad enough for more than two persons to stand abreast, a convention which is repeated in LH III A-B pictorial vases.

the Tiryns Boar Hunt fresco (Pl. 14)[8] and the Lyktos agate[9] (Pl.10) above.

- The tendency for detail occurs also in c.LM IIIA:1/2 fresco fragments from Knossos (Heraklion, HM).[10] In one of the chariot groups, reconstructed by M.A.S. Cameron,[11] the vehicle is occupied by one individual, clothed in a long tunic or robe, holding the reins and a whip, probably in a processional context. The chariot corresponds with those illustrated in reconstructed frescoes on the Mainland c. 200 years later.

MAINLAND GREECE

- Chariot groups are reported on at least four LH IIIA:2/IIIB painted terra cotta larnakes - two from Tiryns,[12] one from Mycenae[13] and another, showing "two chariots approaching each other with a duel taking place between them",[14] from Tanagra (Boeotia).

- Chariot scenes, on a larger scale and more detailed than

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8. Below, p. 38.
9. Above, p. 28 and n. 5.
10. Hood 1978: 58-60, fig. 43; cf. also Crouwel 1981: 64, 172-3 nos. W 70-73, 75. : Pls. 104-107. For chronology, see Hood 1978: 60 with refs.
11. 1967: 330f., nos. I-VI, figs. 1-5, 12; Cf. Hood 1978: 59 fig. 43; also Akerström 1978 : 21-2, fig. 2.
12. Vermeule and Karageorghis 1982 : 221 nos. XI.30, 31.
13. Catling 1968 : 44 no. 15 with n. 49; Crouwel 1981 : 160 no. L1 with refs.
14. Long 1974: 55, with n. 11.

those in the other Mainland sources, have been reconstructed from LH III B:2 fresco fragments from Mycenae (Pls. 12 a,b), Tiryns (Pl. 14), Pylos (Pl. 13) and Orchomenos.[15] Although the majority of the fragments are poorly preserved, the chariots are typologically identical and those from the Megarons at Mycenae (Pls. 12 a,b) and Pylos (Pl.13) in particular are an important source of information on the military use and the role of the chariot in contemporary warfare.[16] Several of the fragments from Tiryns, notably those constituting the Boar Hunt fresco (Pl. 14) are a valuable source on the technology of the chariot during this period.[17]

- From c. the beginning of the 14th century B.C. and continuing until c. the beginning of the 12th century B.C., from LH IIIA:1 - IIIB:2 a profusion of chariot compositions become available for study in Mycenaean pictorial vase-painting (Pls.15-19).[18] Although the majority of these vases are from

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15. Cf. Crouwel 1981: 64 with refs.; see also below, pp. 115 - 7.
16. For discussion, see below, pp. 115 - 7, 126ff.
17. Cf. below pp. 38 - 9.
18. Furumark 1941; Vermeule and Karageorghis 1982. It is not within the scope of this paper to cover in detail the diachronic stylistic characteristics and degeneration of representations in pictorial vase painting; these have been fully covered by Furumark (1941: 433-38 esp.) who demonstrated that the most realistic and detailed representations occur in the early period (LH III A : 1), followed by a period of increased stylization and use of filling ornament (LH III A : 2) and finally, a reductionist phase characterised by increasing abstraction (LH III B) in which only such elements as were essential to the theme were rendered by the artist. For detailed discussion, see Vermeule and Karageorghis 1982 : 15 ff.

sites outside of the Greek mainland - the majority of the representations are on amphoroid craters from Cyprus, and other sites throughout Anatolia, the Levant, Egypt and the Aegean Islands - modern physical archaeological studies, notably through neutron activation and emission spectographic analysis of their clay content, have demonstrated that the majority of the vases are of Mainland origin.[19] Their representational content can, therefore, be regarded as an index of the material culture and artistic conventions current in the Mycenaean centres on the Greek mainland during this period.[20] The scenes depicted are either religious or processional and as far as the chariots themselves are concerned, provide a valuable supplement to and control for the technological detail observed in the other representational, as well as the Linear B documentary sources.

2.2 Discussion

In all the above representations the chariots are typologically the same, in spite of differences in style and artistic

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19. Catling and Millet 1965: 212-224; Catling 1968: 44; Harding 1984: 229 ff. with refs.; cf. also Immerwahr 1945 : 354 ff.
20. The occurrence of intrusive (external) elements in the motifs, as for example in the armoured chariot in the Bird Attack crater, CM T. 7 no. 4784 (Pl. 16) and the six-spoked chariot in the Pyla-Verghi crater, CM 1952/IV-12/1 (Pl. 15), cannot be denied, but should perhaps not be overemphasized, nor should it detract from the fact that these vases depict mainly Mainland motifs and styles, a premise confirmed by the fact that only the Aegean Dual chariot type, and not the Near Eastern types are represented.

convention - contrast, for example, the detail and realism in the Tiryns fresco (Pl. 14) with the abstraction and 'knotty' style in the Astrakhous cylinder (Pls. 9 a,b) and the Lyktos agate (Pl. 10), and the stylization and reductionist tendencies in LH III A-B pictorial vases (Pls. 15-19). They are characterised by the profile of the box (q.v), which, although retaining the more or less rectangular profile of the earlier Box chariots (Type I), is characterised by a second element, which takes the form of a semi-circular flap-like appendage extending backwards from the sides in the rear section of the box and well beyond the edge of the floor. With the exception of the Mycenae Poros Wall fragment (Pl. 19),[21] the flap (q.v) is a recurrent feature in all the extant representations during this period. The box (q.v) consequently appears to be composed of two separate structural elements, hence Evans' classification of these chariots as "Dual".[22]

As far as the box (q.v.) is concerned, the horizontal (side) rail is about hip-height. On the analogy of the Lyktos agate (Pl. 10) it seems in some cases to take a slight upward gradient in the front section of the box, thus following a slight downward curve towards its rear,[23] ending in a vertical element. It is evident

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21. Wace 1953 : 6 : Pl. 1b; cf. Vermeule and Karageorghis 1982 : 211 no. IX.2.
22. 1935 : 821 ff.
23. This feature recurs in the Linear B ideograms *240 BIGae and *241 CURrus at Knossos (see below, p.47). Cf. also the ideograms on KN Sc 221, -238, -257, -5073, Sg 886, in Idéogrammes 1979, Pls. XXIV - XXXI, XXXVIII, XLVI.

also in a number of Linear B ideograms that the framework of the box was probably composed of wooden beams or pieces of artificially heat-bent wood and was strengthened by means of braces in the form of wooden struts, probably fixed on the inside of the frame of the box. In a number of Linear B chariot ideograms from Knossos, the latter are indicated as crossed lines, or as sloping vertical lines in the rear section of the chariot frame.[24] Crouwel[25] suggests that the vertical members are possibly to be explained as struts bracing the rear vertical post (rear siding) against the floor. Two terra cotta models - one from Mega Monasterion (Thessaly) and another from Markopoulo (Attica)[26] - indicate that the floor of the box was D-shaped and that it was open in the rear, probably, as Crouwel[27] remarks, for quick mounting.

For other features relating to the box, the Linear B tablets and Mycenaean vase paintings are particularly useful. It is obvious from vase paintings (Pls. 15-18) that the frame of the box was covered with some sort of screening material. Like Box and Quadrant chariots the Dual chariot type has none of the fenestration or open coachwork observed in contemporary Egyptian chariot. Judging from the spotted and "blotched" decorations in vase paintings (Pl. 15, 17), the frame was stretched over and

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24. Cf. below, pp. 59 (vertical struts).
25. 1981: 66.
26. See Crouwel 1981 : 161 nos. T10 : Pls. 40a-b (Markopoulo), T11 : Pl. 41 (Mega Monasterion).
27. 1981: 65

covered entirely with ox-hide, or in the case of the Lyktos agate (Pl. 10) probably constructed of wickerwork - both materials would have contributed to its lightness.[28] The possibility of covering material other than hide or wickerwork cannot, however, be excluded. In Louvre, AO 20376,[29] for example, a T-shaped decoration, in, CM A 1646[30] a circle decoration and in the Boston crater, 01.8044[31] a scaled pattern are depicted on the covering material of the sidings; the scaled pattern on the so-called Bird Attack crater (Pl. 16) suggests an armoured covering of some sort. The possibility that these are purely decorative patterns painted on the hide or even intrusive elements cannot, however, be ruled out.[32]

As already stated, the distinguishing characteristic of Dual chariots is the flap (q.v), which occurs almost without exception in all the sources. It is depicted as an extension of the sides of the box (q.v) in the rear.[33] That it was a separate structural element is certain - it occurs in the Knossos Sc, Sd and Se tablets in the outline ideograms *240 BIG(ae) and *241 CUR(rus), used to record assembled chariots and chariots without wheels respectively, but is omitted in the Sf and Sg tablets in

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28. On the Linear B evidence for structural materials, see below, pp. 63ff.
29. Vermeule and Karageorghis 1982 : 200 - 1 no. V.8.
30. Vermeule and Karageorghis 1982 : 200 no. V.5.
31. Vermeule and Karageorghis 1982 : 200 no. V.14.
32. See Crouwel 1981 : 66 and Pls. 76 - 78.
33. Cf. above p.33, n. 21; Cf. Crouwel 1981: 66 ff. (wings); also Littauer and Crouwel 1982: 182, with fig. 1.

the outline of #242 CAPS(us), which is used to inventory chariot-frames minus the wheels, pole-brace (q.v.), pole-stay (q.v.) and, of course, the flap (q.v.).[34] On the analogy that they are always depicted in an 'open' position, and occur in representation in both a left and right perspective (i.e. facing left or right) - in the Klavdia crater, BM C342 (Pl. 18), for example, on chariots facing in opposite directions - it must be assumed that they were fitted on either side of the frame. They were probably constructed from a piece of artificially heat-bent wood, joined at the ends, as Littauer and Crouwel rightly note, by a chord;[35] the arc, as evidenced in vase-paintings (Pl. 15) as well as in the outlines of #240 BIG and #241 CUR, was supported by a horizontal strut or bar. The flap was probably fastened to the rear vertical element on either side of the box by means of leather thongs. The strut, moreover, was probably fixed on the inside of the flap, since it is seldom visible in representations other than the ideograms; in vase-painting its presence is often betrayed - for example, in BM C340 and BM C338[36] - by a "stitched" pattern on the covering material, which, judging from the representations in vase-painting, was the same as that which covered the sidings of the box (Pls. 15, 17, 18).[37]

The function of the flap is less certain. If it was intended to

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34. See below, pp. 48, 50 - 2.
35. 1982: 182.
36. Vermeule and Karageorghis 1982 : 197-8 no. IV.12.
37. Cf. for example, Vermeule and Karageorghis 1982, nos. IV.19, IV.21, IV.28.

provide additional grip when mounting, the solid appearance, without an opening to serve as a hand-grip is puzzling, especially in view of the fact that neither Egyptian nor Asiatic chariots have them.[38] Since they are mounted well beyond the edge of the floor, they cannot have served to increase the available floor space.[39] Wiesner's[40] suggestion that they functioned as counterweight to the pole-stay (q.v.) and pole-brace (q.v.), cannot be supported either; the problem of weight could more effectively have been solved by the position of the axle, and besides, both the pole-brace and pole-stay occur much earlier in the Box and Quadrant types, neither of which were fitted with flaps.[41] In the absence of more plausible explanations the suggestion, first made by Littauer[42] and also accepted by Crouwel,[43] that they simply functioned as 'mud guards' to protect the occupants against gravel and flying stones, seems a reasonable alternative.[44]

Another structural element of the box is a triangular spur (q.v.) - a bevelled projection below the rear of the floor, extending

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38. Crouwel 1981: 67
39. The depiction of passengers in the flap section in Mycenaean vase painting (Vermeule and Karageorghis 1982, nos. IV.21, V.1, V.2, V.4, V.18, V.19) cannot be interpreted as realistic and they should be understood to be standing abreast.
40. 1968: 49.
41. Cf. above pp.25; see also Crouwel 1981 : 67; cf. Littauer 1972 : 471.
42. 1972 : 156.
43. 1981 : 67.
44. Vermeule's suggestion (1964: 202) that they were used as racks for the transport of trophies is untenable in view of the rounded shape of the flap. Cf. Crouwel 1982: 67.

beyond its edge and protruding a short distance below the flaps.[45] It is most clearly shown in the Tiryns fresco (Pl. 14), less clearly on the Lyktos agate (Pl. 10) and also in Mycenaean vase-painting (Pl. 17), as well as in the ideograms of both assembled and dismantled chariots at Knossos.[46] In the Tiryns fresco (Pl. 14) the spur occurs with both a straight top edge with a vertical line within and, towards the front of the box, with a double-lined curved top edge with four vertical lines inside it;[47] in a fragment from Orchomenos showing a section of the spur, it has two vertical lines inside it.[48]

Various suggestions have been made to explain the spur.[49] In the Tiryns fresco (Pl. 14) its protruding edge is coloured white, in contrast to the red-brown colour of the sidings of the box (q.v) and flap (q.v), suggesting that it probably was a separate element, or perhaps manufactured from a different material than the heat-bent wood forming the superstructure of the box (q.v). It is therefore unlikely to be an extension of the floor; nor could it have been a step to assist the occupants in mounting, because, as Crouwel notes,[50] its distance from the floor is not sufficient to allow such an interpretation; besides, such a

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45. Crouwel 1981: 65; Littauer and Crouwel 1982 : 183, fig. 1.
46. See below p. 66.
47. See Crouwel 1981 : 65 with W 31 : Pl. 89.
48. See Crouwel 1981 : 65 and refs.
49. Crouwel 1981 : 65; cf. Littauer and Crouwel 1982 : 183.
50. Crouwel 1981 : 64 and n. 41, noting also the presence of the same element, though rounded and not triangular in some of Tutankamun's Egyptian chariots.

step would have been difficult to attach and would also have increased the weight of the chariot. The occurrence of the spur in the outline of the "chariot-frame" ideogram *242 CAPS[51] suggests that it was either fitted at an early stage in the construction of the vehicle or was an integral part of the superstructure. This seems to suggest that it may represent the two ends of the D-shaped frame of the floor projecting slightly beyond the rear edge of the floor.[52] If so, it may perhaps have been retained and merely trimmed off because it formed a necessary element to which the vertical rear member of the box, and perhaps even the lower ends of the crossed struts on the inside of the frame of the box were fastened. The white colouring could be explained simply as a decorative feature, perhaps some kind of bronze or ivory "binding" of a kind similar to that recorded with regard to other structural features in the Linear B tablets.[53] Alternatively, as Littauer and Crouwel suggest, it may be the rear end of the draught pole (q.v.) passing below the floor and projecting beyond its rear edge, a possibility which seems more plausible in view of its presence in the outline of *242 CAPS(us).[54]

Innovations are also observed in the technology of the undercarriage. The axle (q.v.) by all indications is still

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51. See below pp. 65-66.
52. Littauer and Crouwel 1982 : 183; cf. also Crouwel 1981 : 64.
53. Cf. below, pp. 70 - 71, 94.
54. Below, pp.53.

rigidly mounted in a fixed position under the floor of the box and the wheels are still four-spoked. However, in contrast to the seemingly unvarying position of the axle, central relative to the depth of the box (q.v.) in 16th/15th century sources,[55] its position in representations of Dual chariots varies from central to full rear, and also stages in between. This is most obvious in LH Mycenaean vase painting,[56] as well as in the more realistic and carefully draughted sources, such as one of the frescoes at Tiryns (Pl. 14) and two at Mycenae (Pls. 12a,b); the Lyktos agate (Pl. 10) shows the axle in an almost fully rear position, as does the crater BM C339 (Pl. 17); on one of the chariots on the Hagia Triadha sarcophagus (Pl. 11a) it takes a fully rear position. Whether these variances are to be considered due to artistic convention is not certain; but that that axle was a fulcrum has already been pointed out by Littauer.[57]

As for the wheels, they are consistently depicted as four-spoked, the only exception being the six-spoked chariot on Pyla-Verghi crater CM 1952/IV - 12/1 (Pl. 15). Ample evidence exists - in the Linear B tablets,[58] the Lyktos agate (Pl. 10) and the frescoes at Mycenae (Pls. 12 a,b) and Tiryns (Pl. 14), as well as the Hagia Triadha sarcophagus (Pls. 11 a,b) - that the spokes (q.v) widen as they approach the felloe (q.v). Like the flap (q.v), it is a

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55. See above p. 19. See also Littauer 1972 : 146 with fig. 8.
56. Littauer 1972 : 146 with fig. 8.
57. 1972 : 154-5.
58. See below, pp. 78ff.

feature unique to Aegean chariots, and is not paralleled elsewhere. It is generally accepted that these were braces intended to strengthen the wheels and were an integral part of the Aegean composite spoke-and-nave construction. Additional strengthening of the spokes is indicated by the lashings around the spokes in the Tiryns fresco (Pl. 14).[59]

As in the case of Box and Quadrant chariots, the Dual type displays features which do not occur in representations of Near Eastern and Egyptian chariots.

The composite Aegean traction system (q.v.), for example, which occurs for the first time in the Vapheio sardonyx (Pl. 7) in connection with the Box chariots, like the flap (q.v), is uniquely Aegean. It is a tripartite structural element consisting of the draught-pole (q.v.), pole-stay (q.v.) and pole-brace (q.v.).

The draught-pole (q.v.) either passed below the floor of the box, being attached to the frame of the floor at the front and in the rear, or as suggested by Littauer and Crouwel,[60] "its end lay in a socket between the rear floor bar and axle when the axle was at the rear". Both possibilities are reinforced by the Knossos

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59. Crouwel 1981 : 69 ff. In the near East and Egypt strengthening of the wheels was accomplished by increasing the number of spokes from four to six; see Littauer 1972 : 154; cf. Littauer and Crouwel 1979 : 82 ff. (the Near Eastern evidence).
60. 1982 : 184.

Linear B chariot ideograms, in which the superstructure of the chariot - even in the case of incomplete chariots (*242 CAPS) - is always depicted complete with the pole (q.v.);[61] in representations the draught-pole runs obliquely upwards from the front of the box (q.v.) and then forward between two draught-animals (Pls. 10, 11, 14). On the analogy of the Vapheio Sardonyx (Pl. 7) it seems to have been bound along its length by leather thongs, probably to keep it from splitting and, as Littauer and Crouwel[62] observe, to keep it together if it did split.

Extending forward from the horizontal rail of the box is the pole-stay (q.v.).[63] It consisted of an L-shaped wooden element forming two sides of a triangle, of which the draught-pole (q.v.) was the hypotenuse. The shorter vertical element, the pole-brace (q.v.) was attached to the vertical front section of the box (q.v.) and was seated in the draught-pole itself. The horizontal element, the pole-stay (q.v.) extended forward from the upper edge of the horizontal rail of the box (q.v.) to the point of junction of the draught-pole (q.v.) and the yoke (q.v.).[64] Pending vertically downwards from the pole-stay (q.v.), and seated in the pole (q.v.) were a number of members - either thongs or else pieces of wood - producing an arcade effect (Pls.

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61. See below, p. 53.
62. 1982 : 184.
63. See Crouwel 1981 : 93 ff. with refs.; cf. Littauer and Crouwel 1982 : 184-5.
64. ibid. 1982: 184 - 5.

9, 11, 14).[65] That the pole-brace and pole-stay were separate elements of the pole-support system is confirmed by the Tiryns (Pl. 14) and Mycenae murals (Pl. 12 a.b); on the analogy of the Tiryns example (Pl. 14), moreover, it can be assumed that the pole-brace and pole-stay were lashed together by means of thongs, of which the ends may dangle loosely downwards. Both elements served to reinforce the pole (q.v.) and to keep the front of the box from pulling away from it. Triangulation of the traction system also increased the load-bearing properties of the chariot.

On the grounds of the traction system, the retention at the four-spoked wheel and the flap, it would seem reasonable to assume that the Dual chariot, like its Box and Quadrant antecedents represents an Aegean development and was not directly imported from elsewhere.

Conclusion

The earliest occurrences of the Dual chariot in fresco fragments and the Linear B ideograms from Knossos c. 1375 B.C., as well as the Lyktos Agate, suggest that this chariot type was a Minoan development and that its technology was exported to the Mainland at a later date, probably during the first half of the 14th century B.C. Although it retains structural elements, such as the traction system and four-spoked wheels which occur in the earlier Box and Quadrant chariots, the highly decorative nature of the

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65. Crouwel 1981 : 94-5; Littauer and Crouwel 1982 : 184-5; cf. also Åkerström 1978 : 33 ff.

chariot in the Tiryns fresco and the popularity of representations involving religious/cultic ceremonial and procession, especially in Mycenaean pictorial vase-painting, are consistent with the archaeological evidence of a period of prosperity during the 14th and 13th centuries B.C., which are regarded as the floruit of Mycenaean civilization. Significant also is the fact that the only extant documentary evidence for the chariot dates from this period.

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CHAPTER 3

DOCUMENTARY EVIDENCE FOR THE DUAL CHARIOT: CHARIOTS AND CHARIOT WHEELS IN THE LINEAR B TABLETS

Introduction

It has already been stated[1] that the documentary evidence for the existence and use of chariots derives entirely from the Linear B tablets from Knossos (Crete), Pylos (Messenia) and Tiryns (Argolid).[2] At Knossos, records of both chariots and wheels are found in six different classes of tablets: chariots in varying stages of assembly are listed in the Sc, Sd, Se, Sf and Sg series, and wheels only in the So and in one of the Sg tablets. The Pylos chariot archives are less complete; unlike at Knossos, the documentary record at Pylos consists almost entirely of an inventory of wheels in the Sa series. At Tiryns the chariot and

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1. Above, p. 9.
2. For texts, see Chadwick, J. et al, The Knossos Tablets (4th ed.), 1971 (hereafter KT IV 1971); Bennett E.L. Jr. and J.-P.Olivier, The Pylos Tablets Transcribed, Part I : Texts and Notes, 1973 (hereafter PTT I 1973); Godart, L. et al, "Eighteen More Fragments of Linear B Tablet from Tiryns, Ausgrabungen in Tiryns 1981", AA 1983: 413-26 (hereafter Godart et al 1983). For general commentaries, Palmer, L.R. The Interpretation of Mycenaean Greek Texts, 1963 (hereafter Interpretation 1963); Ventris, M. and J. Chadwick, Documents in Mycenaean Greek (2nd ed.), 1973 (hereafter DOCS 1973); Vandenabeele, F. and J.-P. Olivier, Les Idéogrammes archéologiques du Linéaire B, 1979 (hereafter Idéogrammes 1979).

wheel records consist of fragments only: Sm 11(.2.) records a chariot frame(s?), and Sl 8(.3), - 9(.2.3.) and - 10 list wheels; however, while attesting to the existence at Tiryns of records of chariots and of wheels similar to those at Knossos and Pylos, the fragments do not add significantly to our existing research.[3]

The chariot and wheel ideograms according to location, series and ideogram are:[4]

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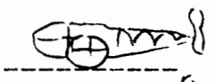
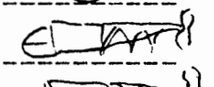
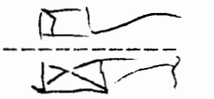
3. See also below p.78.
4. Cf. DOCS 1973: 361 ff.; 371 ff.; Godart et al. 1981: 426. Internal variations in the ideogrammes do occur and are fully dealt with in the discussion of individual series of tablets.

3.1 CHARIOTS AT KNOSSOS

General Observations

As noted above, the evidence for chariots derives almost exclusively from Knossos, where an extensive inventory of chariots in various stages of assembly are extant in the following sets of tablets:[5]

Series	Ideogram	
KN Sc	*240 BIG(ae)	
Sd	*241 CUR(rus)	
Se	*241 CUR(rus)	
Sf	*242 CAPS(us)	
Sg	*242 CAPS(us)	

Commenting on their discovery Evans[6] wrote as follows: "These hoards themselves stand in a certain administrative relation to the building, unfortunately very imperfectly preserved, known as the 'Armoury'. This was situated on the Northern border of the paved 'Via Sacra' leading from the 'Reception Area' to the 'Little Palace', just off its Central Section, where the road slightly dips. How far the royal chariots with which these records mainly deal were able to penetrate within the Northern gateway cannot be clearly ascertained from the existing remains

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5. KT IV 1971 : 270-293; DOCS 1973: 361 ff.
6. 1935: 786.

on that side. But the fact remains, that the two other deposits connected with the present series were found respectively near the point where the Northern Entrance Passage reaches the Central Court and, again, on the South-West border of the Court itself."

Before discussing the individual series of chariot tablets separately and in detail, some general remarks need to be made about the chariot ideograms themselves. Records of fully assembled chariots designated by means of *240 BIG(ae), are confined to the Sc tablets. *241 CUR(rus) and *242 CAPS(us), although also used to denote records of chariots, depict chariots without undercarriages (i.e. minus wheels). In CUR (*241) the ideogram depicts a complete chariot, but without wheels, and in *242 CAPS it preserves only, as the authors of DOCS put it, "the bare outline of the chassis structure, before the addition of the side extensions (A), pole-stay (D) and yoke (F)".[7]

In regard to the absence of wheels in CUR (*241) and CAPS (*242) there can be no doubt that the ideographic convention realistically reflects the Homeric practice[8] of storing wheels separately from the chariot bodies (i.e. the superstructures). When not in use the chariot bodies were probably stored on stands and covered with cloth, a practice which, according to Crouwel,[9]

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7. 1973: 362 with fig. 25. This also seems to confirm that the pole (q.v.). formed part of the superstructure of the box (q.v.). Cf. above, p. 38 - 9.
8. See DOCS 1973: 361.
9. 1981: 86-7 and n. 35; cf. also the Egyptian chariot-workshop scene, Yadin 1963 : 202.

was observed also in the Near East. The wheels were stored separately not only because they tended to warp if not dismantled, but also for more practical purposes, viz. repair, replacement and storage. Moreover, in the case of CAPS (*242) the chariots were apparently still in the process of being fitted out and not yet ready for the wheels to be mounted.[10]

It is certain, furthermore, that the chariots represented in the Knossos texts - and presumably at Tiryns also - are of the Dual type. This is indicated by the presence of the characteristic flap (q.v.) which, although absent in the outline of CAPS (*242), is consistently depicted in the ideographic outlines of BIG (*240) and CUR (*241). There are no grounds for supporting Hiller and Panagl's[11] distinction between two different types of vehicle, one for military (*240 BIG and *241 CUR) and the other, without the flap (*242 CAPS), for civilian use.

3.1.1 *242 CAPSus : The KN Sf AND Sg Tablets

*242 CAPS(us), which is used to denote unassembled chariots, shows little more than the bare outline of the chariot box (q.v.) and the draught-pole (q.v.), i.e. the box (q.v.) without the flap (q.v.), pole-brace (q.v.), pole-stay (q.v.) and wheels (q.v.), is attested only in the following 18 tablets, all

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10. Cf. below, p. 52.
11. 1976: 217, 219.

of which are assigned by the authors of KT IV to the Sf and Sg series:[12]

KN Sf 4418, - 4419 +, - 4420.b, - 4421, - 4423 +, - 4424 +, - 4425, - 4426 + fr., - 4427 + fr., - 4428.b

Sg 884, - 885, - 886 + fr., - 887, - 888 +, - 889, - 1811 +. 1.2., - 8484

The Sf tablets and Sg tablets were found in the so-called Arsenal and North Entrance Area respectively.[13] With the exception of Sg 1811 +, a composite 'page-shaped' text recording totals of CAPS (*242) and ROTA (*243)[14], the tablets are all of the long and narrow 'palm-leaf' type. Apart from Sf 4420, - 4428, the fragment Sf 7723, which does not preserve the ideogram and Sg 1811 +, each of which are inscribed with two, and in the case of the latter, multiple lines, the Sf and Sg tablets generally consist of only one line making up a single entry.[15]

As far as the ideogram goes, minor variations on the basic outline of CAPS (*242) do occur. On Sg 1811 + (.1.2) the ideogram

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12. KT IV 1971: 291-3. Where "+" is added to a tablet reference, this indicates a join.
13. Cf. above, p. 48. n. 6.
14. KT IV 1971 : 293; DOCS 1973: 517-8 no. 322. For the distinction between page-shaped" and "palm-leaf" tablets, see DOCS 1973 : 110 ff.; cf. Chadwick 1976 : 28 ff.
15. KT IV 1971 : 291-3. It must also be noted that the formulaic syntax of Sf 4428 (KT IV 1971 : 292; DOCS 1973 : 368 no. 274) corresponds more closely with that of the Sd tablets (below, pp. 60 - 8) than with the rest of the Sf and Sg tablets and, were it not for the fact that it records *242 CAPS, it might well warrant reclassification. See also below, p. 55.

differs in form from that in the other Sg and the Sf tablets inasmuch as it preserves crossed struts on the inside of the frame of the box (q.v.), the pole-stay (q.v.) and the yoke (q.v.), but apparently without the yoke saddles (q.v.) and the flap (q.v.), both of which occur in the outlines of CUR (*241) and BIG (*240).[16] This may perhaps indicate that the chariot bodies recorded in Sg 1811 + (.1.2) are in a more advanced stage of assembly than the other CAPS - perhaps the final stage of their production, before the structural features characteristic of CUR (*241), and ultimately BIG (*240) are added. Yet the argument of distinction is not conclusive and in general there can be no doubt that in spite of the following ideographic variations,[17] the same unassembled vehicles are represented:

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16. Cf. for example, Idéogrammes 1979: Pls. LV:2 (Sc 232), 4 (Sc 238); LXII:3 (Sd 4403.a);
17. Idéogrammes 1979: Pls. LXVIII - LXXII.

*242 CAPS  Sf 4418, - 4419 +, - 4420.b,
- 4421, - 4423 +, - 4426 +,
- 4427 +, - 4428.b (?)
 Sf 4424 +, - 4425; Sg 884,
- 885, - 886 +, - 887, - 888 +,
- 889, - 8484(?)
 Sg 1811 +.1.2.

The KN Sg series:[18] The extremely fragmented condition of the Sg tablets, including Sg 1811 +,[19] which preserves the CAPS ideogram only in a text which otherwise records numbers of ROTA, limits the amount of information that can be gleaned from them. The only clues to their content are given in Sg 884 je-na-ri-po-to CAPS[20] and Sg 888 + po-ro-su-re / a-na-to , ⍥ CAPS[21], both of which seem to deal with technological details pertaining to the manufacture of the CAPS listed. je-na-ri-po-to

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18. KT IV 1971: 292-3.
19. KT IV 1971 : 293; cf. DOCS 1973: 517-8 no. 322. The occurrence of both chariot bodies and wheels on the same tablet is interesting and demonstrates that they could be recorded on the same tablet; however the fact that the totals do not seem to correspond - the numers of CAPS are higher than those of ROTA - indicates that the CAPS and ROTA listed in this tablet need not necessarily have been intended for the same vehicles.
20. KT IV 1971: 292.
21. KT IV 1971: 293. The occurrence of po-ro-su-re, if it is a masculine noun (cf. DOCS 1973: 573), is not clear. If, however, "⍥", which follows a-na-to, can be taken as an abbreviation for o-pe-ro or o-pa (Sf 4420, below p. 55 and n. 33) it may well be that po-ro-su-re was a contributor to the chariot workshop. See also below, pp. 55 - 6.

(Sg 884) and a-na-to (Sg 888 +) are interpreted in DOCS[22] as the verbal adjectives / enaliptos / "oiled, painted" and / anai(s)toi / "not inlaid" respectively. The latter is also used in connection with CAPS in the Sf tablets below.

The Sf tablets:[23] CAPS (*242) is preserved on 10 of the 17 extant Sf tablets, all of which are more or less intact. They were inscribed by Hands 128 and 129 and apart from Sf 4428, which has already been noted as aberrant, their formulaic syntax is consistent. They seem for the most part to deal with details of the chariots in a preliminary process of manufacture.

A description of the subject of these tablets occurs majuscule in the first position - i-qi-ja , /hiqq^{u}iā, -āi/ "chariot,-s" - confirming[24] that the commodities listed are indeed chariots. In the majority of tablets this is followed by one or two of the following three verbal adjectives:[25] a-na-i-to/-ta, a-na-mo-to/-ta[26] or a-ja-me-na.[27] Although their etymologies are uncertain, a-na-i-ta and a-na-to are usually taken

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22. 1973: 515, 531, 543. Cf. also Chadwick and Baumbach 1963: 169-70 (ἀλείφω), 176 (ἀρμόζω).
23. KT IV 1971 : 291-2.
24. DOCS 1973: 365-6; Chadwick and Baumbach 1963 : 205 (ἵππος). For i-qi-ja majuscule, Sf 4418, - 4419 +, - 4420, - 4424 +, - 4425, - 4426 +, - 4427 +, - 4428, - 5106; i-qi-ja not majuscule, Sf 4421, - 4423 +, - 4491. KT. IV 1971 : 291-2. For its occurrence in the Sd tablets, cf. below p. 61.
25. a-na-i-ta, Sf 4419 +, - 7451; see also a-na-to, Sf 4423 +, - 4425; a-na-ta, Sf 4420.b.
26. a-na-mo-to, Sf 4420.b, - 4421, - 4423 +, - 4427 +, - 7450; a-na-mo-ta, Sf 4465 +, - 7723.b.
27. a-ja-me-na, Sf 4421, - 4424 +, - 4426 +, - 4427 +, - 5106, - 7723a; Cf. also a-ja-me-no in the Sd series, below p. 75.

re-ki-si-to (nom)) and So 1053 +(.a a-re-ki-si-to-jo (gen.)).[34] The exact meaning of o-pa is obscure, but either "contribution", according to DOCS, or "workshop", according to Palmer, is probably correct, so that the CAPS 80 referred to can perhaps loosely be regarded as "the work" of a-re-ki-si-to.[35] The reason why an individual should be specified in this one instance is not clear, since none of the other extant Sf tablets preserve names. It could perhaps be that a-re-ki-si-to was a "chariot-master" in charge of a particular workshop - probably not based at Knossos, but in some other part of the island - especially in view of the large number of CAPS involved. But it does seem that he had not yet contributed his (his workshop's ?) share of the work, or alternatively, had not yet submitted to the central archives at Knossos a record of what he (his workshop?) had in stock.[36]

Excluding Sf 4428, the number of CAPS listed, where the numerals survive, amount to at least 280 or 290 chariot frames in the Sf series alone; in the Sg tablets, CAPS 1 is individually listed on each of Sg 885, - 886 + and - 889, and at least 246 on Sg 1811 + (.1 CAPS 22̣ [, / .2 CAPS 22̣4[ ). It can be inferred from these totals that the number of chariots in a preliminary stage of

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34. KT IV 1973 : 295, 296. Cf. Landau 1958 : 28.
35. DOCS 1973: 420; Interpretation 1963: 437 under o-pa (III).
36. KT IV 1971: 291-3. On the analogy of Sg 885, - 886 + and - 889, each of the other extant Sg tablets will have listed CAPS 1. Assuming that at least some of the CAPS in the Sf and Sg series were included in those on Sg 1811 +, the extent of the lacunae in the extant documents must nevertheless be considerable. Cf. also below p. 125.

production was considerable. As will be demonstrated in chapter 5 below, these figures have important implications for the possible military use of the chariot in Crete.

3.1.2 *241 CURrus : The KN Sd and Se Tablets

*241 CUR(rus) is inventoried in the Sd and Se series. Both series seem to record chariots in varying stages of assembly and completion, possibly kept in storage at various places in Crete. However, as in the case of the Sf and Sg tablets, these two series are sufficiently different to warrant separate consideration.[37]

*241 CUR Sd 4401.a, - 4402 +.a, - 4403 +.a, - 4404 +.a, - 4405 +.a, - 4406.2a, - 4407 +.a, - 4408 +.b, - 4409 +.a, - 4412 +.b, - 4413.a, - 4415 +.a, - 4416 +.a, - 4422.a;

Se 879.b, - 880 +.2, - 881, - 883.a, - 7449.

The Sd tablets : Like the Sf and Sg tablets the Sd tablets were excavated in Evans' Arsenal deposit and like Sf 4428, and probably also Sf 4421, - 4423 + and - 4427 + they were inscribed by Hand[38] 128. Whereas in the Se texts CUR occurs in one form

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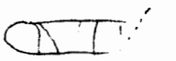
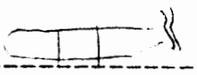
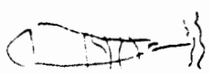
37. Cf. DOCS 1973: 368; see also below p. 68.
38. KT IV 1971: 286-8. See also Ruijgh 1976: 183 ff.; Idéogrammes 1979: 76-8.

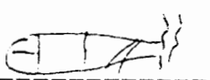
only, the ideogram is not consistently rendered in the Sd tablets and shows at least 5 variations:[39]

(a)  Sd 4401.a

(b)  Sd 4402 +.a, - 4405 +.a(?) - 4407 +.a, - 4413.a(?)

(c)  Sd 4403 +.a, - 4404 +.a(?), - 4408 +.b(?), - 4412 +.b, - 4415 +.a

(d)  Sd 4406.2a, - 4422.a

(e)  Sd 4409 +.a

(f)  Sd 4416 +.a (incomplete)

Although the significance of these ideographic variances is not clear, they could possibly, in view of the fact that these texts were inscribed by one and the same man, indicate that he intended the attention of other scribes who may also have dealt with his records to be drawn to the presence or absence of particular structural features in the vehicles inventoried. If so, it can be assumed that the need to depict the CUR ideogram differently arose because such differences could not otherwise be indicated in or picked up from the terminology of the texts

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39. See Idéogrammes 1979, Pls. LXII-LXV.

The Sd texts are some of the most detailed in the entire Knossos archives. The majority are composed of two lines combining to form a single, composite entry. The longest texts, Sd 4406 and -4450 + have three lines, but are no different from the rest. Their formulaic syntax is constant, consisting of combinations of nouns and adjectives referring to specific structural and technological features pertaining to the CUR listed. The authors of DOCS comment as follows: "Their syntax and the meaning of the adjectives describing colour and material are clear enough; but not only do the nouns which describe the parts of a chariot fail to agree with the nomenclature found in Homer, but their identification is equally open to controversy".[44] They then state some of the conventions essential to an understanding and analysis of these texts:[45]

- The use of a noun in different adjectival combinations, should be taken to denote alternative technologies for the same structural component. The need to specify particular structural features by way of different formulae probably arose because such distinctions could not practically be indicated ideographically;

- the infrequent occurrence of particular nouns or adjectives in particular texts only and not common to the majority or all other entries can be taken to denote the presence of a component or feature not

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44. 1973: 363-4.
45. Ibid 1973: 364.

Following i-qi-ja/-jo are the noun and adjectives already mentioned, in fairly constant formulaic combinations. The following tablets can be taken as representative -

Sd 4405 + 4410 + fr [50]

.a wi-ri-ni-jo , o-po-qo , ke-ra-ja-pi , o-pi-i-ja-pi ,
o-u-qe , pte-no , CUR 1[

.b]i-qi-ja, / po-ni-ki-ja , a-ra-ro-mo-te-me-na , a-ra-ru-
ja , a-ni-ja-pi

Thus -

- "(b.) One (wheel-less) chariot, painted crimson, fully assembled, equipped with reins,
(a) with leather o-po-qo, and horn o-pi-i-ja-pi, without pte-no".

Sd 4415 + 4417 + 4469 + frr. [51]

.a wi-ri-ne-jo , o-po-qo , ke-ra-ja-pi , o-pi-i-ja-pi,
CUR 2

.b i-qi-jo , mi-to-we-sa , a-ra-ro-mo-te-me-na , a-ja-me

Thus -

"(.b) Two (wheel-less) chariots, painted red, fully assembled, (inlaid),
(.a) with leather o-po-qo and horn o-pi-i-ja-pi"

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50. KT IV 1971: 286.
51. KT IV 1971: 287.

leather"[56] and ke-ra-ja-pi , /keraiaphi/"horn (made of horn)"[57]. Both the colouring and the material of manufacture specified in these tablets are common to other CUR in the Sd entries. Other materials are specified as well and can be demonstrated on the basis of the following texts:

Sd 4403 + 5114[58] (128)

.a] e-re-pa-te-jo , o-po-qo , ke-ra-ja-pi , o-pi-i-ja-pi

'ko-ki-da , o-pa' CUR 3

.b i-]qi-ja [,]/ a-ja-me-na , e-re-pa-te , a-ra-ro-mo-te-

me-na , a-ra-ru-ja [

Thus -

"(b) Three (wheel-less) chariots, inlaid with ivory, fully assembled, equipped with reins,

(.a) with ivory o-po-qo and horn o-pi-i-ja-pi; 'the o-pa of ko-ki-da'".

Sd 4404 + fr.[59]

.a]jo , i-qo-e-qe , wi-ri-ni-jo , o-po-qo , ke-ra-ja-

pi[,] o-pi-i-ja-pi CUR [

.b]i-qi-ja , /ku-do-ni-ja , mi-to-we-sa-e , a-ra-ro-mo-

te-me-na [

lat. sup. po-ni-ki-ja BIG 1 [

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56. DOCS 1973: 592. wi-ri-ni-jo, Sd 4401.a - 4404 +.a, - 4405 +.a, 4406, - 4407.a, 4413.a; wi-ri-ne-jo. Sd 4408 +.a, - 4409 +.a, - 4415 +.a, 4468. wi-ri-ne-o, Sd 4450.b. KT IV 1971 : 286-8.
57. DOCS 1973: 545. Sd 4401.a, - 4403 +.a, - 4404 +.a, - 4405 +a. KT IV 1971 : 286-8.
58. KT IV 1971: 286; DOCS 1973: 365-6 no. 265.
59. KT IV 1971: 286; DOCS 1973: 367 no. 269.

Knossos, similar magazines and records did in fact exist elsewhere in the island, in this case at Phaistos and Kydōnia, or in the case of Sd 4407 +(.b), at a place called se-to-i-ja.[80] This would seem all the more plausible in view of the similar scribal annotation ko-ki-da , o-pa (Sd 4403.a),[81] which, as argued in the case of a-re-ki-si-to-jo , o-pa in Sf 4420(.a)[82] above, may possibly indicate not that the vehicles in question were in the possession of these particular individuals, but that ko-ki-da and a-re-ki-si-to(-jo) were in fact masters of chariot workshops or chariot magazines elsewhere on the island. If, as is argued in chapter 5 below,[83] the chariot served a strategic role, primarily in transport and overland communications, the presence of chariot magazines on location at places other than Knossos seems more than just a possibility. If this assumption is correct, it can furthermore be assumed that the presence of these place and personal names in the archives at Knossos is simply due to the fact that the archives at Knossos served as a central bureau where an up-to-date record was kept of all industrial activity concerning chariots and military equipment within its domain.

The Se Tablets : The sixteen tablets and fragments classified as Se were found in Evans' North Entrance Passage[84] and were

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80. KT IV 1971 : 286-7; cf. DDCS 1973 : 557, 567, 582.
81. KT IV 1971 : 286.
82. Above, pp. 55 - 6.
83. Below, pp. 123 - 4.
84. Evans 1935 : 706, 709; cf DDCS 1973: 369.

Thus -

"One(?) CUR of elm-wood, e-ka-te-re-ta (adj., -ed?) with two a -ki-no-o, with ivory ..., with ivory o-mo-pi"
3

If po-ni-ke-a can be taken as contextually associated with wo-ra-we-sa (Se 880.2), the latter, like a -ki-no-o in Se 879, could possibly be taken as a technological term for a particular part of the CUR, which was painted crimson. Interestingly the restored numeral after a -ki-no-o (Se 891) implies that the part referred to could occur more than once in the same chariot.[99] The etymology and meaning of e-wi-su-zo-ko (Se 1007.1, - 965 +.A) is similarly uncertain; it probably also refers to some or other structural component of the chariot, and if ka[(Se 965 +.1) can, on the analogy of ka-ke[in Se 893 and ka-ke-ja-pi, /khalkeiăpni/ (Sd 4409 +.a, - 5091 +.a) be restored as a derivative of ka-ko, it seems possible that it was made of bronze. Similarly, if e-re-pa-te-o, o-mo (Se 1007.2) can on the analogy of Se 891 +(.B) be restored as e-re-pa-te-o , o-mo[-pi, it denotes another material used in the manufacture of a constituent part of the chariot. In this instance "ivory" o-mo-pi are recorded, even though the o-mo-pi cannot be certainly identified.

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99. For e-ka-te-re-ta, see DOCS 1973: 542, 561, 586; cf. Interpretation 1963 : 331.

3.1.3 *240 BIGae: The KN Sc Tablets

Record of *240 BIG(ae) is confined almost exclusively to approximately 95 of the 156 tablets classified Sc, the majority existing only in fragments:[100]

KN Sc 103+, - 135+, - 217, - 219, - 221+, - 223, - 225, - 226, - 230, - 231, - 232, - 234, - 235, - 236, - 237, - 238, - 240, - 242, - 243, - 244, - 245+, - 248+, - 249+, - 251, - 253, - 254+, - 255, - 256, - 257.1, - 260, - 262, - 264, - 1644, - 1651, - 5046, - 5057, - 5058+, - 5059, - 5060+, - 5061+, - 5062+, - 5065+, - 5068, - 5073, - 5083, - 5085, - 5086, - 5137, - 5138, - 5139, - 5141, - 5142, - 5144+, - 5146, - 5148, - 5150, - 5153, - 5155, - 5157, - 5160, - 5161, - 5162, - 5164, - 5165, - 5166+, - 5169+, - 5170, - 7452, - 7454, - 7455+, - 7457, - 7459, - 7460, - 7462, - 7467, - 7468, - 7469+, - 7470+, - 7471+, - 7473, - 7474, - 7476, - 7772, - 7782+, - 7849, - 7889, - 8253+, - 8471, - 8472, - 8474, - 8475,[101] - 8476,[102] - 8478, - 8479, - 8480; Sd 4404 + lat. sup.; Xd 298.

All the Sc tablets were found in Evans'[103] so-called 'Deposit of the Chariot Tablets' in the west wing of the Palace; they are

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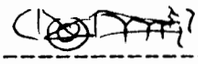
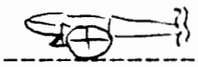
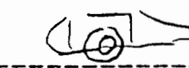
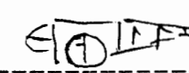
100. KT IV 1971: 270 - 285; cf. Idéogrammes 1979 : 77, 85 ff.
101. KT IV 1971: 286; cf above p. 64.
102. KT IV 1971: 345. This tablet adds nothing to our knowledge and will not be considered further; ta-ra-i according to the authors of DOCS (1973: 583) could possibly be a man's name.
103. 1935: 786-9, fig. 763; see also Idéogrammes 1979: 85 ff.

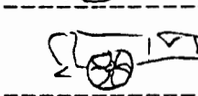
(a)  (Sc 5169)

(b)  (Sc 219)

(c)  (Sc 230)

(d)  (Sc 221)

(e)  (Sc 217)

(f)  (Sc 238)

However, in spite of these differences in the outline of BIG (*240) it can be assumed that all the chariots in the Sc tablets were structurally complete and that the ideographic differences above are due to differences in scribal hand, or else simply a matter of individual scribal taste. These ideographic differences do, however, provide a valuable check on the structural information gleaned from the representation of Dual chariots in non-documentary sources.

The Sc texts[107] are short and, compared to the other chariot documents, especially the Sd tablets, are not very informative. They are devoid of any sort of technical vocabulary and any information gleaned from them is inferential. In those documents in which the texts are more or less complete it can be deduced

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107. For discussion, see DOCS 1973: 379 ff; Chadwick 1976: 167 ff.

on various aspects of the texts and handwritings, cannot be rejected outright, they are not entirely convincing. They were after all found in the same area as the rest of the "chariot" tablets and it is doubtful whether the selection of ideograms in these texts can be arbitrary. They seem for the most part to deal with military equipment.[114] It is tempting, therefore, to interpret these tablets as an issue of chariots and military equipment to the men listed, according to their individual requirements. If these were records of a standard issue, it would be difficult to explain why for example only one horse - two would be needed to complete the team - should be issued.

If, however, Chadwick is correct, these tablets nevertheless provide confirmation that chariots and military equipment were controlled by the authorities at Knossos, and only the numbers would be suspect.[115]

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114. See below, pp. 117 - 20.
115. See below, pp. 120 , 125 ; Cf. Crouwel 1981 : 127-8.

3.2 CHARIOT WHEELS AT KNOSSOS, PYLOS AND TIRYNS

General Observations

The Linear B tablets, besides giving valuable information on chariots, are an important source for chariot wheels, detailed records of which are extant in tablets from Knossos, Pylos and Tiryns. At Knossos a four-spoked wheel forms part of the chariot ideogram, BIG(ae) (*240),[116] and wheels on their own are independently inventoried in the KN So-series,[117] as well as in four entries on KN Sg 1811 +[118] The wheel ideogram occurs on fragments of the Tiryns S1 series,[119] of which only three fragments are extant,[120] and at Pylos, in the Sa series. The Pylos Sa tablets in addition to the plain wheel ideogram (*243 ROTA) list a variant form distinguished by the ligatured adjunct `-TE'. The occurrences of ROTA according to location and series are -

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116. See above pp. 75.
117. KT IV 1971: 295-8; Interpretation 1963: 320ff.; DOCS 1973: 369 ff.
118. KT IV 1971 : 293.
119. Godart et al 1983: 418 ff.
120. PTT I 1973: 223-5, 226.

*243 ROTA

KN Sg 1811 + .3.4.5.6; So 894.1.2.3.4,
- 1053 +.b - 4429+.b, - 4430.b,
- 4431, - 4432 +, - 4432+,
- 4433+.b, - 4434+, - 4435.b,
- 4436+.1.1, - 4437+, - 4438,
- 4439+, - 4439+, - 4440+.b,
- 4441 +, - 4441.v., - 4442+.b,
- 4443.b, - 4445+, - 4446.1.1.2,
- 4446 +. v. lat. inf., - 4447,
- 4448+, - 4449, - 5789,
- 8251.b

TI. S1 8.3, -9.2.3, -10

PY Sa 287, - 403, - 682, 787.A.B; - 794,
- 1266, - 1313

*243 + TE ROTA + TE

PY Sa 483 +, - 487, - 488, - 751, - 753,
- 755, - 758 - 760, - 761,[121] - 763,
- 766, - 767, - 768, - 769, - 774;
- 790, - 791 - 793, - 796, - 797,
- 834, - 840, - 843, - 1264, - 1265,
- 1267.

80/...

121. Sa 761 is included here on the analogy that in other tablets listing names of individuals generally, the wheels are ROTA + TE.

of wheels (ROTA ZE) or single wheels (MO ROTA) respectively.[128]

3.2.1 Chariot Wheels at Knossos

Apart from So 894 and - 1053 all the Knossos ROTA tablets were found in the so-called Arsenal,[129] to the north-west of the Palace, the location also of the Sd, Se, Sf and Sg tablets. Excluding Sg 1811 +, So 894 and -4446 +, all of which are composite or totalling documents, the tablets consist of either one or two lines combining in a single entry. The wheels listed are either single or more in pairs.[130]

So tablets are characterized by a fairly consistent formulaic syntax: The majority of the texts are introduced by the word a-mo-ta which occurs at both Knossos and Pylos, and is written, mostly majuscule, in nine So tablets.[131] a-mo-ta is taken as the Nom. plu. of the neut. noun a-mo, /(h)armo/ (Sg 1811 + .5) - it occurs in the dual a-mo-te, /(h)armote/ in association with ROTA

82/...

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128. It should, however, be noted that ZE is not attested at Tiryns and where MO occurs (Sl 8.2.3) it is not certain whether it refers to ROTA or not; in one tablet (Sl 9.2.3), where the numbers of ROTA survive, ROTA 3 (Sl 9.2) occurs and it is uncertain whether 3 pairs or 3 single wheels are recorded. The possibility exists that ROTA at Tiryns is used of pairs (i.e. the equivalent of ZE at Knossos and Pylos) and consequently contrasts with MO (Sl 8.2.3). But, in view of a lack of complete entries the convention and purpose of the wheel records at Tiryns, must, however, remain uncertain - Godart et al 1979 : 419, 420 esp.
129. Evans 1935 : 793-6; DOCS 1973 : 396.
130. DOCS 1973 : 370.
131. So 4429 + - 4431; - 4435; - 4437+; -4439 ; - 4440 +; - 4442 + (.b); - 4446 +.1; - 448. KT IV 1971 : 295-7; for Pylos, see Sa 790, PTT I 1973 : 224.

ZE 1 in So 4442 +.b - and is generally accepted as meaning (chariot-) wheels.[132] Less frequently the texts are introduced by either e-ri-ka, /helikās/ "of willow-wood"[133] and pte-re-wa, /ptelewas/ "of elm-wood"[134] denoting the timber from which these wheels were made.[135] These are followed by terminology descriptive of the manufacture, technology and condition of the wheels listed. The following tablets illustrate:

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132. DOCS 1973: 371; also Chadwick and Baumbach 1963: 175 (ἅρμα). Palmer's argument (Interpretation 1963: 320) in favour of 'undercarriage' is unconvincing and his contention that the wheels and axle together constituted the undercarriage of a chariot is incorrect That the wheels revolved around a fixed axle and were attached to it by means of lynch-pins is certain and can be substantiated in the representational sources cf. above pp. 40 - 1). In so far as the application of 'undercarriage' in the So tablets is concerned, while as far as ROTA ZE entries go, it would seem perfectly plausible for the wheels and axle together to be classified as an undercarriage, but it would be difficult to reconcile the term with the evidence when only one (i.e. MO ROTA) wheel is listed. This would render the particular ROTA either incomplete or unservicable. The scribe would, furthermore, have been specified by the scribe, as in the case of some wheels at Pylos; see below, p. 93 and n. 185. Another word describing wheels is wa-ra-wi-ta.
133. So 4430.b , - 4432 + , - 4424 + , - 4436 +.1 , - 4438 + , - 4441 + , - 8251.b (e-ri-ko). KT IV 1971 : 295-8; DOCS 1973 : 370.
134. So 4445 + , 4449 +. KT IV 1971 : 297-8. DOCS 1973 : 370.
135. The only other wood specified in the So tabllets is ki-ta-pa (So 894.2). KT IV 1971 : 295; DOCS 1973 : 371. Littauer and Crouwel (1979 : 81) note that elm was also used in chariot manufacture in Egypt.

136
So 4429 + 5790 + 6019 + frr.

.a] de-do-me-na

.b] a-mo-ta, / pte-re-wa, te-mi-dwe-ta ROTA ZE 23 ROTA 1

Thus : "23 (pairs) and 1 (single) wheels of elm-wood with te-mi-dwe-ta, which had been contributed."

137
So 4430

.a ko-ki-da, o-pa, ne-wa

.b e-ri-ka, / o-da-twe-ta, a-ro -a ROTA ZE 22 MO ROTA 1
2

Thus : "22 (pairs) and 1 (single) new wheels of willow-wood, with o-da-twe-ta, of better quality: the work (?) of ko-ki-da."

The etymology and exact meanings of te-mi-dwe-ta and o-da-twe-ta are uncertain, but they are usually interpreted as a technical
138
term relating to the construction of the ROTA listed. In DOCS it is postulated as /termidwenta/ "provided with a termis".
139
L.R. Palmer suggests that the word means "provided with
140
tyres". Ruijgh, however, taking up a suggestion by Crouwel, has recently advanced a different interpretation, according to which what might be

84/...

136. KT IV 1971 : 295. 137. KT IV 1971 : 295; DOCS 1973 : 372 no. 282.
138. 1973: 370, 517, 584; cf. Chadwick 1976: 170.
139. 1963: 321, 324, 456; cf. Lejeune 1972 : 309 with n.4.
140. 1976: 181 (par. 6); cf. Lejeune 1968 a: 35.

wheels which are not specified were from an obvious source, possibly the local wheelwrights on location at Knossos; if so, ko-ki-da may well have been, as suggested above, in charge of a workshop elsewhere in Crete and either sent in his contribution or more likely a record of it to Knossos. If his contribution was specified only because the wheels were ne-wa, /newa/ "new", it does not explain why the source of new wheels in So 4449 + is not specified.[151] The other names which occur in the So series, a-re-ki-si-to (So 4433 +.b)[152] and o-pe-te-we (in So 4447)[153] (if it is a man's name) can be similary interpreted. If pa-i-to, in So 4448 + is correctly assumed to be Phaistos, the possibility exists, as already noted in regard to chariots, that ko-ki-da, a-re-ki-si-to and o-pe-te-we (if it is a man's name) were located at places like pa-i-to.

That the extant Knossos wheel records are an incomplete record of the total archives is indicated by the large number of ROTA in the following two totalling documents:[154]

So 894

.1 a-te-re-te-a , /pe-te-re-wa 'te-mi-dwe' ROTA ZE [

.2 ka-ki-jo ROTA ZE 1 ka-ko-de-ta ROTA ZE [

.3 ki-da-pa , / te-mi-dwe-ta ROTA ZE 41 MO[

.4 o-da-tu-we-ta / e-ri-ka, ROTA ZE 40[

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151. Two other entries may serve to fortify the argument: a-re-ki-si-to-jo's wheels and are noted in So 4433 as wo-zo-me-no, whereas the wo-zo-me-na wheels in So 4438 are not attached to an individual. KT IV 1971 : 296.
152. KT IV 1971: 296, 297; cf. DOCS 1973: 534, 565.
153. KT IV 1971: 297; cf. DOCS 1973; 567.
154. KT IV : 1971 : 295; DOCS 1973 : 371 no. 278.

The majority consist of only one line and are introduced by a man's name in the genitive,[171] followed by wo-ka , we-je-ke-e ROTA + TE and a numeral preceded by either ZE or MO. They seem, therefore, to be either or both an inventory of wheels in storage in the magazines, or else in the possession of the individuals listed.[172]

Of the 19 individuals listed[173] the only names which occur elsewhere in the Pylos archives are a-me-ja-to (Sa 834) and e-te-wa-jo (Sa 769 (e-te-wa-jo-jo), - 1267, - 797 (a-te-wa-jo?)). a-me-ja-to occurs in Sh 736[174] as the possessor or contributor (?) of 5 to-ra-ke , /thorakẽs/; e-te-wa-jo is listed as a shepherd in Cn 600 (.12)[175] and in an uncertain context on Py Xa 639.[176] Although it is uncertain however, whether the men listed in these tablets are in fact the same persons, the fact remains that the majority of the names are in the genitive and this seems to suggest that the men listed in the Sa series are in possession of the wheels listed.

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171. Those that deviate from the standard formula are Sa 22, - 287 , - 403 , - 483 , - 488 , - 682 , - 751 , - 758 ,- 787 - 790 , - 791 , - 793 , - 794 , - 840 + , - 843 , - 1313. PTT I 1973 : 223-5.
172. See further below, pp 125 - 6.
173. PTT I 1973 : 223 ff.
174. PTT I 1973 : 227; DOCS 1973 : 379 no. 296.
175. PTT I 1973 : 73; cf. DOCS 1973 : 518.
176. PTT I 1973 : 268.

As for the technical vocabulary of the Sa tablets, this is similar to that of the So series at Knossos. They seem for the most part to deal with materials used in the manufacture and the physical condition of the ROTA and ROTA + TE listed. The following tablets illustrate:[178]

Sa 487 ke-ro-ke-re-we-o , wo-ka we-je-ke-e , ROTA + TE ZE 2[

Sa 488 ku-pa-ri-se-ja , ROTA + TE ZE 1 MO 1

Sa 682 te-tu-ko-wo-a$_{2}$ no-pe-re-a$_{2}$ ROTA ZE 6

Sa 751 za-ku-si-ja , no-pe-re-a$_{2}$, ROTA + TE ZE 32 [

Sa 753 se-we-ri-ko-jo , wo-ka , e-qe-si-jo , ROTA + TE ZE 2

Sa 758 tu-ri-si-jo-jo , wo-ka , we-je-ke-e , ROTA + TE ZE 1

Sa 787

(.A pa-ra-ja , we-je-ke-a$_{2}$, ROTA ZE 31 MO 1

(.B to-sa , e-qe-si-ja$_{••}$ pa-ra-ja$_{••}$ ROTA 12 za-ku-si-ja ROTA ZE 32

Sa 790 a-mo-ta , e-qe-si-ja , no-pe-re-a$_{2}$, ROTA + TE ZE 6

Sa 793 e-re-pa-to , te-mi-dwe-ta , pa-ra-ja , ta-na-wa , ROTA + TE ZE 11

Sa 794 ka-ko , de-de-me-no , no-pe-re-e , ROTA ZE 1 [

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178. PTT I 1973 : 223-4.

ROTA still had some work to be done on them.

Besides the condition of the wheels, there are, as in the case of the Sd tablets (CUR) at Knossos, indications of the materials used in the construction of the wheels. In Sa 488 the wheels are ku-pa-ri-se-ja "of Cypress-wood",[186] in Sa 287 and - 794 they are a-ku-ro , de-de-me-no "bound with silver" and ka-ko , de-de-me-no "bound with bronze" respectively,[187] and in Sa 793 and - 840,[188] as already noted, e-re-pa-to and ke-ra-e are specified, although in the latter two tablets in connection with the te-mi-dwe-ta. In these instances, where the materials are specified, it must be assumed that the wheels are different from the rest. Except in the case of Sa 488 the wheels were most probably made of wood other than ku-pa-ri-se-ja, possibly, as in the case of the Knossos wheels,[189] of either e-ri-ka or pte-re-wa. As for a-ku-ro , /argurōi/ "with silver" and ka-ko , /khalkōi/ "with bronze" their occurrence in association with de-de-me-no probably indicates that these metals were only used in respect of specific parts of the wheels,[190] probably binding of some sort. As in the case of the ke-ra-e and e-re-pa-to te-mi-dwe-ta, decorative elements of some sort can be postulated.

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186. PTT I 1973 : 223; DOCS 1973 : 373 no. 284.
187. PTT I 1973 : 223, 224; cf. DOCS 1973 : 585, noting the occurrence te-tu-ko-wo-a in the Knossos textile tablets. Cf. DOCS 1973 : 374 no. 290, 375 no. 291.
188. Above p. 90.
189. Above p. 82.
190. Cf. DOCS 1973 : 539.

Conclusions

The chariot and chariot wheel tablets do not essentially differ from other Linear B documents - inventory lists of various commodities, personnel records, cadastral records, etc. - and were, no doubt, kept for a year and then destroyed. Their importance must not, however, be underestimated. Besides confirming that the administration of the chariot and wheel magazines was under the direct supervision of the central administrative authorities, the tablets themselves are a vital source of information on the technology and manufacture of chariots and chariot wheels. They provide a valuable supplement to the information which can be gleaned from the representational sources. In spite of the fact that the vocabulary of the tablets is restricted and the technical terminology often not completely understood, and also the fact that we apparently do not possess the complete archives, important inferences about their use, as well as the logistics of the Knossos and Pylos chariot forces can be reconstructed on the basis of the available texts.[195]

Chronologically too the Linear B chariot and wheel records, in contrast to the relative chronologies reconstructed on the basis of representations, which, as already noted, rarely occur in closely dateable contexts, are important. If a date of c.1375, just before the final destruction of the palace at Knossos is

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195. See below, pp. 124 - 6.

accepted for the Knossos tablets,[196] it would provide a date terminus post quem for the use of the Dual chariot in Crete; similarly the Pylos tablets, if a date c. 1200 is accepted for the destruction of the palace at Ano Englianos,[197] would provide a date terminus ante quem before it went out of use. Important also is the fact that the tablets like the representational sources, confirm that the Dual chariot was the only chariot type used throughout the LM/LH III period.

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196. The chronology of the destruction of Knossos has been a subject of considerable controversy and cannot fully be discussed here. The main points of argument can be consulted in Palmer and Boardman 1963. Palmer, mainly on philological grounds maintained that the Knossos tablets were contemporary with those from Pylos, that is the end of LM IIIB, whereas Boardman, on archaeological grounds maintains that Evans' chronology was essentially correct, that the original date about the end LM II / beginning LM IIIA was in keeping with the archaeological evidence. Boardman's date c. LM IIIA is accepted here.
197. On the destruction of Pylos, see Desborough 1964.

3

- Heidelberg, Inv. 27/12 (Pl. 20) : This fragment depicts parts of two men in a chariot of which the vertical rail (the front member of the box) and horizontal side-rail survive. In the front of the box (q.v.) the vertical rail takes on a curvature element at its highest point before fusing with the horizontal side-rail. This seems to suggest that the rail was higher in the front section of the box than in the rear and by implication the sides of the box would then have curved slightly downwards towards the rear, in much the same way as that of Quadrant chariots, but probably less pronounced. This feature repeats itself in Nauplion 14 336 (Pl. 24) and other fragments (Pl. 21.b) below.

4

- Nauplion 14 336 (Pl. 21a,b) : Sections of at least two chariots are shown, with clear details of the box (q.v.). The rail, representing the sides of the box, is depicted approximately waist high relative to the bodies of the occupants and curves slightly downwards towards the rear (Pl. 21b), indicating that its highest point was in the front section of the box as in Heidelberg 27/12 (Pl. 20) above. In

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2. (cont.) comprehensive catalogue of the sources cannot, in view of the fragmentary and incomplete nature of the majority of the representations, be given here; only such sherds from Mycenae and Tiryns as are directly relevant to the discussion are used and are cited in accordance with the museum catalogue numbers and photographs in Vermeule and Karageorghis 1982.
3. Vermeule and Karageorghis 1982 : 221, Pl. XI.18; cf. Catling 1968 : 47 no. 21, Pl.23:21; also Crouwel 1981 : 165 no. V.54; Pl. 68.
4. Vermeule and Karageorghis 1982 : 220, Pl. XI.16; cf. Littauer 1972 : 146 with I11.1; See also Crouwel 1981 : 164 no. V.43; Pl. 60.

both fragments the axle is in position directly below the floor of the box, more or less in a central (Pl. 21b) to rear (Pl. 21a) position relative to the front of the box. As in the two Mycenae fragments constituting NM 1141 (Pl. 25) the occupants are probably warriors; they wear greaves extending to above their knees and short chitons. In one of the fragments (Pl. 21b) the passenger, standing behind the driver, seems to carry a small round shield of the telamon type depicted on other contemporary sherds, as well as a long spear or lance.

- The "Unterstadt" fragments (joined) (Pl. 22)[5] : The composition is similar to the previous one (Nauplion 14 336, Pl. 21), except that both the driver and his passenger carry shields; they seem to be wearing the 'hedge-hog' type of helmet seen on some of the warriors in the Mycenae Warrior Vase (Athens, NM 1426)[6]. The chariot box is depicted open in the rear and the horizontal section of the rail is omitted. An interesting feature is the decoration on the vertical (front) rail, which corresponds with the crossed decoration on the tail(s) of the team (q.v.). These probably represent interlaced leather thongs, suggesting that leather thongs were

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5. Vermeule and Karageorghis 1982 : 221, Pl. XI.28; cf. Crouwel 1981 : 164 no. V41 : Pl. 59.
6. For the so-called "hedge-hog" helmets on the Warrior Vase, see Vermeule and Karageorghis 1982 : 130 ff. 222, Pl. XI.42 with refs.

used to hold together the constituent parts of the superstructure, or to fix the upward-curving draught-pole (q.v.) - not depicted in this fragment - to the vertical member of the box (q.v.).

- Athens, N.M. 1509 + 1510 (Pl. 23)[7] : Highly fragmented and poorly drawn, the scene shows 3 men - probably two in a chariot and one footman - in a context which cannot be certainly interpreted. It is, however, not unlikely that this is a military scene, for all three men seem to wear helmets and the footman at least seems to be clothed in body armour covering his entire torso and possibly his upper-arms. If the spotted and crossed designs on the charioteers' bodies, around their faces and covering their necks are any indication of the extent of their clothing, it is not unlikely, though far from certain, that they also wear armour. The driver is seen holding the reins. The horizontal rail(?) of the chariot is depicted curving unrealistically upward above the shoulders of the charioteers. As in the other fragments, it seems to be a light, open framed affair, for the bodies of the two warriors are clearly visible and no breastwork is evident.

MYCENAE

- Athens, NM 3596 (1272 lot) (Pl. 24.a) and Nauplion 8357 (Pl.

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7. Vermeule and Karageorghis 1982: 216, Pl. X.9.; cf. Catling 1968 : 47 no. 1; Crouwel 1981: 176 no. V. 47 : Pl. 63. a.

24.b).[8] These two crater fragments, now joined, although broken at crucial points, are sufficiently intact to show that two chariots are depicted. They have open sides, with the horizontal side rail extending along the length of the box (q.v.) and approximately waist-level relative to the bodies of the standing charioteers. The two occupants of each of the two vehicles carry the same telamon type shields already observed in the Tiryns fragment Nauplion 14 336 (Pl. 21b) and the 'Unterstadt' fragments (Pl. 22). In both fragments the figure behind the driver, presumably standing next to him, carries a spear. Their equipment corresponds with that of the soldiers in the Warrior Vase[9]. The same hedge-hog type helmets already observed in the "Unterstadt" fragments (Pl. 22) are clearly visible in Nauplion 8357 (Pl. 24b). Commenting on the bent knees of charioteers in NM 3596 (Pl. 24a), Lorimer[10] notes that "the chariot is in rapid motion and ... they are trying to counteract the jolting".

- Athens, NM 1141 (two fragments, joined) (Pl. 25)[11] : Each of the two fragments preserves part of the leg of a charioteer,

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8. Vermeule and Karageorghis 1982 : 220, Pls. XI.1 A-B; cf. Catling 1968 : 47 no. 19, Pl. 23:19; Crouwel 1981 : 163 no. V.18; Pls. 53 a-b.
9. See above n.6.
10. 1950 : 316.
11. Vermeule and Karageorghis 1982 : 220, Pl. XI.2; cf. Catling 1968 : 47 no. 20, Pl. 23:20; Crouwel 1981 : 163 no. V.19, Pls. 54 a-b.

In representation the depth of the box (q.v.) varies according to the number of occupants and may consequently not be realistically depicted. If the artistic convention noted earlier of showing two figures standing one behind the other when they were in fact standing abreast, applies here as well, we may assume that the box was not as deep as the sources suggest. That it may have been relatively compact is in fact suggested by one of the fragments of Nauplion 14 336 (Pl. 21.b).

On the analogy of the Unterstadt fragment (Pl. 22) and Nauplion 14 336 (Pl. 21a,b) the wheels were four-spoked. If the round ring-like depiction of the hub (q.v.) in the Unterstadt fragment (Pl. 22) and Nauplion 14 336 (Pls. 21a,b) are anything to go by, the wheels revolved around a fixed axle and were kept in position by means of linchpins. Such an arrangement would facilitate easy removal for repairs or storage.[16] Less certain, however, is the position of the axle. If the position of the charioteers' feet in Nauplion 14 336 (Pls. 21a,b) is realistic the axle would have taken a fully rear or almost rear position. Although this is not certain it seems a reasonable assumption in view of the generally light structure of these chariots. This would, in fact, have enhanced their stability and manoeuvrability and would also be consistent with the Near Eastern and Egyptian evidence.[17]

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16. On the removal and storage of wheels, cf. above p.49 and n.8.
17. For the Near Eastern and Egyptian evidence, see Littauer and Crouwel 1979 : 74 ff.

Mycenae, Tiryns and Pylos around the end of LH III B.[20] Its history should then be viewed in the context of increased militarism during the 12th and 11th centuries B.C., at a time when the organisation and resources available to the 14th and 15th century Mycenaean palaces and the industrial infrastructure to support a comparable chariot industry no longer existed.[21]

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20. For detailed coverage of the archaeological evidence relating to the destruction levels at the end of LH III B and the reduced level of occupation of these sites during LH III C, see Desborough 1964: 217 ff. esp.
21. Cf. Crouwel 1981 : 150.

times portrayed in scenes of the chase. But the appearance of chariots in Greece for either purpose is always puzzling; the terrain is usually too rough to allow them to operate except on a made track, which would severely inhibit their use. They probably served purposes of prestige as much as anything, and we need not accept too literally the scenes on these gravestones, which are normally taken to represent the warrior running down his enemies".

In this chapter, the military use of the chariot and its active role in the context of LM and LH warfare is demonstrated by way of a systematic consolidation of the representational, documentary and archaeological evidence, including brief notes on field surveys of Mycenaean roads, notably in Messenia and the Argolid, as well as comparative material from the Near East and Egypt where relevant. Since the bulk of the evidence dealt with in the preceding chapters consists of representations these are discussed first, primarily as a means of establishing whether a military interpretation of the chariot scenes in the sources can be upheld or not.

5.1 The Military Use of the Chariot

Concerning the earliest representations, those depicting the Box chariot (Type I), the representational content of the three best preserved stelae from Shaft Grave Circle A at Mycenae - Athens,

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NM 1427 (stele I), NM 1428 (stele V) and NM 1429 (stele IV) - and the traditional interpretation of the chariot groups as battle scenes in which the deceased warrior took an active role have already been noted.[2] However, in 1951 Mylonas argued against the earlier communis opinio, maintaining that:

- "In all the extant representations we have one or two persons on the chariot whenever a quiet, stately scene is represented; but we have two men on the chariot whenever an active or violent scene is represented or action is anticipated ... a single warrior or hunter on a chariot could hardly handle the horses and fight or hunt at the same time";[3]

- in the case of NM 1428 (Pl. 2)[4] and NM 1429 (Pl. 3)[5] he argues that neither the charioteers nor the footmen are properly equipped for battle: the footmen "are equipped with light weapons, in one case a knife, in the other what seems to be a spear, a lance or even a long staff ... In both stelae we have a single man on the chariot who is essentially unarmed ...";[6]

- on NM 1427 (Pl. 1),[7] compositionally the most complex, what has traditionally been interpreted as a slain figure with a figure-of-eight shield lying on the ground, presumably run

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2. See above pp. 13 - 7.
3. Mylonas 1951 : 136-7.
4. Mylonas 1951 : 137-8, Fig. 2; cf. above p. 15.
5. Mylonas 1951 : 138-42, Fig. 3; cf. above p. 14.
6. Mylonas 1951 : 140.
7. Mylonas 1951 : 142, Fig. 6; cf. above p. 14.

over by the chariot, is interpreted by Mylonas as, " the contour of the landscape through which the chariot is racing; that is, two boulders placed side by side ...".[8]

On the basis of his re-examination of the stelae, Mylonas concludes that, "The chariot compositions on the stelae cannot be interpreted as battle or as hunting scenes but as chariot races ".[9] His views were subsequently accepted amongst others by E.T. Vermeule,[10] who sees in these scenes both chariot races and hunting scenes, and by J.P. Holoka[11] who, in an article concerned mainly with NM 1427 (Pl. 1) (stele I) reaffirms Mylonas' arguments.

While not quite improbable Mylonas' conclusions can be challenged on several grounds, as most recently pointed out by J.H. Crouwel[12] : The only reasonably certain instance of chariot racing in the representational sources occurs during the transitional period LH IIIB:2 / LH IIIC, i.e. c. 1200/1900 B.C. in recently published reconstructed fragments of a deep-bowl crater from Tiryns.[13] Mylonas' and Holoka,[14] moreover, both read too much detail in the stelae which, as Schliemann himself remarked, were

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8. Mylonas 1951 : 146.
9. Mylonas 1951 : 147.
10. 1975 : 16 ff. See also Tsountas and Manatt 1897 : 92; Heurtley 1921-23:132; Cf. Dickinson 1977 : 71.
11. 1980 : 38-40 and n. 4.
12. 1981 : 119-20 with refs. ; cf. Mylonas 1951 : 147 n. 55.
13. Crouwel 1981 : 142, 165 no. V.51; Pl. 66.
14. 1980 : 40-2; cf. Crouwel 1981 : 119 n.6.

executed in a crude and puerile fashion.[15] The apparent absence of shields, helmets and other armour can be explained simply in terms of the difficulties presented by the medium and the intentions of the artist. It is perhaps significant that, in the hunting scene on the gold ring from Grave IV, which preserves all the details essential to the hunting theme, the artist omitted details of the yoke-and-pole assemblage, reins and other parts of the harnessing (Pl. 6).[16] If a lack of details were a criterion, Mylonas' interpretation fails to explain why, if chariot races are indeed depicted, only one chariot is shown in each of the stelae. Mylonas also fails to account satisfactorily for the presence of the charioteers' swords, most clearly shown in NM 1428 (Pl. 3) and NM 1429 (Pl. 2); in the latter the unrealistic position of the sword may perhaps indicate that it was added as an afterthought, probably because the artist needed to emphasize the fact that the charioteer was armed.[17] Mylonas' remarks regarding the charioteer's sword in NM 1428, that it "could be of little use to a riding warrior or hunter"[18] is unconvincing and is based on his failure to understand properly the role of the chariot in Bronze Age Greek warfare.[19] The reason why only one charioteer is present in each of the stelae can be explained by taking into account the probability - which

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15. Schliemann 1878 : 99.
16. Significantly perhaps, the same artist may have also been the sculptor of the stelae. Heurtley 1921-23 : 140, 145; cf. Evans 1929 : 54.
17. Cf. Schliemann 1878 : 89 - 90, Heurtley 1921-23 : 131.
18. 1951 : 138.
19. For discussion, see below pp. 126 ff.

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19. For discussion, see below pp. 126 ff.

Mylonas[20] also argues in the case of his chariot-race interpretation - that the stelae were erected in commemoration of the deceased and consequently served the same purpose as honorific scenes in Egyptian monumental art, where the victorious pharaoh is often depicted alone in his chariot, subduing his enemies.[21] Most importantly, Mylonas, as Crouwel notes,[22] does not take into account the obvious military character of the fragments of stelae VIII (Pl. 4) and IX (Pl. 5). Furthermore, if in the 'rearing' stance of the horses the artist was influenced by Egyptian and Near Eastern artistic conventions the possibility of the motif of an enemy being trampled underfoot (Pl. 1) cannot be dismissed.[23]

The evidence in other representations is unconclusive. The only possible instance of a military scene occurs in the Vapheio sardonyx (Pl. 7), in which the only weapon is a spear carried by one of the occupants. However, the lack of accompanying motifs makes it impossible to state whether the charioteers were warriors or not and there is nothing else to betray the purpose of their mission.[24]

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20. 1951 : 147.
21. Cf. the reliefs from the tomb of Thutmose IV (c. 1411 - 1397) in which, in a battle against the Canaanites and Syrians he is shown with the reins tied around his waist and fighting alone from his chariot with a bow-and-arrow. Yadin 1963 : 192-3 (right). For a brief discussion of Egyptian and Near Eastern warfare, see also Littauer 1972 : 145 ff.
22. 1981 : 120.
23. For the popularity of the theme, see Crouwel 1981 : 120-1 with refs. On foreign influences in the art of the Shaft Graves, see Hooker 1976 : 45 ff.
24. Cf. Crouwel 1981 : 121-124; also above p. 21.

There is nothing visibly military about the second, the Quadrant chariot type;[25] but as far as Type III chariots, the Dual type go, the greater detail afforded by the representational sources and the occurrence of chariot groups in association with other figures or objects - whether as filling ornament in pictorial vase-painting, or in narrative contexts in the religious/sacrificial scenes on the Hagia Triadha sarcophagus and in the Knossos murals - allow some measure of contextual control and it is possible therefore to state with a greater degree of certainty whether a military scene is indicated or not.

Taking first the representations in Mycenaean fresco painting, it is fairly certain that the murals at Mycenae and Pylos depict military scenes.[26] Among the fragments from Pylos a military scene has been reconstructed from very poorly preserved fragments found in front of the northeast wall of the Megaron (Hall 64) in the South-Western Building.[27] Although Piet de Jong's reconstruction relies entirely on the interpretation of incised lines and traces of figures, it is generally accepted that a Dual chariot with one occupant and a footman, the latter armed with a spear and walking behind the chariot, is represented.[28] In view of the find-spot of the fragments, this chariot group is probably contextually related to other fragments from Hall 64 which make

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25. Above, ch. 2.
26. See Littauer 1972 : 149 ff; Åkerström 1978: 21 ff.
27. Lang 1969: 44, 73 no. 26 H 64 : Pl. 18.
28. Littauer (1972 : 152) rightly comments on De Jong's restoration that the billowing reins and the charioteer's chiton, which ends above the horizontal side rail of the box,

up the so-called 'Battle Scene', in which combat is made with swords and daggers,[29] and another fragment showing a warrior armed with a spear, which "he is hurling with his right hand and guiding with his left".[30]

The interpretation of Rodenwaldt's reconstruction of chariot scenes from the fragments belonging to the north and west walls of the Megaron at Mycenae as military scenes has already been noted.[31] Although Rodenwaldt's reconstructions have been criticised in regard to his interpretation of the role of the chariot, their military character is not disputed.[32]

Rodenwald's first group,[33] reconstructed from the west wall fragments, depicts a harnessing scene with armed warriors and attendants leading horses up to unhitched chariots, probably in preparation for the scenes of battle reconstructed from the north wall fragments. The military character of the west wall fragments is obvious from the remains of at least three spear shafts - two of them carried over the shoulders of two warriors - a helmet, and the short chitons and greaved legs of the associated

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28. (cont.) may be inaccurate, but does not detract from the military character of the chariot group.
29. Lang 1969: 42 ff., nos. 22 H 64, 22 H 65; Pls. M, N.
30. Lang 1969: 72 no. 23 H 64: Pl. M. His boar's tusk helmet is parallelled in both the 'Battle Scene' (above, n. 29) and the footman in the chariot scene (above, n. 27).
31. Cf. above p. 31.
32. Littauer 1972: 149 ff.; Åkerström 1978: 22-3.
33. Rodenwaldt 1921: 29, 44, Beil I: 1-7.

figures.[34]

The north wall fragments, as Crouwel rightly notes,[35] do not form a homogeneous group; but two chariot groups are of importance.[36] The first group, associated with the siege scene, was reconstructed from two fragments, both showing sections of a multi-storied building similar to those found by Marinatos on Thera.[37] One of the fragments, furthermore, preserves the greaved legs and part of the belted chiton of a man, apparently falling backwards and down towards the building below; in the upper corner a patch of reddish-brown paint was interpreted and reconstructed by Rodenwaldt as a chariot team at full gallop. On the analogy of the galloping horses on the Mycenae gold ring (Ath., NM 240) (Pl. 6) and a similar scene involving a falling warrior in the Ramessite reliefs commemorating the Battle of Quadesh,[38] he proposed to interpret the whole scene as depicting a slain warrior falling headlong from his speeding chariot (Pl. 12a).

A second chariot group (Pl. 12b)[39] shows two individual chariots each occupied by one man and either moving slowly or at a

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34. Crouwel (1981: 129 with n. 63) remarks that the spears, chitons and leggings are not in themselves significant, since they occur in hunting scenes as well.
35. 1981 : 129.
36. Rodenwaldt 1921 : 32-3, 55-6, Beil. II: 8 and colour Pl.
37. Marinatos 1974, Pl. 9 (colour).
38. Rodenwaldt 1921: 55 ff, fig. 29; cf. Yadin 1963: 239.
39. Rodenwaldt 1921 : 41-3, Beil IV : 15, 16.

standstill; associated with one of the vehicles are shown the greaved legs of a man, facing away from the vehicle. The latter was interpreted by Rodenwaldt as a crouching "Bogenschützen", on the analogy of one of the figures (a lancer) on the Mycenae Lion Hunt Dagger.[40]

Concerning the documentary evidence, the contextual association in the Sc - series at Knossos of the "fully assembled chariot" (*240 BIG) with AES, TUN, *165, *166, and EQU has already been noted as probably denoting the issue of chariots and military equipment to a number of charioteers.[41] In the case of TUN, the outline of the ideogram resembles the Pylos ideogram ARM(a) (*163), an inventory of which is extant in the PY Sh-series.[42] On the analogy in one tablet, PY Sh 736, listing 5 ne-wa (new) commodities specified as to-ra-ke, /thórakes/, ARM is interpreted as representing military corselets, i.e. body armour.[43] That the Knossos TUN and Pylos ARM in all probability represent the same commodity is confirmed, furthermore, in the Tiryns fragment TI Si 5[44] which lists an ideogram *163 - corresponding in outline with both the Knossos TUN and Pylos ARM - in association with the word to-ra-ka, /thórax/ "corselet".[45] However, in view of separate

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40. Rodenwaldt 1921 : 42-3, Beil. IV : 16.
41. Cf. above p. 76.
42. Cf. Idéogrammes 1979 : 17 ff., figs. 4, 8-11 Pls. I-XII.
43. PTT I 1973 : 227; DOCS 1973: 379 no. 296, 587; cf. Chadwick 1976 : 160 ff.
44. Vandenabeele 1978 : 25 ff., fig. 1.
45. Vandenabeele 1978 : 27 ff., figs. 2-9.

records of GALea (*191) (helmets) in the KN Sk series [46] - at both Pylos and Tiryns ARM is used in respect of the complete military corselet, including the helmet (GAL) [47] - it can be inferred that TUN at Knossos is used to denote body-armour only. Ligatured forms of TUN occur in the Knossos textile tables where they are recorded as manufactured of ri-no, /linon/ "linen", or else specified as ki-to [48], /khiton/ "tunic". This may perhaps be taken to indicate that whereas the ligatured TUN in the textile tablets are possibly for non-military use, TUN in the KN Sc tablets may have been manufactured of bronze and were probably intended for military use. [49]

In eight Sc tablets, BIG(ae) are associated not with TUN, but with either * 165 [50] or * 166, [51] the latter sometimes inscribed over an erased TUN. [52] All three ideograms are mutually exclusive

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46. KT IV 1971 : 294.
47. For detailed coverage of corselets and helmets at Pylos, see DOCS 1973 : 375 ff. with refs.
48. Cf TUN + RI (*162 + RI), KN L 178; TUN + KI, KN Lc 646.v, Ld 595. 1. 2., - L 593 B.B. KT IV 1971: 216, 221, 229, 270 ff. A complete list of occurrences with photographs and drawings can be consulted in Idéogrammes 1979: 18-19, PLS. I-XII, XV-XVI. For the identification of TUN + RI = TUN + ri-no and TUN + KI = TUN + ki-to, see Melena 1975 : 38ff, 60ff.
49. The ligatured ideogram TUN + QE in the KN Sc tablets, used in association with BIG, probably stands for TUN + qe-ro$_2$ (acrophonically abbreviated QE). The exact meaning of qe-ro$_2$, used also in association with GAL in the KN Sk tablets (above n. 46) is, however, uncertain; see DOCS 1973 : 494-5.
50. Sc. 246, - 247, - 248 (over erased EQU), - 249, - 7461. KT IV 1971 : 273, 281.
51. Sc. 225.v, - 5141.v, - 7462.v. KT IV 1971: 271, 277, 282; Sc 7462.v. is included here as listing *167 on the basis of Idéogrammes 1975, Pl. XCI: 3.
52. Sc. 246, - 247, - 7461 KT IV 1971 : 273, 281.

and do not occur together on the same tablet, thus implying that the recipient could be issued with either TUN, or *165 or *166. Interpretations of * 165 and * 166 differ. Their resemblance to the "ingot" ideogram (*167), which appears in both plain and ligatured forms (* 167, * 167 + PE) in the KN Oa tablets[53] led to the suggestion that what is indicated by *165 and *166 is the raw material from which the corselets were manufactured, and that the men listed in the Sc tablets were sometimes issued with the raw material, i.e. with bronze instead of the finished product (TUN).[54] There are problems with this interpretation since neither *165 nor *166 is used in conjunction with any units for the measurement of weight, unless of course the ideograms represent a standard unit. This could explain why the numbers of *165 and *166 are, as far as can be ascertained never more than one.[55] Puzzling also is, as Chadwick[56] puts it, the "absence of linen, leather or whatever was used as a foundation"; he suggests, however, that "it is not a complete do-it-yourself kit for the home-made corselet, though of course the quantity of bronze would be the item hardest to come by".[57] Chadwick also points out that the interpretation of the ideograms as raw material does no more than compound the problems, since " ... can we seriously imagine a situation in which the individual

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53. *167, Oa 730; *167 + PE, Oa 733, - 734. KT IV 1971: 256.
54. DOCS 1973: 380, 522-3; Chadwick 1976 : 168-9; cf. Evans 1935: 652 ff, 805 ff; see also Idéogrammes 1979 : 151 ff., fig. 97, Pl. XCII : 1-3.
55. Cf. Crouwel 1981 : 125.
56. 1976 : 168
57. 1976 : 168

warrior was supplied with raw materials instead of the finished product? How long would it have taken to turn the ingot into a serviceable piece of armour?"[58] Crouwel,[59] however, rightly comments that other, perhaps more plausible, interpretations have been offered and that *165 and *166 may very well represent textile materials. This is almost certainly the case with *166 and its ligatured form *166 + WE,[60] which Melena[61] has demonstrated to be different kinds of textiles.

If the identification of *165 and *166 as textiles is correct, it may well solve the problem of the missing foundation material for the TUN. It is possible then to see in the Sc texts records of an issue of military equipment to the men listed, probably in replacement of damaged or lost equipment no longer in their possession. In this regard it is significant also that the chariots (BIG) issued to them are fully assembled, suggesting that they are being commissioned into active service. In view of their number, at least 95, assuming that each Sc tablet listed BIG 1, it can moreover be postulated that they were not all stationed at Knossos. The possibility that these men fulfilled a strategic function cannot be excluded.

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58. 1976 : 168
59. 1981 : 125 and n. 42
60. KN Da 878.1, - 1808, - 7374.2; in Da 7374.2 in association with ri, probably on acrophonic abbreviation for ri-no, /linon/ "linen". KT IV 1971 : 256. For further arguments, see Duhoux 1976 : 116 ff.
61. 1975 : 61 - 2 and refs.

However, the most explicit evidence for the military use of the chariot occurs in representations of the Open-Rail chariot, from about end LH III B/beginning LH III C onwards.[62] Whether these vehicles were used exclusively in warfare is uncertain. If Crouwel's[63] recent identification of a chariot racing-scene on joined fragments of a LH II B/III C deep-bowl crater from Tiryns is correct and assuming that the chariots are indeed of the Open-Rail type, these vehicles, like the other three types, may very well have served non-military purposes as well. This does not, however, imply that they were not designed primarily with a military purpose in mind. Although the archaeological record may be biased in terms of both the number of excavated sherds and the range of artistic motifs, the lightness of the Open-Rail chariots and the military character of the majority of extant representations do seem to suggest that they were designed and constructed first and foremost for speed and manoeuvrability, that is for the transport of warriors to and from the battle field.[64]

The paucity of military scenes in representation and the inferential nature of the Linear B evidence above need not, however, be interpreted as an accurate index of the military use

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62. See above, pp. 106 - 7.
63. 1981 : 142, 165 no. V. 51 ; Pl. 66; cf. above, p. 111 - 2.
64. See below, pp. 130 ff.

of the chariot. There is no reason to go along with Akerström's conclusion that "one feels tempted to ask, whether the chariotry in the Aegean should not be taken more or less as an expression of the sovereign's prestige, just to betray knowledge of this spectacular kind of armed forces.."[65] The reasons are three-fold:

- Firstly, there is the matter of archaeological visibility and bias in the archaeological record. There can be no doubt that the surviving corpus of representations, whether they be non-military or not, represents a relatively small sample of the material evidence in existence more than 3 000 years ago - the lacunae in the Linear B archives from Knossos, Pylos and Tiryns, and the absence of similar records from Mycenae are a case in point. The lack of any physical remains of an actual chariot,[66] the relatively small sample of extant horse bits and the fragmentary nature of Minoan and Mycenaean fresco art are proof enough that the archaeological record is biased in so far as much depends on preservation and chance finds.

- Secondly, as far as the absence of military motifs in LH III A - III B vase-painting go, Littauer[67] rightly observes that it may quite simply not have been an inspiring motif for

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65. 1978 : 37.
66. See Crouwel 1981 : 158 nos. B 1-12 ; Pls. 1-8.
67. 1972: 149, 153. Crouwel (1981: 133) remarks on the depiction of armed figures often seen accompanying chariots in vase painting that they should probably be understood as escorts and, since none of the occupants are not visibly armed, do not necessarily imply military activity.

Mycenaean vase-painters and consequently not popular. It should also be borne in mind that the LH III A-B period was one of general prosperity and wealth for the Mycenaean palaces and that this can only be expected to be reflected in the material evidence throughout the Mycenaean archaeological horizon. In this regard it is significant that aggression should be reflected in the Schliemann's grave stelae, by all indications at a time when a new dynasty, probably a local chieftain and his clan were establishing themselves at Mycenae[68] and again, during LH III C, after the collapse of the main centres c. 1200 B.C., probably in the wake of increased military activity, when a military consciousness finds expression both in the appearance of the light Open-Rail chariot and in an increased frequency of military motifs in vase-painting.[69]

- Thirdly, the technical terminology and extent of the chariot and chariot wheel archives at Knossos and Pylos suggest that the chariot industry was well organized and an important part of the industrial activity in both Crete and in Messenia.[70] The suggestion made earlier[71] in regard to the occurrence in

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68. Dickinson 1977 : 107 ff.
69. For detailed coverage of the transitional LH III B/C and LH III C periods, see Desborough 1964: 217 ff., 241 ff.
70. That the industry must have been well organized and would have probably required a substantial sector of the Knossian and Pylian labour forces can be inferred on the basis of a chariot workshop scene in an Egyptian fresco from the tomb of Hapu (c. 1352 - 1343 B.C.); Yadin 1963: 202. See also below, pp. 125 - 6.
71. See above p. 86.

the Knossos tablets of the place-names pa-i-to (Sd 4413.b; So 4448 +), ku-do-ni-ja (Sd 4404 +.b) and (?) se-to-i-ja (Sd 4407 +.b), and the personal names ko-ki-da (Sd 4403 +.a, So 4430.a) and a-re-ki-si-to (So 4433 +.b; gen. a-re-ki-si-to-jo, So 1053 +.a, Sf 4420.a), that they probably indicate the existence of chariot workshops elsewhere in Crete, implies that the industry was not localized either. If chariot workshops and magazines did exist in other parts of the island and were as tightly controlled by the central authorities at Knossos as the tablets suggest, it can be inferred that the industry was no less important than the comparably well documented textile industry.[72] That the Knossos chariots served a strategic function and were not used for private transport and ceremonial purposes only can also be inferred from the numbers of complete and incomplete vehicles in the Knossos archives; on the analogy of the extant and restored figures in KT IV[73] the numbers are:

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72. For a detailed study of the Knossian textile industry, see Melena 1975.
73. 1971 : 270- 93.

		Series	Extant Totals
*240	BIG(ae)	KN Sc [74]	95
		KN Sd	1
*241	CUR(rus)	KN Sd	10
		KN Se [75]	5
*242	CAPS(us)	KN Sf [76]	281
		KN Sg [77]	251
*243	ROTA	KN So	461 (ZE) 1 (MO)
		KN Sg	208 (ZE)

Assuming that these figures represent only a part of the entire Knossos chariot force - both vehicles in commission (Sc) and those in storage or under construction (Sd, Se, Sf, Sg) - and allowing for the probability that some of the vehicles listed in the single-entry texts are included in the composite entries in totalling tablets,[78] the total number of chariots at Knossos must have been in excess of 500, a figure which more or less tallies with the extant total of 500-600 pairs of wheels in Sg 1811 +

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74. Sd 4404 +. lat. sup. KT IV 1971 : 286.
75. Sf 4428.b, CAPS 1 is included here on the assumption that me-ta-ke-ku-me-na (.b) denotes a "dismantled" chariot; KT IV 1971 : 292; cf. DOCS 1973 : 368 no. 247.
76. Sg 1811 +.5 a-mo 1 [is included here on the analogy of CAPS (.1.2), which may perhaps be taken to indicate that the chariots listed on this tablet are not fully assembled. KT IV 1971 : 293; cf. DOCS 1973 : 517 no. 322.
77. A total of 8 (MO) can be postulated if it is assumed that So 894.3 , - 4429 +.b , - 4430.1 , - 4431 + , - 4432 + , - 4434 + , - 4439 + and - 4446 + each preserved MO ROTA 1. KT IV 1971 : 295-7.
78. Sg 1811 + ; So 894(?) , - 4446 +. KT IV 1971 : 293, 295, 297. Further evidence in regard to the constituent parts of chariots in the Pylos archives occurs in Vn 10 which lists 200 a-ko-so-ne "axles" in the area of ro-u-so, although the number of chariots is unknown. Chadwick 1963 : 2. For corresponding evidence from Knossos, see Crouwel 1981 : 86.

and the So tablets.

At Pylos of course the archives are much less complete than at Knossos. No records of chariots survive and only approximately 59 pairs (ZE) and 2 single (MO) wheels survive on the single-entry tablets, and 105 pairs (ZE) and 1 single (MO) wheel are listed in totalling tablets. This would suggest that at least 105 chariots could be mustered on the basis of existing composite entries alone.[79] However, while the Pylos chariot force was by all indications probably considerably smaller than the Knossos force, its strategic importance for the security of the Pylian kingdom must not be underestimated.

5.2 The Role of the Chariot in LBA Warfare

It is evident from the well-documented military history of the chariot in the Near East and Egypt[80] that the advantage of the chariot lay in its use as a tactical weapon, that is in its deployment <u>en masse</u> and at speed across the open plains of Syria, Palestine, Anatolia, the Levant and Egypt, first at medium and then at close range, initially as shock troops and then in outflanking and pursuit of the defeated enemy. These elements of strategy are vividly portrayed in the temple records at the Luxor, Abu-Simbel and the Rameseum at Thebes, depicting Rameses II's victory over a coalition of the Hittites and their

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79. PTT I 1973 : 223-5.
80. For coverage of Near Eastern and Egyptian warfare, see Yadin 1963 : 106 ff. Later references to massed chariot attack at speed are contained in Caesar, <u>The Gallic War</u> 4.33.

allies at Kadesh in 1280 B.C.[81] Significantly the Ramesite reliefs also demonstrate that additional tactical advantage could be gained by a choice of weaponry: the Hittite lancers were decidedly disadvantaged against the Egyptian archers, whose weapons enabled them to strike a decisive blow to the Hittite armies before the latter could come within close-range fighting distance of their Egyptian counterparts.[82]

The question that must now be asked is, did the chariot serve a similar role in LM and LH warfare or not? P.A.L. Greenhalgh,[83] in a study concerned principally with chariotry and equestrian practices in the Dark Ages following the Mycenaean collapse c. end 12th/mid-11th centuries B.C., argues that "there is no direct evidence that the Mycenaeans used massed chariots in the manner of the Hittites, but it is a sound conjecture ... the very large numbers of chariots revealed by the tablets suggest that chariotry was a major arm, and make it very likely that massed chariot charges were as much a feature of Mycenaean tactics as they were among the other Bronze Age monarchies".[84] In a subsequent article, he reaffirms this view and on the grounds of the cumbersome nature of the Dendra panoply, argues that it was too "unwieldy for a footsoldier to walk far or fight effectively in";[85] he consequently postulates that it was a specialized piece

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81. Yadin 1963 : 106 ff.
82. 1963 : 106 ff.; cf. also the battle records of Thutmose IV, Yadin 1963 : 192-3.
83. 1973.
84. Greenhalgh 1973 : 10 ff.
85. 1980 : 204 ff.

of equipment designed for use by warriors "on moving chariots with levelled lances ...".[86]

Objections to his views have however, been raised and set out by M.A. Littauer[87] and J.K. Anderson.[88] On a practical level, Greenhalgh's views can be challenged on several grounds, not least of all the lack of suitable open terrain, both in Crete and in the Greek Mainland to afford the opportunity of massed attack at speed. Not that open terrain did not exist; open plains do exist in Crete and in the Mainland, but, as Akerström rightly notes,[89] nothing geographically comparable to those further east. The mountainous terrain of Messenia in any case positively precludes all possibility of <u>en masse</u> chariot attack.[90]

The logistics of the chariotry too are different. At Megiddo for instance, according to the annals of Thutmose III at Karnak, the booty of the victorious pharaoh included 924 chariots and 2 041 horses.[91] Even allowing for the <u>lacunae</u> in the Linear B archives at Pylos and Knossos,[92] and taking into account also that the Karnak records may be vastly exaggerated in terms of the numbers recorded,[93] the rulers in Crete and in Messenia are

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86. 1980 : 204 ff.
87. 1972 : 145 ff. For coverage of Near Eastern and Egyptian warfare, see Yadin 1963.
88. 1975 : 175 ff.; cf. Yadin 1963 : 106 ff.
89. 1978 : 19ff.
90. See McDonald and Rapp 1972 : 25 - 28 , 244 - 5.
91. Greenhalgh 1973 : 10.
92. 1980 : 204.
93. 1980 : 204.

unlikely to have had similar forces at their disposal.

As far as Greenhalgh's "Dendra charioteer"[94] is concerned the use of the thrusting spear, rightly noted by Littauer and Crouwel[95] as a confrontational weapon used in direct confrontation, is impractical. The latter authors have demonstrated beyond doubt that the head-on attack of chariots, a necessary strategy if long thrusting spears were used, would not only have injured the chariot teams and probably wrecked the chariots, but would also have required enough space between vehicles to avoid their axles from interlocking. The close-range effectiveness of the long thrusting spear from a speeding chariot would be more than off-set by the disadvantage to the charioteer, who not being able to dislodge the weapon from his stricken foe would have been unsteadied and thrown from his chariot by shock of impact.

There is indeed no direct evidence to support Greenhalgh's contention that the spear was used in confrontation by Aegean charioteers. During LH III C, when spears are depicted as part of their armour, there is nothing to suggest that the spears are thrusting spears or that chariot scenes are confrontational. Littauer and Crouwel[96] observe that the two examples quoted by Greenhalgh - the Vapheio sardonyx (Pl. 7) and the Nauplion fragment 14 336 (Pl. 21b) similarly do not depict active military operations. In the case of the Vapheio sardonyx the

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94. 1977; also Littauer and Crouwel 1983.
95. For full discussion with a diagram, Littauer and Crouwel 1983 : 188-9, with fig. 1
96. 1983 : 189-10; cf. Greenhalgh 1980 : 203-4.

interpretation of the chariot group as military is at best conjectural.[97]

There is also no direct evidence to suggest that the bow-and-arrow,[98] the weapon par excellence of the Egyptian chariotry was used in the same way in Greece and Crete. In the gold signet ring from Shaft Grave IV (Pl. 6) it is used in a hunting context. Evidence for its military use by charioteers is lacking, except in one of Rodenwaldt's chariot frescoes from Mycenae (Pl. 12b), where it is used not in the oriental fashion from within the chariot, but by a warrior who had already alighted from his vehicle and fought from the ground beside or behind it. The absence of the bow as a weapon in Aegean chariot warfare is all the more striking in view of the presence of arrows in the Knossos tablets,[99] the bronze arrow-heads excavated in Evans' "Armoury" and those from Cretan and Mainland sites, including Pylos.[100]

As far as the Dual chariot is concerned the Pylos (Pl. 13) and Mycenae frescoes (Pl. 12), suggest that the chariot was used

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97. Cf. above, p. 113.
98. For a concise discussion of the evidence, with illustrations and notes on the practical disadvantages presented by the use of the bow-and-arrow in chariot warfare, see Littauer 1972 : 145-7.
99. KN Ws 1704. KT IV 1971 : 334; see also DOCS 1973 : 360-1. In DOCS it is also noted (1973 : 356) that the total weight of bronze in the Jn tablets at Pylos would hypothetically be sufficient for at least 534 000 arrow-heads.
100. DOCS 1973 : 356 with refs.; cf. Snodgrass (1965 : 102 ff.) who also comments on the conspicuous absence of archery in chariot contexts.

primarily as a means of transporting a warrior to and from the field of battle, probably accompanied by footmen and other platoons of infantry. Furthermore, if the theme of the accompanying footman in the Pylos frescoes is anything to go by, it seems reasonable to assume that chariots were the prerogative not of the rank-and-file Mycenaean soldier, but of the ranking officers and commanders. In this regard it is significant that the Sa series at Pylos lists wheels of the e-qe-si-ja type (PY Sa 7[3], -784.b, - 790)[101] which by the very nature of the term were probably restricted to those of e-qe-ta rank. It is notable as well that another extremely high-ranking person in the Pylian kingdom, the ra-wa-ke-ta, the lāwāgetās, is indirectly implicated in PY Ea 421 and - 809,[102] which concern the a-mo-te-wo, gen. of *(h)armoteus, "the wheelwright" of the ra-wa-ke-ta. Possession of chariots would probably have served to distinguish men of rank from the regular infantry.[103]

The differences between oriental and Aegean chariotry are indeed numerous. Besides the lack of suitable terrain in Greece and Crete to facilitate direct confrontation <u>en masse</u> and the lack of evidence in the Aegean for the use of the bow-and-arrow from mobile chariots, Littauer also points out that there is no evidence to suggest

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101. PTT I 1973 : 223-4; cf. also PY Wa 1148, PTT I 1973 : 260.
102. PTT I 1973 : 85, 87.
103. See also below, pp. 133.

that efforts were made "to cope with the difficulties seemingly encountered in using (as opposed to merely carrying) even one shield in a chariot", nor are any of the structural changes made to chariots to cope with the difficulties of mobile chariot warfare evidenced in any one of the four Aegean Bronze Age chariot types. The latter included fixing quivers, bow-cases and shields to the sidings of the box. But, if chariots in Crete and the Greek mainland were not used in the oriental fashion, what was their role in Late Bronze Age warfare?

Again, it must be stressed that direct evidence is lacking and such conclusions as are arrived at are largely inferential. Some indication of the military use of the chariot may be further revealed in the so-called o-ka tablets - PY An 657 , - 654 , - 519 , - 656 and - 661.

These are usually interpreted as documents recording military action of some sort; as correctly noted, probably preparations for defensive action.[104] In spite of the fact that the word o-ka and the role of the e-qe-ta in these tablets are differently interpreted by scholars,[105] there is evidence to suggest that these tablets record the despatch of an organized coast-guard to all parts along the coast of the Pylian kingdom. It is probable, moreover, that these guards in addition to their duties, in this

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104. PTT I 1973 : 49-53; cf. DOCS 1973 : 183 ff.; also Baumbach 1983 : 28-40.
105. Cf. Palmer 1965 : 134 ff.

instance in an emergency, acted as border patrols and played an important role in so far as strategic communications are concerned, since the areas under their patrol included both the de-we-ro-a -ko-ra-i-ja and the pe-re-a -ko-ra-i-ja, that is both provinces[3] falling under the administrative supervision of Pylos.[106]

If the Pylos o-ka tablets and the references to place-names in the Knossos Sd and So tablets are anything to go by it seems reasonable to infer that chariots in Mainland Greece and Crete fulfilled a strategic rather than a tactical role. Confirmation for this can indeed be found in both the archaeological record and representational sources.

Although comparative evidence for Crete is lacking, archaeological field surveys have produced convincing evidence for the existence of a network of LH III B roads in Messenia and the Argolid.[107] The Argolid, as Richard Hope Simpson sums it up, "was well served by the main fortresses, Mycenae, Midea (Dendra), Tiryns, and Argos, and was linked by roads to Epidauros and the Corinthia..."[108] Messenia was similarly well served by a network of roads.

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106. Chadwick 1963 : 125 ff.
107. Detailed coverage of the evidence is beyond the scope of this dissertation and can be consulted in McDonald 1964; 1972; McDonald and Hope Simpson 1964; McDonald and Rapp 1972. On the evidence in Crete, see McDonald and Hope Simpson 1964 : 241 with refs.; cf. McDonald and Rapp 1972 : 244 ff.
108. 1981 : 11.

Commenting on Fant's survey in 1962 of the remains of a Mycenaean highway system between the villages of Neromilo and Kazarma, McDonald and Hope Simpson[109] note that, "The careful, easy grades and other construction techniques have convinced us that the route was laid out for wheeled traffic; and we postulate that this ambitious project was in response to a sudden need to move war chariots long distances toward the end of the Late Helladic period".

If correctly dated, the archaeological evidence provides a striking confirmation of the assumptions already made in regard to the Pylos o-ka tablets, i.e. that they represent the deployment of a mobile coastal defence. With regard to the Open-Rail chariot in LH III C representational sources, it is significant that its appearance in the region coincides with a period of increased military activity, i.e. in the wake of the destruction of many Mainland sites c. 1200 B.C.[110]

The weaponry too of the charioteers in LH III C crater fragments accords well with the postulation that these men are not engaged in active military operations, but rather in the process of travelling to (or from?) the battle field. Their equipment is too light to offer enough protection if they were for instance to be confronted by archers and, as Littauer[111] notes, were not suited to battle in the oriental fashion.

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109. 1964 : 241; cf. McDonald and Hope Simpson 1972 : 242 ff.
110. See above p. 107 and n. 20.
111. 1972 : 148-9.

Conclusion

The military use and the role of the chariot in warfare is attested in both the representational and documentary sources. Its application in LM and LH warfare was, however, dictated by the geographical constraints of the Greek Mainland and Crete, and as a result its military role can best be described in terms of the need to maintain strategic communications between the regions under the administration of the palaces and for transporting warriors to and from the battle-field in the true Homeric fashion.[112]

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112. The possible references in Homer to the use of chariots in massed attack at speed, e.g. Il. IV. 293 - 309, XI. 150 - 154, should probably not be interpreted as true Bronze Age tactics, but rather as intrusive and vague memories of such use of chariots in the Late Bronze Age.

CHAPTER 6

CONCLUSIONS

The chariot is first documented in the archaeological record at Mycenae about the end of the first half of the 2nd millennium B.C. It origins and early history in the region are uncertain and although either an Anatolian or Levantine origin seems probable there are no conclusive grounds on which the various hypotheses can be tested. In view of the fact that trade with the Eastern Mediterranean at the time was conducted by Crete rather than Mainland Greece, it seems reasonable to assume that it first reached Crete and thereafter Greece.

Furthermore, it is not certain whether it was introduced to the region through direct importation, or whether it was only the technology that was taken over. The technological history of the Aegean chariot throughout the Bronze Age is different from that in the Near East and Egypt and seems to suggest that the chariot in Greece and Crete represents a local adaption and technological development of an essentially imported technology.

The sources for the existence and use of the chariot in Greece and Crete in the archaeological horizons defined as Late Helladic and Late Minoan are rich and varied. They comprise

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representations in glyptic, funerary art (grave stelae and larnakes), wall paintings and pictorial vase-painting, as well as documentary records in the form of Linear B tablets from both Crete and the Mainland.

In terms of its technological history at least four typologically distinct chariots are represented in the representational sources. On the basis of differences in the profile of the box differentiation is made between Box (Type I), Quadrant (Type II), Dual (Type III) and Open-Rail (Type IV) chariots.

The sources for all four chariot types are almost exclusively representational. Only in the case of the Dual chariot can the representational record be supplemented by 14th and 13th century B.C. Linear B records of chariots and chariot wheels from Knossos and Pylos. Furthermore, compared with the relatively abundant representational evidence for the Dual chariot, the sources for its predecessors, the Box and Quadrant types, and its successor, the Open-Rail type are fairly poorly documented.

This does not imply that the validity of the typological classification of Aegean Bronze Age chariots is suspect, but only that the archaeological record is biased in favour of LH III A - III B, which generally marks the floruit of Mycenaean civilization on the Mainland. The technological history of the

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chariot therefore relies to a large extent on comparative studies of the Dual chariot with the technological features observed in the 16th and 15th century B.C. Box and Quadrant., and in 12th and 11th century B.C. Open-rail chariot representations. On the basis of such a comparative study it becomes possible to conclude that the Aegean chariot retains the four-spoked wheel annd a composite traction system consisting of the pole, pole-stay and pole-brace throughout the LM and LH archaeological horizons. These technological features are, moreover, characteristic of Aegean chariots during the period. The four-spoked wheel was retained whereas elsewhere in the eastern Mediterranean the tendency was towards six-spoked wheels; the Aegean traction system, moreover, is attested nowhere else. Together these features provide an almost certain indication that the Aegean chariot was locally developed and not taken over direct from the east, probably because, as demonstrated in chapter 5, its role in LM and LH warfare differed from that in the Near East, where its technology was dictated by its use first and foremost as a highly mobile firing platform and for en masse deployment on the open plains of Egypt, Palestine, Syria, the Levant and Anatolia.

The military history of the chariot in Greece and Crete is largely inferential and relies on a synthesis of the representational and Linear B evidence. Its military use can be

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demonstrated on the basis of its representation in martial themes in the 16th century B.C. grave stelae, 14th and 13th century B.C. Minoan and Mycenaean fresco art and in 12th and 11th century B.C. crater fragments. These constitute only a small sample of the extant evidence. The Linear B tablets from Knossos and Pylos on the other hand, reveal that the chariotry was a highly organized and by all indications probably significant part of the total industrial activity in both Crete and the Mainland. In spite of a chronological gap of almost 200 years between the time c. 1375 B.C. of the Knossos and c. 1200 B.C. Pylos tablets, the bureaucratic procedures at both sites are similar. The chariot industry came under the direct supervision of the palaces.

If the occurrence of different place-names in the Knossos tablets and the so-called o=ka tablets at Pylos are anything to go by, the industry was localized at neither Knossos nor Pylos.

Chariot workshops and chariot forces probably existed in other parts of Crete at places such as ku-do-ni-ja , se-to-i-ja and a-mi-ni-so , and in Messenia in both the pe-ra -ko-rai-ja and de-we-ro-a -ko-ra-i-ja provinces respectively. At Pylos, moreover, the Sa[3] tablets reveal that some of the wheels at least were intended for the use of the e-qe-ta , who by all indications were important military officers in charge of an organized coast-guard.

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These references in the tablets in association with the representational evidence, in particular the explicit association of armed warriors and chariots in LH III C crater fragments from Mycenae and Tiryns also provide an important key to an understanding of the military role of the chariot in LM and LH warfare. The location of chariot workshops and troops in Crete and the records of the deployment of troops in the Pylos <u>o=ka</u> tablets, seen in the context of military scenes in LH III C pictorial craters and the dismounted archer in one of Rodenwaldt's Mycenae frescoes are evidence for the use of the chariot as a means of maintaining communications and transporting armed warriors to and from the battle field. This is further reinforced by the existence of an extensive network of roads in Messenia and the Argolid.

In contrast to the direct deployment of chariots in battle after the Near Eastern and Egyptian fashion, it can therefore be concluded that the Aegean chariot was a strategic rather than a tactical weapon.

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APPENDIX A

GLOSSARY OF TECHNICAL TERMINOLOGY

The following illustration and glossary of technical terms (marked 'q.v.' in the text), with cross references where applicable, are based on similar glossaries and illustrations in Littauer and Crouwel (1979 : 3-7; 1982 : 181 - 7, fig. 1) and Crouwel (1981 : 23-4, figs. 4, 7, 8). As regards the illustration it must be noted also that the choice to illustrate the Dual chariot (Type III) is based on its widespread use throughout Mainland Greece and Crete during LM/LH III A-B and the assumption that corresponding structural features, with minor differences primarily concerning the construction of the chariot box (q.v.), notably the absence of the flap (q.v.) occur in representations of both Box (Type I) and Quadrant (Type II) chariots; in the case of the Open-Rail chariot (Type IV), the most obvious difference, as far as can be ascertained from the LH IIIC representational sources is the absence of screening material (q.v.) or coachwork of any sort in the sidings of the chariot box.

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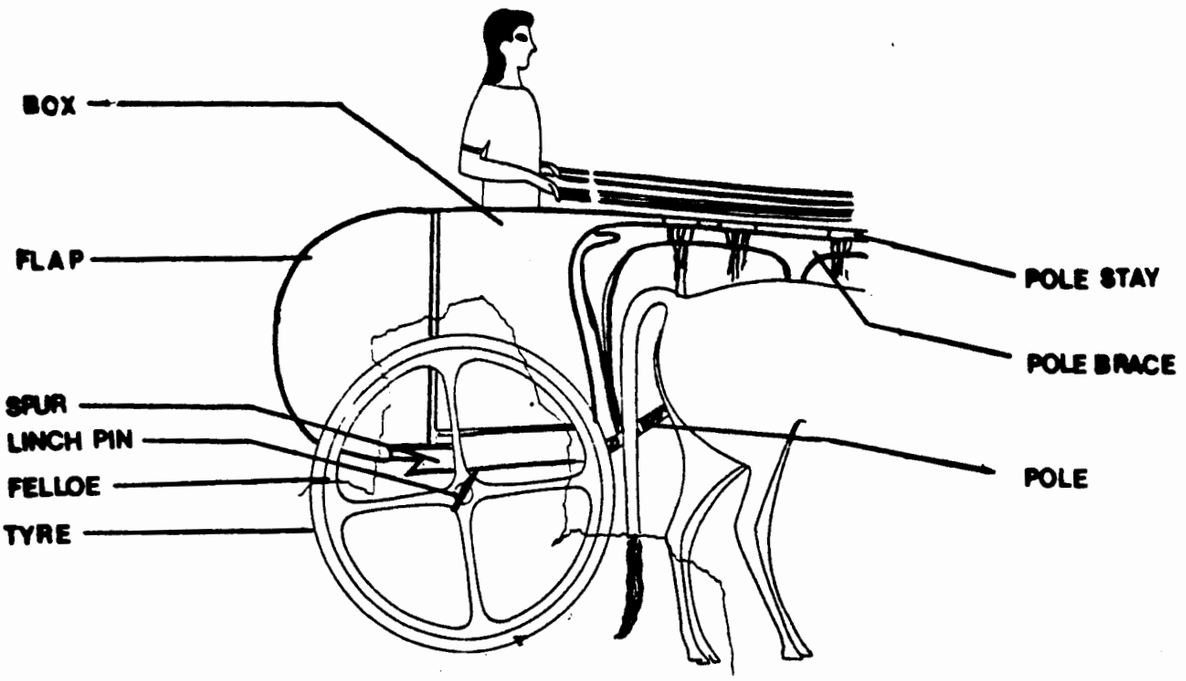

THE DUAL CHARIOT

TECHNICAL TERMS

AXLE : A rod, probably of wood, fixed to and passing underneath the floor (q.v.) of the box (q.v.); the wheels revolve on it and are fixed to it by means of linchpins.

BIT : The bridle (q.v.) element for controlling the draught-team by the mouth. See also Appendix B.

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BOX (also CHARIOT BOX) : The entire superstructure of the chariot (q.v.) constructed of heat-bent wood, and composed of the floor (q.v.) and sidings; it is occupied by the charioteer (q.v.), or the charioteer and his passenger(s).

BRIDLE : The composite system by which the draught-team was controlled, composed of the headstall, with or without the reins and bit. See also Appendix B.

CHARIOT : A light two-wheeled four-spoked vehicle, capable of relative speed, usually horse-drawn and used in hunting, warfare and transport, both private and ceremonial.

CHARIOT BOX : See Box (q.v.)

CHARIOTEER : The driver of the chariot (q.v.) as opposed to any other person(s) present in it; in military contexts, however, used in the plural, the term may be loosely used in respect of either or both of the occupants of the chariot.

CONTROL : See Bridle (q.v.).

DRAUGHT POLE (also POLE) : A wooden element passing forward from underneath the box (q.v.), connecting it with the yoke (q.v.) and yoke-saddles (q.v.).

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DRAUGHT-TEAM (also TEAM) : Used collectively in respect of the two animals, in military contexts usually horses, which pull the vehicle.

FELLOE : The inner and outer rims of the wheel (q.v.) into which the outer ends of the spokes (q.v.) were morticed and over which a rawhide tyre (q.v.) may be stretched.

FLAP (also WINGS) : Characteristic of LM/LH III A-B Aegean chariots, a semi-circular extension attached to the vertical rear member of the box (q.v.) and extending well beyond the edge of the floor (q.v.).

FLOOR : That part of the box (q.v.), probably constructed of wood or interlaced leather thongs, on which the charioteer (q.v.) and other occupants of the chariot stood.

HARNESS (also HARNESSING SYSTEM) : An aggregate of traction elements of the chariot, composed of the yoke (q.v.), yoke saddles (q.v.), neckstraps and girth which attach the draught-team (q.v.) to the yoke-and-pole assemblage. See also Appendix B.

HUB (also NAVE) : The inner, cylindrical, wooden element in the centre of the wheel (q.v.) through which passes

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the axle (q.v.) and to which the inner ends or the spokes (q.v.) are fixed.

POLE : See Draught-Pole (q.v.)

POLE-BRACE : A composite element peculiar to 14th and 13th century B.C. Aegean chariots, vertically attached to the front of the box (q.v.) and horizontally connecting the draught-pole (q.v.) and the pole-stay (q.v.).

POLE-STAY : Not attested outside of the Aegean, a long wooden supporting element, resting on top of and attached to the pole-brace (q.v.), running horizontally from the top front section of the box (q.v.) to the junction of the yoke (q.v.) and draught-pole (q.v.).

SPOKES : The four wooden radial elements of each wheel (q.v.) set at opposite ends into the felloe (q.v.) and hub (q.v.).

SPUR : A projection at the rear end of and below the level of the floor (q.v.) and projecting slightly beyond its edge.

TEAM : See Draught-Team (q.v.).

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TYRE : The outer element of the wheel, composed of wet rawhide shrunk over the outer felloe (q.v.), or of wood.

WHEEL : A circular composite construction consisting of four spokes (q.v.) the felloe (q.v.) and hub (q.v.).

YOKE : The curved wooden element connected with the draught-pole (q.v.) and running over the necks of the animals of the draught-team (q.v.).

YOKE SADDLES : Wooden elements, of inverted Y-shape and lashed to the yoke (q.v.), probably by means of straps, for the purpose of adapting the yoke (q.v.) to the conformation of the draught-team (q.v.).

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APPENDIX B

HARNESSING AND CONTROL

An obvious lacuna in the main text of this dissertation paper is discussion of the harnessing (q.v.) and control (q.v.) of the draught-team (q.v.).[1]

The following is a brief outline of the evidence, based on the representational sources, mainly in LH III A-B fresco fragments and other sources of Mainland provenance. In regard to the control (q.v.) in particular, additional evidence is provided by LH IIIB artefactual sources, and the Pylos tablet PY Ub 1315.

1. Harnessing[2]

Due to the lack of any physical material of evidence reconstruction of the Aegean harnessing system depends entirely on the representational sources. It is shown in detail for the first time in LM and LH II-IIIA:1/2 glyptic representations of the Box (Type I) and Quadrant (Type II) chariots, in the Vapheio sardonyx (Pl. 7) and the Knossos Gem (Pl. 8) respectively. Thereafter the same system is consistently depicted in LM and LH III A-B representations of Dual chariots, including inter alia the terra cotta model from Mega Monasterion,[3] and the Knossos

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1. Detailed coverage with full references and illustrations, including discussion of evidence from the Near East and Egypt can be consulted in Wiesner 1968; Littauer 1968; 1969; Crouwel 1981 : 97-112 esp.; Littauer and Crouwel 1973 b; 1982 : 186-6 esp.
2. See Crouwel 1981 : 97 ff. with refs.
3. See above p. 34 and n. 26.

Linear B ideograms - BIG(ae) (*240) and CUR(rus) (*241)[4] - as well as fragments of fresco from Knossos.[5] Although the evidence is lacking in the sources for Open-Rail chariots,[6] it may be assumed that a harnessing system similar to that used in the other three Aegean chariot types was used on these vehicles as well. This implies that the same harnessing system was consistently used in all the Aegean chariot types from c. 1600 - 1050 B.C.

The harnessing system itself consisted of the yoke (q.v.), the yoke saddles, girths and neckstraps. The yoke (q.v.) was a wooden element, depressed in the centre with its two curved sections[7] - clearly evidenced in the Knossos Linear B ideograms - lying over the horses' necks. It was set near the end of the draught-pole (q.v.). On the analogy of the representational evidence, supplemented by actual examples in the Egyptian sources, it can be assumed that the yoke was fixed to and kept in its position on the draught-pole (q.v.) with lashings and supporting thongs running from midway along the pole to either section of the yoke and tied to the areas where the yoke saddles (q.v.)[8] were attached.

The yoke saddles were attached to either end of the yoke and are

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4. See above p. 48.
5. Crouwel 1981 : 173 no. W76 ; Pl. 108.
6. Cf. above p. 106.
7. See above pp. 45 - 6.
8. For the sources, see Crouwel 1981 : 95. Egyptian chariots, used a combination of lashings and a wooden peg; see Littauer and Crouwel 1979 : 85 with n.2.

attested in a fresco fragment[9] and the Linear B ideograms[10] from Knossos. They held the yoke in position and fitted over the horses' necks just ahead of their withers. Although their representation in the Knossos fresco fragment and the ideograms is not entirely in perspective, they were probably shaped roughly like an inverted letter "Y". Crouwel[11] notes that, unlike the Egyptian specimens, Aegean yoke saddles curved sharply at their ends and in the Knossos fragment terminated in a knob, which functioned as lashing points for the girth-straps; these passed around each horse's chest and behind its forelegs. The girth straps are depicted as broad on the Lyktos Agate (Pl. 10) and the Hagia Triadha sarcophagus (Pls. 11 a-b), but on the analogy of the Knossos fresco fragment, it may have consisted of several straps. In the area where the girths and neckstraps are attached to the ends of the yoke saddles depended a loop or loops which, in the Knossos fresco fragment seem to have been decorated with disks or studs, possibly of ivory.[12]

2. Control

The animals of the draught-team (q.v.) - usually two horses - were each controlled by means of a bridle (q.v.), consisting of a bit, headstall and reins.[13]

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9. See above n. 5.
10. Above pp. 45 - 6.
11. 1981 : 99 with n.
12. Crouwel 1981 : W76 : Pl. 108.
13. For detailed discussion, see Littauer and Crouwel 1979 : 86 ff. (the Near East); Crouwel 1981 : 101 ff. (the Aegean); cf. also Littauer 1969 : 289 ff.

As for the bit (q.v.), it consisted of a mouth-piece - either a single bar canon, or two canons of equal length (i.e. a jointed canon) - and two cheek-pieces, one on either end of the bit. These were kept in position by means of the cheek-straps of the headstall, and were used both to exercise directional control and to prevent the mouthpiece from slipping out.[14]

A typological classification of Aegean metal bits, primarily on the basis of the mouth-pieces in association with their cheek-pieces, has been done by Crouwel,[15] who distinguishes four types, parallels for which exist in Littauer and Crouwel's[16] similar classification of contemporary Near Eastern and Egyptian bits. Crouwel's types 1 and 2, consisting of single bar canons and discoid and "key-hole" cheek-pieces respectively, are documented in material evidence in LH III B find (archaeological) contexts from Mycenae and Thebes.[17] His types 3 and 4 are listed as bits with joined canons and rectangular cheek-pieces, of which complete examples, probably of similar date to those classified as Types 1 and 2, come from a Mycenaean burial context in Miletus, as well as Mycenae and Thebes.[18]

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14. Crouwel 1981 : 101 ff., 158 nos. B 1-12; Pls. 1-8.
15. 1981 : 102-4.
16. Crouwel 1979 : 86 ff.
17. Type 1 : Crouwel 1981 : 102-3, 158 nos. B 1, 2 : Pls. 1, 2 (Mycenae), 158 nos. B 5, 6 : Pl. 5 (Thebes); Type 2 : Crouwel 1981 : 103, 158 nos. B 7, 8; Pl. 6 (Thebes).
18. Type 3 : Crouwel 1981 : 103-4, 158 nos. B 11-12 : Pl. 8; Type 4 : Crouwel 1981 : 104, 158 no. B 3 : Pl. 3 (Mycenae), 158 no. B 4 : Pl. 4 (Thebes). It must, however, be noted that Littauer and Crouwel's (1979: 87-8) fifth type, bits of organic material - bone, sinew, rope, or thong - are not attested in the Aegean.

Documentary evidence for the control system, and in particular the reins and other leather equipment, is afforded by the Pylos tablet Ub 1315, excavated in 1957 and published by Mabel Lang in 1958:[19]

PY Ub 1315.1[20]]-wo-ja a-ni-ja, te-u-ke-pi, 5 di-pte-ra e-ru-ta-
3
ra 1 (

.2 ro-u-si-je-wi-ja 6 ra-pte-ri-ja a-ni-ja 3

.3a 2

ne-wa , a-ni-ja , a-na-pu-ke , 5 dwo 2 a-pu-ke 9

a-ni-ja-e-e-ro-pa-jo-qe-ro-sa

.4a 1

a-pe-ne-wo 4 a-pu-ke , a-pe-ne-wo ne-wa po-qe-wi-

ja ZE 11

Thus -

".1 5 (sets of ?) reins, (fitted) with te-u-ke-pi (equipment?), 16 red hides.

.2 6 (sets of ?) reins of the ro-u-si-je--wi-ja type (?); 3 (sets of?) reins with saddlers' work.

.3 5 (sets of?) new a-na-pu-ke (without headbands) reins; nine (sets?) with 2 (headbands); two sets of reins ....

pairs of new po-qe-wi-ja (halters)."

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19. 1958 : 181 ff. (Sb 1315); for detailed discussion, see also Ruijgh, 1966 : 130 ff.
20. PTT I 1973 : 239; DOCS 1973: 520

Although the etymology and exact meaning of the terminology in this tablet are for the most part uncertain - te-u-ke-pi (.1), - e-e-ro-pa-jo-qe-ro-sa (.3), a-pe-ne-wo (.4) - it can be inferred that this tablet concerns an inventory of equipment relating to the industry.[21]

In the case of the 16 di-pte-ra, e-ru-ta-ra (.1), /diptherai eruthrai/ "(treated) hides",[22] and ro-u-si-je-wi-ja, a derivative of place-name ro-u-so, /lousos/ "Lousos",[23] the terms are used in a descriptive sense - in the case of the treated hides with a distinctive red decorative element, and in the case of ro-u-si-je-wi-ja, /lousiēwiai/ possibly to denote a particular technology or feature not common to all sets of reins.[24] This becomes all the more plausible in view of ra-pte-ri-ja (.2), /rhaptēriai/, an adjective derived from ra-pte, /rhaptēr/ "leather worker",[25] which seems to indicate that some work had already been done on the equipment listed, possibly some form of decorative stitching of the kind depicted in the Knossos fresco fragment.[26] The presence of a-pu-ke (.3 .4), /ampukes/ "frontlets, head-bands"[27] and po-qe-wi-ja (.4), /phorg̑eiai/ "halters"[28] and a-ni-ja, /(h)ānniai/ "reins"[29] on one tablet seems to indicate that the

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21. DOCS 1973 : 519-20; cf. Interpretation 1963 : 328-9.
22. DOCS 1973 : 520 (di-pte-ra), 546 (e-ru-ta-ra).
23. DOCS 1973 : 520. Palmer (Interpretation 1963 : 328) proposes to interpret the term as some part of the harness.
24. Cf. above pp. 60 - 1 on the technical vocabulary of the KN Sd tablets.
25. DOCS 1973 : 520.
26. Above n. 5.
27. DOCS 1973 : 533.
28. DOCS 1973 : 521.
29. See above p. 66 and n. 73.

reins, halters and head-bands were manufactured in a separate workshop and only later, once preliminary stages of the assembly of chariot frames (CAPS) had been completed, fitted to the assembled bodies (CUR) and stored until commissioned for use (BIG).[30]

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30. Cf. above pp. 73 - 4.

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AD	Archaeologikon Deltion
AE	Archaeologikē Ephemeris
AJA	American Journal of Archaeology
AM	Mitteilungen des deutschen archäologischen Instituts, Abteilung Athen
BCH	Bulletin de Correspondence Hellēnique
BICS	Bulletin of the Institute of Classical Studies, University of London
BSA	Annual of the British School at Athens
CAH	Cambridge Ancient History (3rd ed.) Cambridge, 1970
CMS	Corpus der minoischen und mykenischen Siegel. Berlin, 1964 -
CVA	Corpus Vasorum Antiquorum
JHS	Journal of Hellenic Studies
NS	New Series
OpAth	Opuscula Atheniensia
PPS	Proceedings of the Prehistoric Society
RDAC	Report of the Department of Antiquities, Cyprus
SIMA	Studies in Mediterranean Archaeology. Göteborg , 1962-
SMEA	Studi Micenei ed Egeo-Anatolici

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Conclusion

The military use and the role of the chariot in warfare is attested in both the representational and documentary sources. Its application in LM and LH warfare was, however, dictated by the geographical constraints of the Greek Mainland and Crete, and as a result its military role can best be described in terms of the need to maintain strategic communications between the regions under the administration of the palaces and for transporting warriors to and from the battle-field in the true Homeric fashion.[112]

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112. The possible references in Homer to the use of chariots in massed attack at speed, e.g. Il. IV. 293 - 309, XI. 150 - 154, should probably not be interpreted as true Bronze Age tactics, but rather as intrusive and vague memories of such use of chariots in the Late Bronze Age.

CHAPTER 6

CONCLUSIONS

The chariot is first documented in the archaeological record at Mycenae about the end of the first half of the 2nd millennium B.C. It origins and early history in the region are uncertain and although either an Anatolian or Levantine origin seems probable there are no conclusive grounds on which the various hypotheses can be tested. In view of the fact that trade with the Eastern Mediterranean at the time was conducted by Crete rather than Mainland Greece, it seems reasonable to assume that it first reached Crete and thereafter Greece.

Furthermore, it is not certain whether it was introduced to the region through direct importation, or whether it was only the technology that was taken over. The technological history of the Aegean chariot throughout the Bronze Age is different from that in the Near East and Egypt and seems to suggest that the chariot in Greece and Crete represents a local adaption and technological development of an essentially imported technology.

The sources for the existence and use of the chariot in Greece and Crete in the archaeological horizons defined as Late Helladic and Late Minoan are rich and varied. They comprise

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representations in glyptic, funerary art (grave stelae and larnakes), wall paintings and pictorial vase-painting, as well as documentary records in the form of Linear B tablets from both Crete and the Mainland.

In terms of its technological history at least four typologically distinct chariots are represented in the representational sources. On the basis of differences in the profile of the box differentiation is made between Box (Type I), Quadrant (Type II), Dual (Type III) and Open-Rail (Type IV) chariots.

The sources for all four chariot types are almost exclusively representational. Only in the case of the Dual chariot can the representational record be supplemented by 14th and 13th century B.C. Linear B records of chariots and chariot wheels from Knossos and Pylos. Furthermore, compared with the relatively abundant representational evidence for the Dual chariot, the sources for its predecessors, the Box and Quadrant types, and its successor, the Open-Rail type are fairly poorly documented.

This does not imply that the validity of the typological classification of Aegean Bronze Age chariots is suspect, but only that the archaeological record is biased in favour of LH III A - III B, which generally marks the floruit of Mycenaean civilization on the Mainland. The technological history of the

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chariot therefore relies to a large extent on comparative studies of the Dual chariot with the technological features observed in the 16th and 15th century B.C. Box and Quadrant, and in 12th and 11th century B.C. Open-rail chariot representations. On the basis of such a comparative study it becomes possible to conclude that the Aegean chariot retains the four-spoked wheel annd a composite traction system consisting of the pole, pole-stay and pole-brace throughout the LM and LH archaeological horizons. These technological features are, moreover, characteristic of Aegean chariots during the period. The four-spoked wheel was retained whereas elsewhere in the eastern Mediterranean the tendency was towards six-spoked wheels; the Aegean traction system, moreover, is attested nowhere else. Together these features provide an almost certain indication that the Aegean chariot was locally developed and not taken over direct from the east, probably because, as demonstrated in chapter 5, its role in LM and LH warfare differed from that in the Near East, where its technology was dictated by its use first and foremost as a highly mobile firing platform and for en masse deployment on the open plains of Egypt, Palestine, Syria, the Levant and Anatolia.

The military history of the chariot in Greece and Crete is largely inferential and relies on a synthesis of the representational and Linear B evidence. Its military use can be

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demonstrated on the basis of its representation in martial themes in the 16th century B.C. grave stelae, 14th and 13th century B.C. Minoan and Mycenaean fresco art and in 12th and 11th century B.C. crater fragments. These constitute only a small sample of the extant evidence. The Linear B tablets from Knossos and Pylos on the other hand, reveal that the chariotry was a highly organized and by all indications probably significant part of the total industrial activity in both Crete and the Mainland. In spite of a chronological gap of almost 200 years between the time c. 1375 B.C. of the Knossos and c. 1200 B.C. Pylos tablets, the bureaucratic procedures at both sites are similar. The chariot industry came under the direct supervision of the palaces.

If the occurrence of different place-names in the Knossos tablets and the so-called o=ka tablets at Pylos are anything to go by, the industry was localized at neither Knossos nor Pylos.

Chariot workshops and chariot forces probably existed in other parts of Crete at places such as ku-do-ni-ja , se-to-i-ja and a-mi-ni-so , and in Messenia in both the pe-ra -ko-rai-ja and de-we-ro-a -ko-ra-i-ja provinces respectively. At Pylos, moreover, the Sa[3] tablets reveal that some of the wheels at least were intended for the use of the e-qe-ta , who by all indications were important military officers in charge of an organized coast-guard.

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These references in the tablets in association with the representational evidence, in particular the explicit association of armed warriors and chariots in LH III C crater fragments from Mycenae and Tiryns also provide an important key to an understanding of the military role of the chariot in LM and LH warfare. The location of chariot workshops and troops in Crete and the records of the deployment of troops in the Pylos e-ka tablets, seen in the context of military scenes in LH III C pictorial craters and the dismounted archer in one of Rodenwaldt's Mycenae frescoes are evidence for the use of the chariot as a means of maintaining communications and transporting armed warriors to and from the battle field. This is further reinforced by the existence of an extensive network of roads in Messenia and the Argolid.

In contrast to the direct deployment of chariots in battle after the Near Eastern and Egyptian fashion, it can therefore be concluded that the Aegean chariot was a strategic rather than a tactical weapon.

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APPENDIX A

GLOSSARY OF TECHNICAL TERMINOLOGY

The following illustration and glossary of technical terms (marked 'q.v.' in the text), with cross references where applicable, are based on similar glossaries and illustrations in Littauer and Crouwel (1979 : 3-7; 1982 : 181 - 7, fig. 1) and Crouwel (1981 : 23-4, figs. 4, 7, 8). As regards the illustration it must be noted also that the choice to illustrate the Dual chariot (Type III) is based on its widespread use throughout Mainland Greece and Crete during LM/LH III A-B and the assumption that corresponding structural features, with minor differences primarily concerning the construction of the chariot box (q.v.), notably the absence of the flap (q.v.) occur in representations of both Box (Type I) and Quadrant (Type II) chariots; in the case of the Open-Rail chariot (Type IV), the most obvious difference, as far as can be ascertained from the LH IIIC representational sources is the absence of screening material (q.v.) or coachwork of any sort in the sidings of the chariot box.

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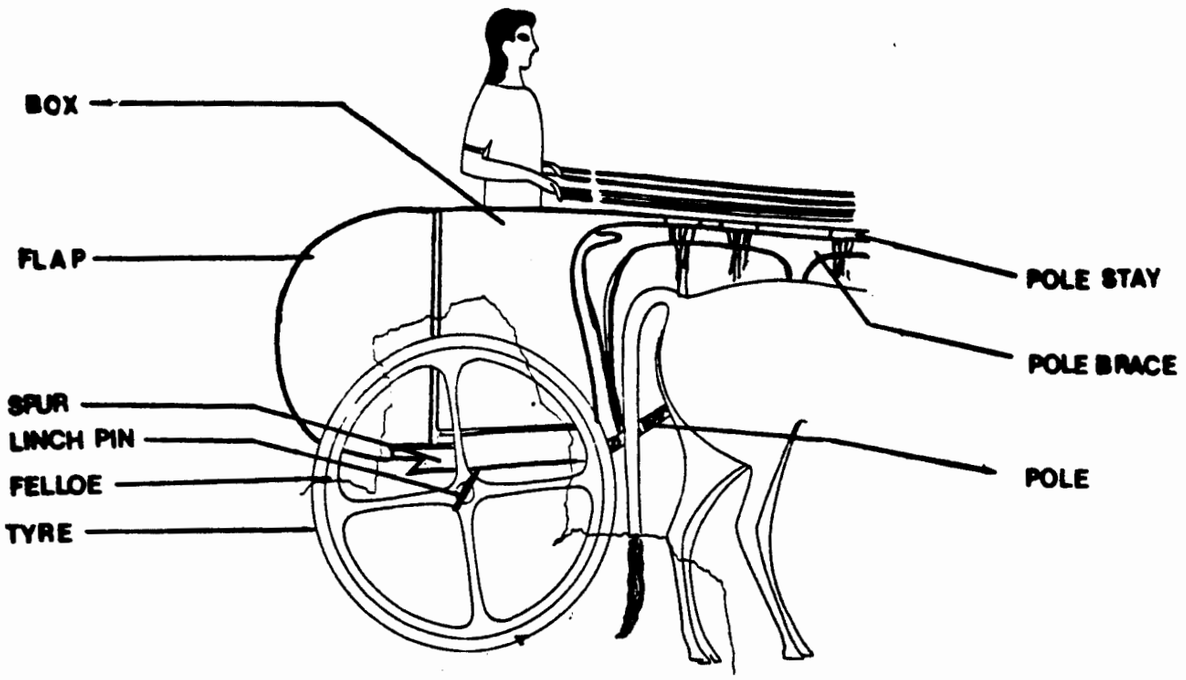

THE DUAL CHARIOT

TECHNICAL TERMS

AXLE : A rod, probably of wood, fixed to and passing underneath the floor (q.v.) of the box (q.v.); the wheels revolve on it and are fixed to it by means of linchpins.

BIT : The bridle (q.v.) element for controlling the draught-team by the mouth. See also Appendix B.

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BOX (also CHARIOT BOX) : The entire superstructure of the chariot (q.v.) constructed of heat-bent wood, and composed of the floor (q.v.) and sidings; it is occupied by the charioteer (q.v.), or the charioteer and his passenger(s).

BRIDLE : The composite system by which the draught-team was controlled, composed of the headstall, with or without the reins and bit. See also Appendix B.

CHARIOT : A light two-wheeled four-spoked vehicle, capable of relative speed, usually horse-drawn and used in hunting, warfare and transport, both private and ceremonial.

CHARIOT BOX : See Box (q.v.)

CHARIOTEER : The driver of the chariot (q.v.) as opposed to any other person(s) present in it; in military contexts, however, used in the plural, the term may be loosely used in respect of either or both of the occupants of the chariot.

CONTROL : See Bridle (q.v.).

DRAUGHT POLE (also POLE) : A wooden element passing forward from underneath the box (q.v.), connecting it with the yoke (q.v.) and yoke-saddles (q.v.).

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DRAUGHT-TEAM (also TEAM) : Used collectively in respect of the two animals, in military contexts usually horses, which pull the vehicle.

FELLOE : The inner and outer rims of the wheel (q.v.) into which the outer ends of the spokes (q.v.) were morticed and over which a rawhide tyre (q.v.) may be stretched.

FLAP (also WINGS) : Characteristic of LM/LH III A-B Aegean chariots, a semi-circular extension attached to the vertical rear member of the box (q.v.) and extending well beyond the edge of the floor (q.v.).

FLOOR : That part of the box (q.v.), probably constructed of wood or interlaced leather thongs, on which the charioteer (q.v.) and other occupants of the chariot stood.

HARNESS (also HARNESSING SYSTEM) : An aggregate of traction elements of the chariot, composed of the yoke (q.v.), yoke saddles (q.v.), neckstraps and girth which attach the draught-team (q.v.) to the yoke-and-pole assemblage. See also Appendix B.

HUB (also NAVE) : The inner, cylindrical, wooden element in the centre of the wheel (q.v.) through which passes

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the axle (q.v.) and to which the inner ends or the spokes (q.v.) are fixed.

POLE : See Draught-Pole (q.v.)

POLE-BRACE : A composite element peculiar to 14th and 13th century B.C. Aegean chariots, vertically attached to the front of the box (q.v.) and horizontally connecting the draught-pole (q.v.) and the pole-stay (q.v.).

POLE-STAY : Not attested outside of the Aegean, a long wooden supporting element, resting on top of and attached to the pole-brace (q.v.), running horizontally from the top front section of the box (q.v.) to the junction of the yoke (q.v.) and draught-pole (q.v.).

SPOKES : The four wooden radial elements of each wheel (q.v.) set at opposite ends into the felloe (q.v.) and hub (q.v.).

SPUR : A projection at the rear end of and below the level of the floor (q.v.) and projecting slightly beyond its edge.

TEAM : See Draught-Team (q.v.).

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TYRE : The outer element of the wheel, composed of wet rawhide shrunk over the outer felloe (q.v.), or of wood.

WHEEL : A circular composite construction consisting of four spokes (q.v.) the felloe (q.v.) and hub (q.v.).

YOKE : The curved wooden element connected with the draught-pole (q.v.) and running over the necks of the animals of the draught-team (q.v.).

YOKE SADDLES : Wooden elements, of inverted Y-shape and lashed to the yoke (q.v.), probably by means of straps, for the purpose of adapting the yoke (q.v.) to the conformation of the draught-team (q.v.).

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APPENDIX B

HARNESSING AND CONTROL

An obvious lacuna in the main text of this dissertation paper is discussion of the harnessing (q.v.) and control (q.v.) of the draught-team (q.v.).[1]

The following is a brief outline of the evidence, based on the representational sources, mainly in LH III A-B fresco fragments and other sources of Mainland provenance. In regard to the control (q.v.) in particular, additional evidence is provided by LH IIIB artefactual sources, and the Pylos tablet PY Ub 1315.

1. Harnessing[2]

Due to the lack of any physical material of evidence reconstruction of the Aegean harnessing system depends entirely on the representational sources. It is shown in detail for the first time in LM and LH II-IIIA:1/2 glyptic representations of the Box (Type I) and Quadrant (Type II) chariots, in the Vapheio sardonyx (Pl. 7) and the Knossos Gem (Pl. 8) respectively. Thereafter the same system is consistently depicted in LM and LH III A-B representations of Dual chariots, including inter alia the terra cotta model from Mega Monasterion,[3] and the Knossos

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1. Detailed coverage with full references and illustrations, including discussion of evidence from the Near East and Egypt can be consulted in Wiesner 1968; Littauer 1968; 1969; Crouwel 1981 : 97-112 esp.; Littauer and Crouwel 1973 b; 1982 : 186-6 esp.
2. See Crouwel 1981 : 97 ff. with refs.
3. See above p. 34 and n. 26.

Linear B ideograms - BIG(ae) (*240) and CUR(rus) (*241)[4] - as well as fragments of fresco from Knossos.[5] Although the evidence is lacking in the sources for Open-Rail chariots,[6] it may be assumed that a harnessing system similar to that used in the other three Aegean chariot types was used on these vehicles as well. This implies that the same harnessing system was consistently used in all the Aegean chariot types from c. 1600 - 1050 B.C.

The harnessing system itself consisted of the yoke (q.v.), the yoke saddles, girths and neckstraps. The yoke (q.v.) was a wooden element, depressed in the centre with its two curved sections[7] - clearly evidenced in the Knossos Linear B ideograms - lying over the horses' necks. It was set near the end of the draught-pole (q.v.). On the analogy of the representational evidence, supplemented by actual examples in the Egyptian sources, it can be assumed that the yoke was fixed to and kept in its position on the draught-pole (q.v.) with lashings and supporting thongs running from midway along the pole to either section of the yoke and tied to the areas where the yoke saddles (q.v.)[8] were attached.

The yoke saddles were attached to either end of the yoke and are

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4. See above p. 48.
5. Crouwel 1981 : 173 no. W76 : Pl. 108.
6. Cf. above p. 106.
7. See above pp. 45 - 6.
8. For the sources, see Crouwel 1981 : 95. Egyptian chariots, used a combination of lashings and a wooden peg; see Littauer and Crouwel 1979 : 85 with n.2.

attested in a fresco fragment[9] and the Linear B ideograms[10] from Knossos. They held the yoke in position and fitted over the horses' necks just ahead of their withers. Although their representation in the Knossos fresco fragment and the ideograms is not entirely in perspective, they were probably shaped roughly like an inverted letter "Y". Crouwel[11] notes that, unlike the Egyptian specimens, Aegean yoke saddles curved sharply at their ends and in the Knossos fragment terminated in a knob, which functioned as lashing points for the girth-straps; these passed around each horse's chest and behind its forelegs. The girth straps are depicted as broad on the Lyktos Agate (Pl. 10) and the Hagia Triadha sarcophagus (Pls. 11 a-b), but on the analogy of the Knossos fresco fragment, it may have consisted of several straps. In the area where the girths and neckstraps are attached to the ends of the yoke saddles depended a loop or loops which, in the Knossos fresco fragment seem to have been decorated with disks or studs, possibly of ivory.[12]

2. Control

The animals of the draught-team (q.v.) - usually two horses - were each controlled by means of a bridle (q.v.), consisting of a bit, headstall and reins.[13]

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9. See above n. 5.
10. Above pp. 45 - 6.
11. 1981 : 99 with n.
12. Crouwel 1981 : W76 ; Pl. 108.
13. For detailed discussion, see Littauer and Crouwel 1979 : 86 ff. (the Near East); Crouwel 1981 : 101 ff. (the Aegean); cf. also Littauer 1969 : 289 ff.

As for the bit (q.v.), it consisted of a mouth-piece - either a single bar canon, or two canons of equal length (i.e. a jointed canon) - and two cheek-pieces, one on either end of the bit. These were kept in position by means of the cheek-straps of the headstall, and were used both to exercise directional control and to prevent the mouthpiece from slipping out.[14]

A typological classification of Aegean metal bits, primarily on the basis of the mouth-pieces in association with their cheek-pieces, has been done by Crouwel,[15] who distinguishes four types, parallels for which exist in Littauer and Crouwel's[16] similar classification of contemporary Near Eastern and Egyptian bits. Crouwel's types 1 and 2, consisting of single bar canons and discoid and "key-hole" cheek-pieces respectively, are documented in material evidence in LH III B find (archaeological) contexts from Mycenae and Thebes.[17] His types 3 and 4 are listed as bits with joined canons and rectangular cheek-pieces, of which complete examples, probably of similar date to those classified as Types 1 and 2, come from a Mycenaean burial context in Miletus, as well as Mycenae and Thebes.[18]

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14. Crouwel 1981 : 101 ff., 158 nos. B 1-12: Pls. 1-8.
15. 1981 : 102-4.
16. Crouwel 1979 : 86 ff.
17. Type 1 : Crouwel 1981 : 102-3, 158 nos. B 1, 2 : Pls. 1, 2 (Mycenae), 158 nos. B 5, 6 : Pl. 5 (Thebes); Type 2 : Crouwel 1981 : 103, 158 nos. B 7, 8: Pl. 6 (Thebes).
18. Type 3 : Crouwel 1981 : 103-4, 158 nos. B 11-12 : Pl. 8; Type 4 : Crouwel 1981 : 104, 158 no. B 3 : Pl. 3 (Mycenae), 158 no. B 4 : Pl. 4 (Thebes). It must, however, be noted that Littauer and Crouwel's (1979: 87-8) fifth type, bits of organic material - bone, sinew, rope, or thong - are not attested in the Aegean.

Documentary evidence for the control system, and in particular the reins and other leather equipment, is afforded by the Pylos tablet Ub 1315, excavated in 1957 and published by Mabel Lang in 1958:[19]

PY Ub 1315.1[20]]-wo-ja a-ni-ja, te-u-ke-pi, 5 di-pte-ra e-ru-ta-
3
ra 1
.2 ro-u-si-je-wi-ja 6 ra-pte-ri-ja a-ni-ja 3
.3a 2
ne-wa , a-ni-ja , a-na-pu-ke , 5 dwo 2 a-pu-ke 9
a-ni-ja-e-e-ro-pa-jo-qe-ro-sa
.4a 1
a-pe-ne-wo 4 a-pu-ke , a-pe-ne-wo ne-wa po-qe-wi-
ja ZE 11

Thus -

".1 5 (sets of ?) reins, (fitted) with te-u-ke-pi (equipment?), 16 red hides.

.2 6 (sets of ?) reins of the ro-u-si-je--wi-ja type (?); 3 (sets of?) reins with saddlers' work.

.3 5 (sets of?) new a-na-pu-ke (without headbands) reins; nine (sets?) with 2 (headbands); two sets of reins ....

pairs of new po-qe-wi-ja (halters)."

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19. 1958 : 181 ff. (Sb 1315); for detailed discussion, see also Ruijgh, 1966 : 130 ff.
20. PTT I 1973 : 239; DOCS 1973: 520

Although the etymology and exact meaning of the terminology in this tablet are for the most part uncertain - te-u-ke-pi (.1), - e-e-ro-pa-jo-qe-ro-sa (.3), a-pe-ne-wo (.4) - it can be inferred that this tablet concerns an inventory of equipment relating to the industry.[21]

In the case of the 16 di-pte-ra, e-ru-ta-ra (.1), /diptherai eruthrai/ "(treated) hides",[22] and ro-u-si-je-wi-ja, a derivative of place-name ro-u-so, /lousos/ "Lousos",[23] the terms are used in a descriptive sense - in the case of the treated hides with a distinctive red decorative element, and in the case of ro-u-si-je-wi-ja, /lousiēwiai/ possibly to denote a particular technology or feature not common to all sets of reins.[24] This becomes all the more plausible in view of ra-pte-ri-ja (.2), /rhaptēriai/, an adjective derived from ra-pte, /rhaptēr/ "leather worker",[25] which seems to indicate that some work had already been done on the equipment listed, possibly some form of decorative stitching of the kind depicted in the Knossos fresco fragment.[26] The presence of a-pu-ke (.3 .4), /ampukes/ "frontlets, head-bands"[27] and po-qe-wi-ja (.4), /phorg eiai/ "halters"[28] and a-ni-ja, /(h)ānniai/ "reins"[29] on one tablet seems to indicate that the

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21. DOCS 1973 : 519-20; cf. Interpretation 1963 : 328-9.
22. DOCS 1973 : 520 (di-pte-ra), 546 (e-ru-ta-ra).
23. DOCS 1973 : 520. Palmer (Interpretation 1963 : 328) proposes to interpret the term as some part of the harness.
24. Cf. above pp. 60 - 1 on the technical vocabulary of the KN Sd tablets.
25. DOCS 1973 : 520.
26. Above n. 5.
27. DOCS 1973 : 533.
28. DOCS 1973 : 521.
29. See above p. 66 and n. 73.

reins, halters and head-bands were manufactured in a separate workshop and only later, once preliminary stages of the assembly of chariot frames (CAPS) had been completed, fitted to the assembled bodies (CUR) and stored until commissioned for use (BIG).[30]

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30. Cf. above pp. 73 - 4.

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AD	Archaeologikon Deltion
AE	Archaeologikē Ephemeris
AJA	American Journal of Archaeology
AM	Mitteilungen des deutschen archäologischen Instituts, Abteilung Athen
BCH	Bulletin de Correspondence Hellēnique
BICS	Bulletin of the Institute of Classical Studies, University of London
BSA	Annual of the British School at Athens
CAH	Cambridge Ancient History (3rd ed.) Cambridge, 1970
CMS	Corpus der minoischen und mykenischen Siegel. Berlin, 1964 -
CVA	Corpus Vasorum Antiquorum
JHS	Journal of Hellenic Studies
NS	New Series
OpAth	Opuscula Atheniensia
PPS	Proceedings of the Prehistoric Society
RDAC	Report of the Department of Antiquities, Cyprus
SIMA	Studies in Mediterranean Archaeology. Göteborg , 1962-
SMEA	Studi Micenei ed Egeo-Anatolici

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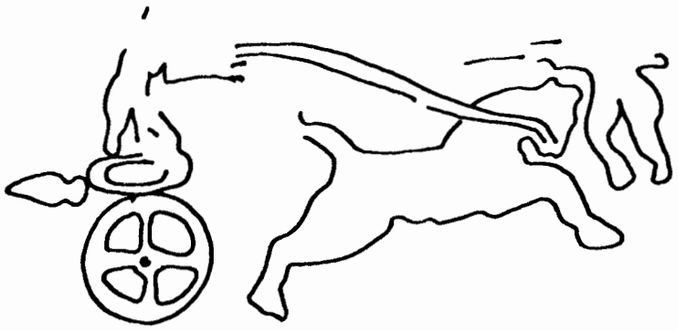
PLATES

PL. 1



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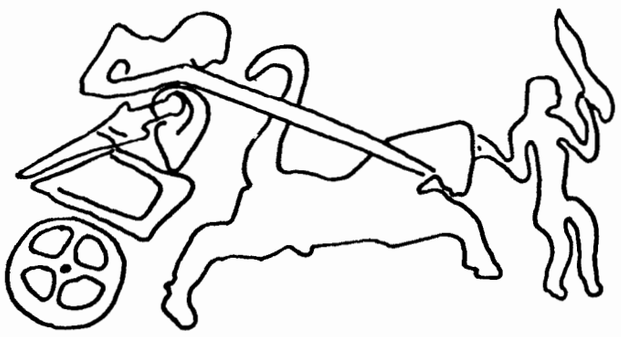

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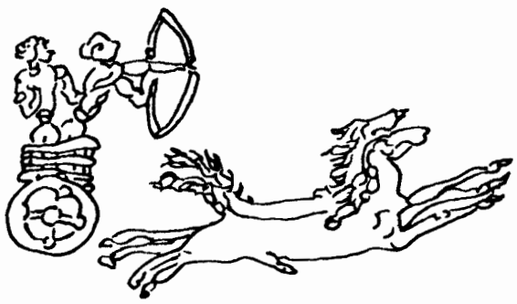

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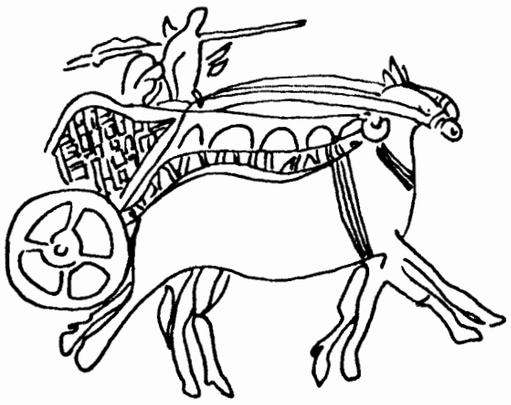

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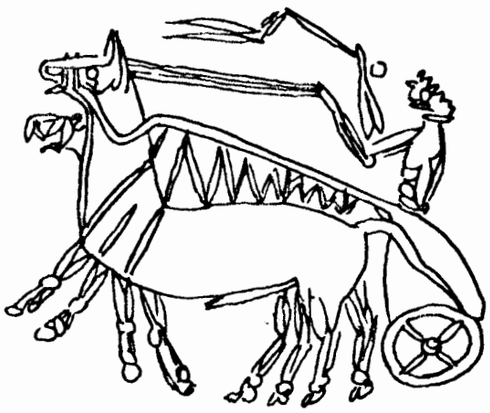

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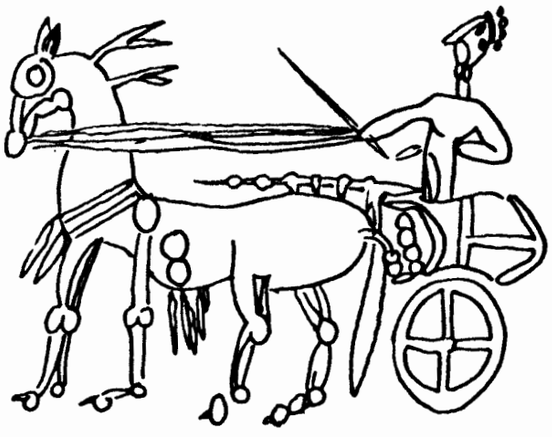

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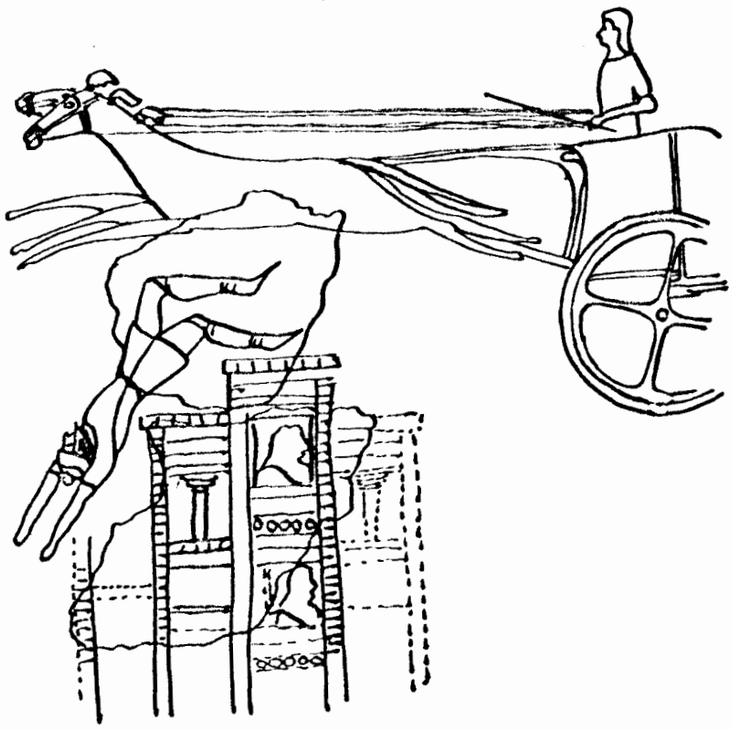
PL. 11a

PL. 11b



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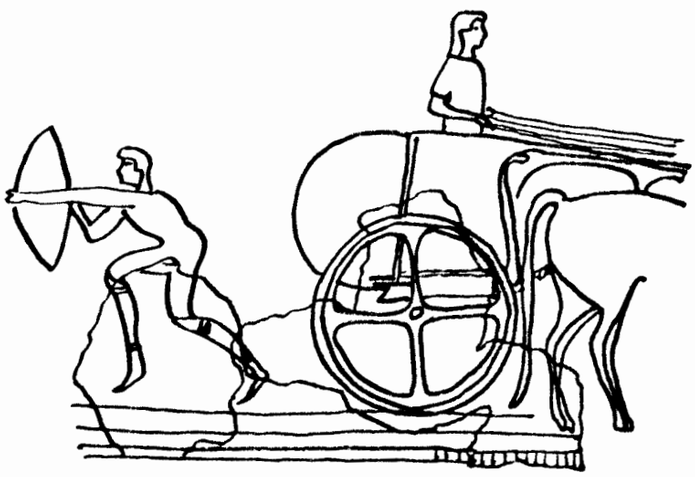

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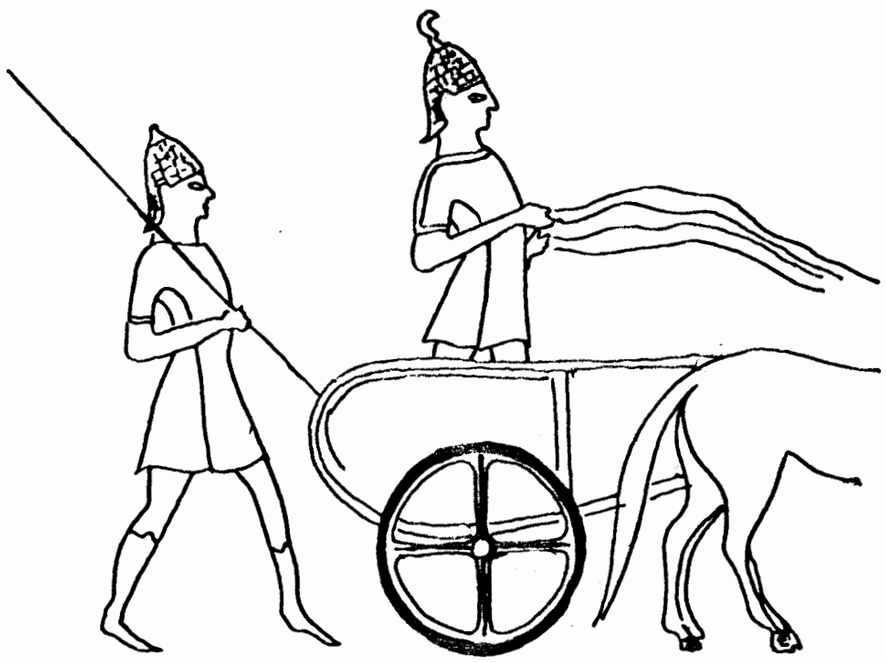

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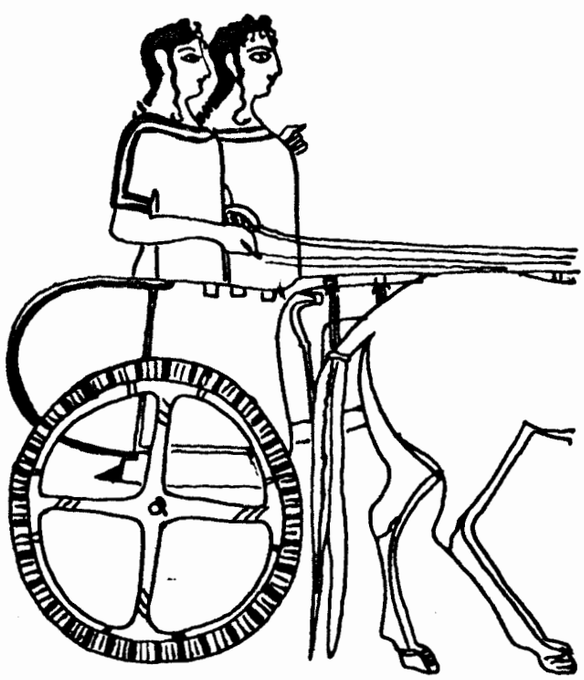

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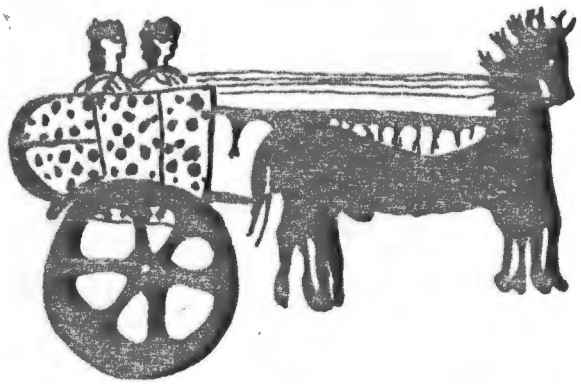

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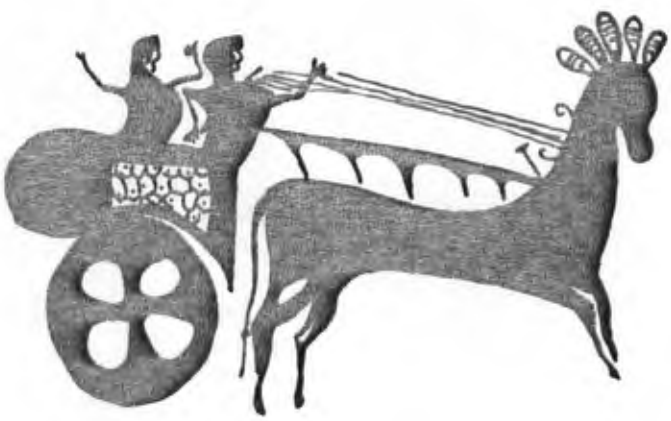

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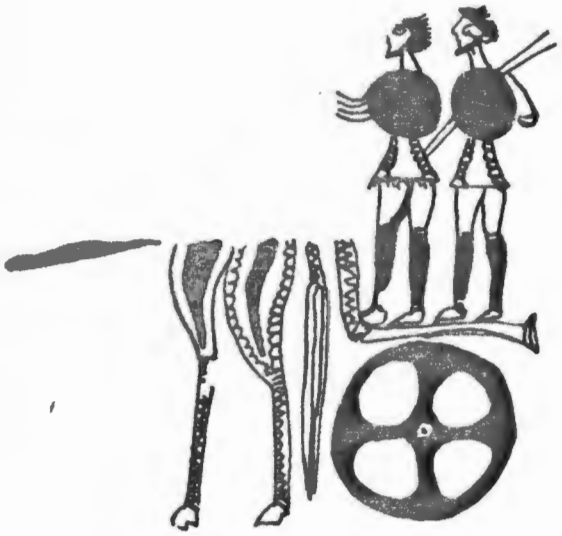

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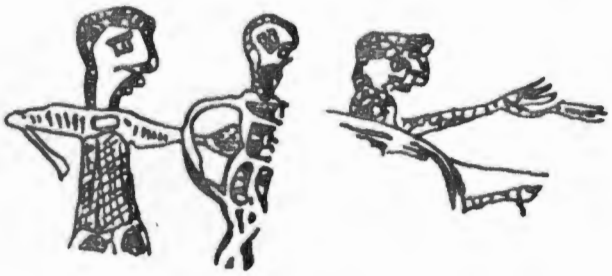
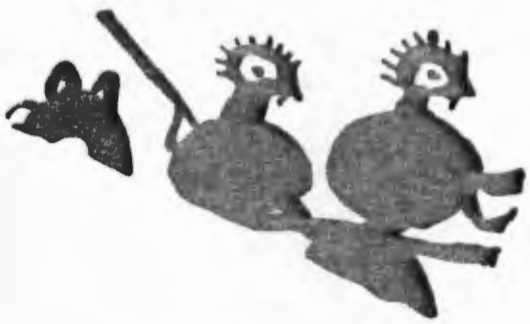
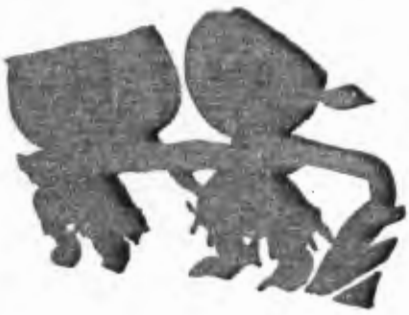


PL. 23

PL 25



PL. 24a

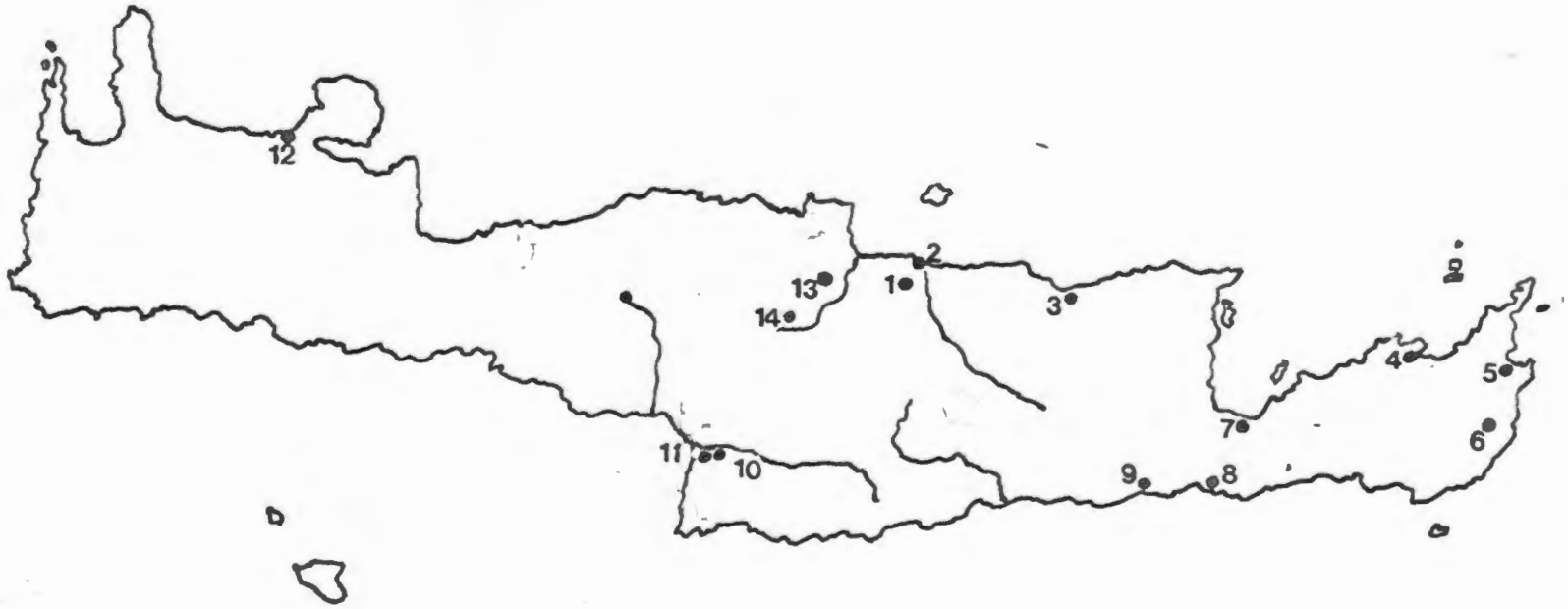


PL. 24b

MAPS

MAP 1: BRONZE AGE GREECE

MAP 2: BRONZE AGE CRETE



KEY:

1 Knossos	4 Sitia	8 Ierapetra	12 Kydonia
2 Amnissos	5 Palaiokastro	9 Mirtos	13 Tylisos
3 Mallia	6 Kato Zakro	10 Phaistos	14 Sklavokambos
	7 Gournia	11 Haghia Triadha	

1	ko-no-so
2	a-mi-ni-so
10	pa-i-to
12	ku-do-ni-ja
13	tu-ri-so