

# THE KNOSSOS OXEN DOSSIER :

## THE USE OF OXEN IN MYCENAEAN CRETE.

### PART I : GENERAL BACKGROUND

### AND SCRIBE 107\*

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#### 1. Introduction

At the fifth international Mycenological Colloquium in Salamanca, Louis Godart wrote that his work with a set of Pylos texts dealing with the management of livestock in Bronze Age Messenia (**Cn** set : **Cn 655**; **Cn 40**, **Cn 45**, **Cn 254**, **Cn 599**, **Cn 600**, **Cn 643**, **Cn 719**; **Cn 131**) led him to write his fundamental article on the mixed livestock series (**Co**) from Knossos<sup>1</sup>. In particular Godart was led from the two provinces of a mainland palatial territory to the western and central regions of Mycenaean Crete by the common economic vocabulary of these tablets (*a-ko-ra*, *a-ke-re*, *a-ko-ra-ja*, *a-ko-ra-jo*) and the comparable administrative procedures that this shared vocabulary implied. Twenty years later I am tracing the same route for similar reasons. What is different is my focus : not administrative terminology and economic procedures *per se*, but one special animal, domestic cattle, *bos*<sup>2</sup>. In this paper I continue my detailed study of references to oxen in the Linear B texts in order to understand how they were managed and used in the

(\*) I use the following standard abbreviations :

ASSA : *Aegean Seals, Sealings and Administration* (Th. G. PALAIMA ed. = *Aegaeum* 5 [1990]);

MME : W. A. MACDONALD & G. RAPP, Jr., *The Minnesota Messenia Expedition* (1972);

*Perspectives* : Th. G. PALAIMA, «Perspectives on the Pylos Oxen Tablets : Textual (and Archaeological) Evidence for the Use and Management of Oxen in Late Bronze Age Messenia (and Crete)», *Studia Mycenaea* (1988), p. 85-124;

RCTK : J. DRIESSEN, *The Room of the Chariot Tablets at Knossos. Interdisciplinary Approach to the Study of a Linear B Deposit* (Dissertation Katholieke Universiteit Leuven, 1989).

(1) L. GODART, «Les tablettes de la Série Co de Gnosso», *Acta Mycenaea*, p. 418-424.

(2) In order to prevent misunderstanding, I shall continue my practice of referring in English to the animals represented by the ideograms BOS, BOS<sup>m</sup>, BOS<sup>f</sup> as ox(en), male ox(en) and female ox(en) respectively.

palatial economies of different Mycenaean territories. In this opening section I shall discuss four interrelated points which affect our interpretation of the Knossos oxen documents : general background ; reasons for studying these texts ; initial assumptions ; and limitations of the data.

### 1a. General background

References to oxen on mainland texts have recently been expanded by the sudden double publication of the Thebes sealings<sup>3</sup>. These sealings seem to be connected with the movement (and subsequent temporary maintenance) of livestock from Euboea and outlying areas of Boeotia to the environs of the citadel of Thebes<sup>4</sup>. The two sealings which refer to oxen belong to larger sets of sealings (defined by seal-impression : **Wu 53** [BQŠ<sup>m</sup>]<sup>5</sup> and seal F ; **Wu 76** [BOS<sup>f</sup>] and seal C) that contain information appropriate to such operations :

#### Wu 53

.α BQŠ<sup>m</sup>                    *supra sigillum F* [5]  
 .β qe-ṭe-q  
 .γ i-ri-ja  
       .α BQŠ<sup>m</sup> corrected from BQŠ<sup>f</sup>.

#### Wu 76

.α BOS<sup>f</sup>                    *supra sigillum C* [5]  
 .β1 a-e-ri-qo  
 .β2 *vacat*  
 .γ o-pa \*171 30

Two of the five sealings impressed by seal F describe sus + *SI* as *a-ko-ra-jo*. All of the five sealings impressed by seal C (including **Wu 76**) and one of the two sealings impressed by seal J link the animals (CAP<sup>f</sup>, CAP<sup>m</sup>, BOS<sup>f</sup>, SUS<sup>s</sup>) with \*171 (most likely some

(3) V. ARAVANTINOS, «The Mycenaean Inscribed Sealings from Thebes : Problems of Content and Function», ASSA, p. 149-174, pl. XXIII-XXIV ; Chr. PITEROS, J.-P. OLIVIER & J. L. MELENA, «Les inscriptions en linéaire B des nodules de Thèbes (1982) : la fouille, les documents, les possibilités d'interprétation», BCH 104 (1990), p. 103-184. Since the BCH version is more widely accessible and follows the format of an *editio princeps* by presenting proper transcriptions along with photographs and/or drawings, I refer mainly to its readings and analysis of the texts, unless noted by [A]. Readers should beware that the text numbers assigned to the sealings by the [A] and BCH editions differ from **Wu 81** onward, since the BCH editors detected vestigia on TH M 9944, which [A] considered *agraphon*. Consequently [A] **Wu 81-98** = BCH **Wu 82-99**. The designations of seal designs likewise are not coordinated, i.e., the BCH letters do not correspond to the [A] numbers : e.g., BCH seal F = [A] seal 9 ! It is regrettable that such potential sources of confusion could not have been avoided by drawing upon the cooperative spirit which has prevailed in Mycenaean studies from Gif onward, particularly because the tabular presentation of the inscriptions in [A] is extremely useful.

(4) BCH 104 (1990), p. 153-155, 183-184 with references.

(5) The reading of male ox here, although dotted, is reinforced by context and by the non-existence of any plausible alternative interpretation of the inscription on face .α.

type of fodder recorded in quantities of 30-36 units)<sup>6</sup> and/or the transactional term *o-pa*. Sealings from other sets contain explicit religious vocabulary (**Wu 44** [*i-je-ra*] seal A; **Wu 86** and **Wu 87** [*i-je-ro*] seal U). On the basis of comparanda (mainly **PY Un 2** and **Un 138**), the *BCH* editors have advanced the theory that this collection of 56 inscribed sealings records the contributions of single animals from various locations and under various terms of obligation for a religious ceremony (including sacrifice of the animals) at the palatial center of Thebes<sup>7</sup>. If this interpretation is correct, the new Thebes references would be consistent with the clear religious and sacrificial associations of oxen in Mycenaean iconography and in all eight Pylos tablets that refer to the animals directly<sup>8</sup>.

Secular uses of oxen on the mainland are suggested only by references to oxherds. **TI Ef 2** links *qo-u-ko-ro* with landholding (*DA 1* and *GRA 6* on **Ef 2** and the term *ke-ke-me* on **Ef 3** from the same series and archaeological context)<sup>9</sup>. At Pylos, five tablets of the **Ea** series link *qo-u-ko-ro* with *ki-ti-me-na* land and *qo-qo-la* with *ke-ke-me-na* land<sup>10</sup>. The unfortunately fragmentary document **An 830** [+ **907**] registers four large groups of *qo-u-ko-ro* (at least 204 total) in areas of grazing lowlands in both provinces of Messenia. Earlier sections of this tablet refer to landholdings: *ke-ke-me-no* and *DA 30* and *50*. A greater hint of the use of oxen for labor is furnished by **PY** tablets **An 18**, **An 852** and perhaps **Nn 831**<sup>11</sup>. On **An 18**, 90 *qo-u-ko-ro* are listed at the site of *ti-no* while previous sections of the tablet record individual *to-ko-do-mo* and *le-ko-to-na-pe*. The association between *qo-u-ko-ro* and *le-ko-to-na-pe* is repeated on **An 852** in connection with a place name, a form of which recurs on **An 18**. **PY Nn 831** lists *qo-u-ko-ro* along with other occupational (*po-me-ne*, *ka-ke-u*) and official (*e-re-e-u*, *ko-re-te*) designations in the context of flax contributions at the site of *ko-ri-to*. I have argued that this evidence suggests that oxherds controlled animals in specific breeding and grazing zones and that they may also have been involved in using the animals as a source of power in agriculture, flax growing and building operations. The growth in population, settlements and intensive exploitation of natural resources in the LH IIIB period would have made it necessary for the central authorities in Messenia to control these important animals very carefully<sup>12</sup>.

(6) *BCH* 104 (1990), p. 162-163, reasonably explains the number of units as corresponding to the number of days for which fodder has been provided. It is surprising that no absolute quantity is registered for the fodder supplied to animals with such widely varying food needs. If the sealings were manufactured at the place of origin of the animals, one must imagine that those responsible for sending the animals estimated in advance how much fodder (30 or 36 days' worth) would have been needed to maintain the animals after they had arrived at their destination. The responsible administrator(s) at Thebes would then have had to judge whether the actual quantity of fodder furnished by the senders was sufficient for the goats, ox and pig respectively. If this is a correct interpretation, then we might conclude that the pig on **Wu 59** was supposed to arrive at Thebes 6 days before the other foddered animals.

(7) *BCH* 104 (1990), p. 171-184. In my opinion, the inclusion of *sus* + *SI* and the low proportion of oxen to sheep, pigs and goats are strong points in favor of the idea that the animals at least were to be consumed. It is reasonable to assume that the information on the individual sealings, including the personal identifications communicated by the impressed seal designs, would eventually have been transferred, if necessary, to leaf-shaped tablets or single entries on (a) page-shaped tablet(s).

(8) *Perspectives*, p. 97 (brief iconographical survey with further references) and p. 110 *et passim* (discussion of religious texts).

(9) L. GODART & J.-P. OLIVIER, « Nouveaux textes en linéaire B de Tirynthe », *Tiryns VIII* (1975), p. 43-50, pl. 41.

(10) *Perspectives*, p. 100 and p. 123.

(11) The **An** and **Nn** texts are collected and more fully discussed in *Perspectives*, p. 100-103 and p. 122-124.

(12) *Perspectives*, p. 99-103 and p. 110-115.

### 1b. Reasons for studying the Knossos oxen dossier

These are simply defined. I wish to analyze the interests in oxen displayed by the scribal and economic administration at Mycenaean Knossos from the comparative perspective of the mainland data.

### 1c. Initial assumptions and limitations of the data

I assume that the Knossos texts will document some of the same general religious and secular interests in oxen. However, the specific nature of such interests should be somewhat different for interconnected historical, chronological and geographical reasons.

In Crete we have a documentary background from which to interpret the Linear B evidence. Although in the Linear A inscriptions ideographic references to livestock — including sheep which were so important to the highly developed Cretan cloth-production industry of the Mycenaean period — are surprisingly few<sup>13</sup>, oxen are attested ideographically on tablets from Hagia Triada (bos<sup>m</sup> on **HT 30.4.5**, **HT 114a.3**, **HT 121.3**) and Khania (bos on **KH 6.5**; bos<sup>m</sup> on **KH 87.3**) and on roundels from Gournia (**GO Wc 1b**) and possibly Khania (**Wc 2069**). The importance of these albeit limited references is twofold. First, they give us direct evidence for the sites which had a demonstrable interest in oxen in the Minoan neopalatial period and therefore had land within their territories suitable for breeding, maintaining and/or employing these animals<sup>14</sup>. The latter point should not be overlooked because the natural environment determines where on the island of Crete oxen could or should be concentrated in significant numbers<sup>15</sup>. It should not surprise us to find references to oxen at Minoan Hagia Triada, for excavations of the nearby harbor site of Kommos produced the remains of ca. 57 individual domestic cattle, most likely used as draft animals, from Middle Minoan through Late Minoan III levels<sup>16</sup>. Moreover, Hagia Triada and Khania lie along the coasts in two of the three principal cultivated areas of Crete and possess land and water supplies necessary to

(13) Signs AB 21, 21<sup>f</sup> and 21<sup>m</sup> (= ov1s, ov1s<sup>f</sup>, and ov1s<sup>m</sup>) occur as certain ideograms on a mere 7 tablets and 3 roundels from Hagia Triada, Khania, Phaistos and Zakro. Signs AB 22, 22<sup>f</sup>, and 22<sup>m</sup> (= cap, cap<sup>f</sup>, and cap<sup>m</sup>) are attested as certain ideograms on only 5 tablets and 2 roundels at the sites of Hagia Triada, Khania, Knossos and Phaistos. I have even included here dotted readings and instances where in my opinion intratextual parallels override the laudable caution of the *GORILA* editors in identifying signs as ideograms. This is not done to base any arguments on uncertain readings, but to illustrate — by citing an absolute maximum of *possible* references — how rarely the livestock ideograms occur.

(14) The Gournia roundel is to be dated LM IA according to J. WEINGARTEN and E. HALLAGER : E. HALLAGER, «Roundels Among Sealings in Minoan Administration : A Comprehensive Analysis of Function», *ASSA*, p. 122 and p. 143. The Hagia Triada and Khania tablets are dated LM IB.

(15) This point is well made in the faunal analysis of the EM II settlement at Myrtos and the reconstruction of the living system of the site. Oxen constitute an extremely small percentage of the faunal remains (oxen : 1.5 percent *vs.* sheep/goat : 90.3 percent *vs.* pig : 8.2 percent); and an environment unfavorable to cattle husbandry is the most likely determining factor. P. WARREN, *Myrtos* (BSA Supplementary Volume No. 7, 1972), p. 255, 265 and p. 318-319.

(16) Information kindly provided by D. REESE from his work in progress.

support these major herd animals<sup>17</sup>. Secondly, these Linear A references inform us about the scale and administrative level of interest in oxen in Minoan times. **HT 30**, **HT 114** and **HT 121** all record male oxen (2, 3 and 3) as part of mixed commodity texts dealing otherwise with agricultural commodities : GRA, OLE, NI, VIN. The last two tablets are virtual duplicates except that slightly larger amounts of these commodities are recorded on **HT 121**. It would not be surprising to discover, if Linear A is ever deciphered, that these three texts are parallel to the Linear B mixed offering texts from Pylos mentioned above. At Khania, a single ox is recorded on tablet **KH 6** in a long list of entries of the presumably agricultural product A 303. On **KH 87**, a single male ox is preserved on a fragmentary text. According to E. Hallager's analysis, Minoan roundels result from transactions on a very personal level between a representative of the central administration and producers, users or recipients of mainly agricultural products (including livestock) and textiles. Our Gournia roundel tells us that at this site in the LM IA period a single individual had dealings with the central administration involving 5 male oxen<sup>18</sup>. None of these documents gives any hint of large-scale livestock management; but this may not be truly representative of the Minoan system, since the extant Linear A data from these sites reflect neopalatial administration at a domainal, not a palatial level<sup>19</sup>.

This Linear A evidence at least assures us that regional centers in the most fully developed period of Minoan administration were interested in oxen at a microeconomic level of control. We can assume that similar concerns continue into the Mycenaean period. But the Cretan Linear B documentation should be somewhat different both from the Linear A and the mainland Linear B documentation for two reasons. First, the Mycenaeans in their takeover of Crete were confronted with already existing economic structures and systems of control. I assume that in order to control and exploit the economy of the island, the Mycenaeans maintained the existing systems, especially at the lowest levels of the organizational hierarchy<sup>20</sup>, making adjustments only when absolutely necessary. This should have produced a slightly different look to economic administration than the evolution of familiar domestic systems in the separate palatial territories of the Greek mainland. Moreover, the Cretan organizational system had a different geographical scale, whatever the exact relationship between the central Cretan palace at Knossos and the far western site of Khania, the importance of which in the LM III period is being more clearly demonstrated by every season of the Greek-Swedish

(17) See the Land Use map opposite p. 572 in L. G. ALLBAUGH, *Crete : A Case Study of an Underdeveloped Area* (1953). See also the comments on the natural resources of the region of Khania-Aptera in L. GODART, «Nuovi ritrovamenti nell'eparchia di Amari», *RivFil* 111 (1983), p. 258-259, and the general statement by J. T. KILLEN, «The Knossos Texts and the Geography of Crete», *Mycenaean Geography*, p. 42.

(18) E. HALLAGER, ASSA, p. 127, p. 131-133. Again Gournia is situated along the coast and near the fertile territory between the Gulf of Merabello and the site of Ierapetra.

(19) J.-P. OLIVIER, «Structure des archives palatiales en linéaire A et en linéaire B», *Le système palatial en Orient, en Grèce et à Rome* (E. LÉVY ed., 1986), p. 230-234.

(20) This is a common tactic used in the takeover of one culture by another. The example of Ptolemaic Egypt is carefully analyzed by A. SAMUEL, «The Ptolemies and the Ideology of Kingship», *Hellenistic History and Culture* (P. GREEN ed., forthcoming).

excavations<sup>21</sup>. Toponymic studies prove that Knossos was at least in contact with sites in the western two-thirds of the island, even though scholars still debate the degree of control Knossos exercised over sites beyond its immediate territory and the precise nature of Knossian extra-regional interests<sup>22</sup>.

The second reason why the evidence provided by the Cretan Linear B texts should be different is chronology. I accept J. Driessen's recent multi-disciplinary demonstration that the Room of the Chariot Tablets material is to be dated to the end of LM II, and I think that at least some of the remaining tablets must be assigned to the destruction that is now dated LM IIIA2 early<sup>23</sup>. This will be my working assumption in examining the oxen texts<sup>24</sup>. Since the mainland material of concern to us dates LM IIIB (Tiryns), LM IIIB1 (Thebes) and before, at or after the end of LM IIIB (Pylos), we have to allow for changes in systems of control and administrative practices over a period of one to two centuries<sup>24a</sup>. Of course, a clever *advocatus diaboli* will also point out the inherent circularity that this chronological spread reveals in my discussion of point number one. It may well be that some of the chief features of Mycenaean *administration* were fixed during the earlier period of the Mycenaean takeover of Crete and then transferred to the growing palatial economies on the mainland. Still the underlying organization of Messenian society and economy and its locally developed political hierarchy would require some different techniques of centralized control. In any event, the chronological split in the Knossos archives prevents us from having the «freeze-frame» view of oxen management that we have at the individual mainland sites.

## 2. The Knossos oxen dossier

An exhaustive discussion of all the material is beyond my scope. I shall concentrate in this paper mainly on the work of a single scribe (Scribe 107) as a demonstration of the problems inherent in interpreting so heterogeneous a dossier. I shall deal with other texts when they offer information that is useful in interpreting the Scribe 107 texts. Such an

(21) Especially by the discovery of Linear B tablets in summer 1989 and 1990. **KH Sq 1** lists 10 + pairs of chariot wheels : E. HALLAGER, M. VLASAKIS & B. P. HALLAGER, «The First Linear B Tablet(s) from Khania», *Kadmos* 29 (1990), p. 24-32. See also now *Kadmos* 31 (1992), p. 61-87.

(22) The major issues in the scholarly debate concerning the control and organization of LM III Crete are discussed by Th. G. PALAIMA, «Inscribed Stirrup Jars and Regionalism in Linear B Crete», *SMEA* 25 (1984), p. 189-203, and more recently and comprehensively by H. W. HASKELL, «LM III Knossos : Evidence Beyond the Palace», *SMEA* 27 (1989), p. 81-110. I think that the discovery of Linear B texts at Khania by offering further proof of the administrative importance of the site lends additional support to the view shared by Haskell and myself that Knossos had only selective interests in territories outside its own central region. On Khania's interrelations with Knossos and its status in the LM IIIB period, see HALLAGER, *Kadmos* 31 (1992), p. 86-87.

(23) *RCTK*.

(24) Absolute proof is impossible. Some of the factors, approached from the point of view of the overall evolution of Minoan-Mycenaean sealing and written administration, are discussed in Th. G. PALAIMA, «Origin, Development, Transition and Transformation : The Purposes and Techniques of Administration in Minoan and Mycenaean Society», *ASSA*, p. 97-99.

(24a) The chronological spread of texts would remain even if the Pylos material were dated earlier in IIIB as suggested by M. POPHAM, *OJA* 10 (1991), p. 315-324.

analytical overview of a selection of the available evidence should mark the limits of interpretation and suggest possibilities for further study of the Knossos oxen dossier consistent with the background and assumptions discussed in sections **1a** and **1c**.

## 2.1. Scribe 107 : oxen tablets, find-spots, other tablets<sup>25</sup>

Scribe 107 :

- **Co 903** / **Co 904** + 8008 / **Co 906** / **Co 909** + 7133 + 7835 + fr. <**Co 8347**> / **Co 910** <**Co 7056**> /
- **C(1) 901** + 7661 + 8049 / **C(1) 989** + 5744 + 7997 / **C(1) 5544** / **C(1) 5753** + 7046 + 7630 /
- Mainly from Area I3 (Area of Bull Relief); **C(1) 989** + 5744 + 7997 perhaps from I2 (Spiral Cornice Room).
- Scribe 107 is also responsible for two (?) personnel tablets [**B 798** and **B(1) 809** (?)] and a new tablet fragment **C(1) 9666**.

Scribe 107 is considered by Shelmerdine a semi-specialized scribe, because she correctly sees the likely association of the two **B-** series records of personal names with the scribe's **C-** and **Co** series livestock texts<sup>26</sup>. This cautious interpretation is further supported by Killen's suggestion that the long list **B 798** constitutes a catalogue of collectors<sup>27</sup>. The livestock texts of Scribe 107 then are concerned with a higher level (either completely major-toponymic or important personnel) of administrative activity. All the livestock texts make reference to oxen. The **Co** texts refer to small numbers of male and female oxen (the proportions are 2:4 and 2:10 on the two tablets where the figures are extant) as final entries after larger numbers of both sexes of sheep, goats and pigs are recorded in bookkeeping slots on each tablet. On **Co 906** the bookkeeping nature of entries induced the scribe to write and then erase the ideogram  $\text{BOS}^m$  which proved unnecessary for this tablet and its final entry of only 6 female oxen (ratio 0:6). The toponyms *ka-la-ra-i* (**Co 906**) and *o-]du-ru-wo* (**Co 910**) are associated elsewhere on tablet **V(2) 145** (where the toponym is spelled spelled *u-du-ru-wo*)<sup>28</sup> from the Room of the Chariot Tablets by scribe *Fred* whose other texts are of the **Sc** series. The animals on these tablets are designated as *a-ko-ra-jo* after the majuscule heading words which are major toponyms in western Crete<sup>29</sup>.

The four oxen tablets of class **C(1)** are more varied in nature. What they have in common is that they list only oxen and they do so in the three preserved instances in

(25) In this section I am relying on three treatments of the scribal organization of the Knossos inscriptions : *Scribes Knossos*, C. W. SHELMERDINE, «Scribal Organization and Administrative Procedures», *Studies Bennett*, p. 343-384 and *RCTK*, especially p. 335-390. I use the symbol < > to designate that a fragmentary text is thought to belong to the immediately preceding text. (?) implies that a piece of information is tentative.

(26) SHELMERDINE, *Studies Bennett*, p. 350. **B 798** and **B(1) 809** are themselves linked by the personal name *ke-sa-do-ro*.

(27) J. T. KILLEN, *Studies Palmer*, p. 124.

(28) But this might also be the spelling of Scribe 107, since the initial *o-* is a pure restoration on **Co 910**, and the scribe's texts provide no other instances of the treatment of initial *o-/u-* variants in toponyms. The only initial *o-* in his texts being the patent Greek formation *o-pi-le-u-ke-we* on **B 798**.

(29) Cf. L. GODART, *Acla Mycenaea* II, p. 423-424 for location of the toponyms.



connection with the important toponyms *ku-do-ni-ja* and *ko-no-so-de* and the likely (?) toponym *e-wo-la-de*<sup>29a</sup>. It is important to observe the variation between the allative and non-allative forms of the toponyms because this variation implies at least different aspects of the same record-keeping task : management of animals *at* a particular location *vs.* allocation of animals *to* a particular location. The high number on **C(1) 5544** (a possible totalling document) reinforces this impression of administrative variety. Otherwise the entries vary significantly in numbers. *bos*<sup>m</sup> 91 alone is preserved on **C(1) 5544**, while the range of other entries is *bos*<sup>f</sup> 5-14-20 and *bos*<sup>m</sup> 8 to the presumed totalling figure *bos*<sup>m</sup> 91.

An unusual ideographic usage occurs in **C(1) 901 + 7661 + 8049** where the entry *bos*<sup>f</sup> 20 is followed by *la bos* 1. The standard interpretation (*Documents*<sup>2</sup>, p. 583) views *la* here as a descriptive designation : an abbreviation of the Greek word *lauros*<sup>30</sup>. But then the use of the unsexed ideogram is very odd, unless Scribe 107 viewed the sex-marks as redundant after stipulating that this animal was a bull. The use of this special adjunct reference at least should imply a difference between the *la* animal and the normal male oxen listed on the texts, especially if we group **C(1) 901 + 7661 + 8049** together with **C(1) 5753 + 7046 + 7630** based on their clearly parallel structures : TOPONYM in allative form / *bos*<sup>f</sup> / *bos*<sup>m</sup>. Only the annoyingly different ratios of female oxen to the male and *la* oxen (5:8 *vs.* 20:1) prevent such an association from being certain, because the different ratios might imply different activities or functions for the animals. For example, such a harsh reversal of proportion is inconsistent with the established proportional patterns in the definitely unified **Co** set. Returning to the adjunct *la*, if it is correctly interpreted as *lauros*, such exceptional treatment perhaps indicates that this single animal is a breeding bull being consigned along with the 20 female oxen to *e-wo-la*, a site or «festival». However, it is remotely possible — and completely unprovable given the paucity of data — that the *la* has the same value it does on the mainland **Cn** sheep tablets and that it makes reference to a *la-to-mo* animal, i.e., one which is to be drawn from or assigned to a stead location rather than from or to the grazing areas of the collector flocks and sherds. Supporting this line of interpretation is the difference in administrative status of the toponyms involved : *ku-do-ni-ja* and *ko-no-so* being major centers, while *e-wo-la* occurs as a possible toponym only here<sup>31</sup> and thus might be an

(29a) J. T. Killen in a lecture at PASP in April, 1992 proposed to interpret *e-wo-la-de* as «to the festival» (later Greek ἐορτή). This offers intriguing alternatives to the interpretations of the Knossos **C(1)** tablets presented here.

(30) The fact that *la* has two reasonable Greek interpretations is significant. For both here and in the **Cn** series, the descriptive terminology for these important animals is drawn from the language of the controlling administrators, the Mycenaean Greeks. One might contrast the situation in the major cloth production industry where some of the descriptive ligatures for cloth are common to both Linear A and Linear B and have no probable Greek explanation. See, however, the secondary qualification *la-ra-me-to* which, along with [●]-*mo*, is recorded with entries of worker oxen on an *RCT* tablet **Ce 59**. *Documents*<sup>2</sup>, p. 438, proposes that *la-ra-me-to* might be a man's name, a reasonable suggestion given the occurrence of single toponyms with each of the five *we-ka-la* oxen entries on the two sides of the tablet. But since *la-ra-me-to* cannot be connected with a clear Greek name, it is possible that it and [●]-*mo* are descriptive terms (perhaps Minoan, considering the early date of the *RCT* deposit : cf. *supra* n. 28 where Scribe *Fred* from the *RCT* preserves a «Minoan» spelling of a toponym) modifying the animals.

(31) On **B 806.3**, it is more probable, given the context, to restore ]-*wo-la* as a personal name. In the **Sc** series (**Sc 8271** : *e-wo*], the extant entries on the rectos are personal names rather than toponyms. On **Xd 7547.2a**, the latest reading is *q-wo-la*]. On **Xd 119**, the apparatus proposes either *e-wo*q] or *e-ta*q].



otherwise obscure «steading center». If *ta* does stand for *ta-to-mo vel sim.*, the omission of the sex-marks on **BOS** 1 might then be a mere inadvertency, as it most probably is on tablet **Ce 59.2b** (the only tablet assigned to scribe *Cedric* in the *RCT* material)<sup>32</sup>.

**C(1) 989** + 5744 + 7997 adds to this impression of heterogeneity. It starts with a fragmentary majuscule heading (perhaps non-toponymic) ]-re-[●]-ja and then inserts the major toponym *ku-do-ni-ja* in smaller characters before the entry **BOS**<sup>f</sup> 14[. The last detail that we can insert into this by now confused picture is the new fragment **C(1) 9666** the text of which reads : ]sus<sup>s</sup> 1 [ with *inf. mūt.* **Co 909** + 7133 + 7835 + *fr.* demonstrates that Scribe 107 can be interested in such a small number of pigs (line 2 : sus<sup>m</sup> 3) even in the *a-ko-ra-ja/-jo* groups; but, according to the transcription, the entry on **C(1) 9666** occurs on the upper part of the fragment, so it cannot belong to the **Co** set. It might, however, be a preliminary document for the **Co** series<sup>33</sup> or belong to yet another kind of set by this scribe.

Unless we can find a convincing way to eliminate these ambiguities and variations in information on the tablets, it is safest to proceed on the basis that the work of Scribe 107 falls into the following potential administrative sub-sets (although I do not mean to imply that they would necessarily form distinct series) :

1. **Co a-ko-ra-ja/-jo** tablets possibly together with the two **B** collector lists.
2. **C(1) 901** + 7661 + 8049 and **C(1) 5753** + 7046 + 7630, keeping in mind the above-mentioned provisos.
3. **C(1) 989** + 5744 + 7997 which has a slim chance of being a preliminary text for **Co 904** + 8008, where the number of **BOS**<sup>m</sup> (and **BOS**<sup>f</sup>) are missing. It would not be an identical preliminary text, but one which provided supplementary or partial information and represented the information-gathering process that lay behind the final figures in the **Co** texts.
4. **C(1) 5544** which is a possible totalling tablet.
5. **C(1) 9666** possibly preliminary also, dealing with sus.

The scribe remains semi-specialized by Shelmerdine's definition, and his assignments are given coherence by the general subject of «collector» livestock and the fact that the administrative level is toponymic where it can be determined. Again to avoid possible mistaken assumptions at this primary level of analysis, we must strike Driessen's assertion (*RCTK*, p. 338-339) that on **C(1) 5753** «eight *working* oxen are booked as being sent (*from Khania?*) to Knossos» [italics mine]. We do not know, even conjecturally, the point of origin of these animals : *wa-to*, *ka-la-ra*, *a-pa-la-wa*, *o/-u-du-ru-wo* or even some unspecified site in the western (or even the Knossian : null reference implying proximate location) district are equally likely possibilities. There is also no explicit or implicit indication that they are *we-ka-la* animals.

Here I shall permit myself a digression to modify another point raised in Driessen's discussion of a text by Scribe 107 : **C(1) 5544**, because it is crucial to our general understanding of Knossian and Mycenaean Cretan interest in oxen. I take such pains

(32) *RCTK*, p. 106.

(33) **B(1) 809** might provide a parallel as a preliminary single-entry text from which the information on **B 798** is then extracted.

here because I believe that Driessen's work in its final published form will be the fundamental starting point for future work on the Knossos material and on textual evidence for the Mycenaeanization of Crete. *RCTK*, p. 339 : «The same hand booked a reference to at least 91 oxen on **C 5544**, perhaps a summarizing record for *all* oxen under control of the palace». His discussion then makes a point of the great difference between the Pylos evidence (a total of some 20 male and 7 female oxen being recorded) and the Cretan evidence (of Scribe 107 and other texts such as *Cedric's Ce 59* where 84 working oxen are recorded, 50 at *ku-do-ni-ja*) with its much larger numbers of animals. He then cites with some approbation Halstead's explanation that this difference can be attributed to differences in natural geographical conditions, i.e., «the general unsuitability of southern Greece for the raising and keeping of traction animals» vs. the excellent conditions for these animals in the major agricultural areas of Crete<sup>34</sup>.

First, given the fact that one text (**Ce 59**) from an LM II deposit lists 84 working oxen with special secondary qualifications of *la-ra-me-to* and [•]-*mo*, whatever their meaning, and that tablets from other (perhaps later) contexts list comparably high numbers *in single administrative tasks*, e.g., the oxen-pair tablets (**Ch** of Scribe 110 and **C 7698** of unknown Scribe) which record 40 animals associated with individuals, it is most likely that the total on **C 5544** also has to do with a specific administrative assignment and, therefore, represents only a small portion of oxen under Knossian palatial control. As I have indicated in the introduction, the Pylos texts are extremely biased. They only deal with animals in religious contexts. Why is this?

Among several possible explanations, besides mere hazards of preservation, we might consider the season of the year when the tablets were recorded. If the destruction of the Palace of Nestor took place in early spring (our best working hypothesis)<sup>35</sup>, the texts would not have been associated with the main seasons when oxen would have been used for plowing, fertilizing, sowing and harvesting the principal crops (August to December for wheat-barley and barley as fodder / June-July for wheat-barley harvest) or for the cutting, baling and irrigation of alfalfa (May to early October). Nor would they have been written during the dry summer period when the animals would have to have been brought collectively to wet lowland areas simply to furnish them with enough water to stay alive<sup>36</sup>. If on the other hand, one of the tablet-preserving destructions at Knossos took place in June<sup>37</sup>, the wheat-barley harvest and the drier season would provide ideal

(34) *RCTK*, p. 339 and n. 28 citing P. HALSTEAD, «Counting Sheep in Neolithic and Bronze Age Crete,» *Patterns of the Past* (I. HODDER *et al.* ed., 1981), p. 330-332.

(35) See J. CHADWICK, *The Mycenaean World* (1976), p. 188-192 for discussion of the time of year for both the Knossos and the Pylos destructions.

(36) See the convenient chart of the agricultural year in S. ASCHENBRENNER, «A Contemporary Community», *MME*, p. 51.

(37) This hypothesis rests partly on the numbers of month-names attested in the Knossos tablets, assuming a chronological unity of the archives. Since we now have a probable chronological split in the tablets, it is worth noting that the 6 verifiable month names all are attested at least once on the **Fp** tablets from Area A (*Clay Chest*), thus assuring that the hypothesis about season of the year holds for at least one tablet-preserving destruction. The word *me-no* without a clear month name preceding it is found on tablets from Areas G1 and H4. Both *RCT* and non-*RCT* texts deal with relatively large numbers of animals.

motives for the central administration to be generating texts that recorded the allocation of animals for agricultural work and their collection in well-watered areas. A second reasonable explanation for the paucity of direct references to oxen in the Pylos corpus has to do with the hierarchy of administrative control. The bulk of oxen in LH IIIB Messenia could have been controlled at the local level, only appearing in the texts of the central palace when the animals were used for religious purposes or when their local controllers were needed for palatially directed operations, such as building.

Second, to illustrate the danger of reasoning from a superficial assessment of our selective extant documentation, we might turn the argument around. The Knossos tablets never record oxen in mixed religious offering contexts of the mainland **Un** type<sup>38</sup>. The fragmentary text **C 394** alone links a single *bos*<sup>m</sup> certainly with deities : *pa-ja-q-ne*, *pa-de*, and perhaps *ge*-. A conclusion that this proves that the Mycenaeans on Crete did not sacrifice oxen to the same degree as the mainland Mycenaeans is patently absurd.

Third, calculations prove that there must be something wrong with Halstead's blanket statement. They also help us to understand the scale on which oxen must have been exploited as draft animals in Messenian and Cretan agriculture<sup>39</sup>. In 1963, the total worked farmland in Messenia was 1,276 sq. km. and the population was 211,970. The average farm size was 3.4 hectares or 34,000 sq. meters. Each sq. km. = 1,000,000 sq. meters. There were then roughly 30 average farms per sq. km. of worked land and ca. 38,280 farms in the region. The average number of oxen per farm — at a period when the number of livestock had fallen off significantly from the turn of the century and at an accelerated pace in the 1950's and 1960's due to the introduction of mechanized equipment<sup>40</sup> — was 0.4. Thus there were roughly 15,000 oxen in the region ( $0.4 \times 38,000 = 15,200$ )<sup>41</sup>. Even if one scales down these figures tremendously — a rough estimate of human population in the Late Bronze Age is 50,000<sup>42</sup> or 1/4 the modern population, so even if we scale down by a quadrupled population ratio (= 1/16) we still would arrive at a feasible oxen population of ca. 1,000 — they at least disprove the notion that Messenia could not support oxen<sup>43</sup>. Nor do I think we should scale down too severely. In the 1960's the village of Karpofora possessed a mere 210 hectares of land in cultivation for which plowing by draft animals was required. The first and second

(38) **Ce 159** + 8256 lists individual entries of equal numbers of *BOS*, *OVIS*, and *CAP*. These entries might represent sacrificial combinations. Cf. *RCTK*, p. 377 and n. 2.

(39) Statistics here are taken from H. J. VAN WERSCH, «The Agricultural Economy», *MME*, p. 177-188.

(40) ASCHENBRENNER, *MME*, p. 57.

(41) In 1963, there were 50,700 oxen in the Western Peloponnese, defined as the *nomoi* of Achaea, Arcadia, Ilia, Messenia, and the Ionian islands of Cephalonia, Ithaca and Zakynthos. Achaea, Ilia, Zakynthos and Cephalonia contained half these cattle, leaving ca. 25,000 to be distributed among Messenia, Arcadia, and Ithaca. Our calculations then seem reasonably conservative. Statistics taken from the reports of the United Nations Special Fund Project in Greece, *Final Report on the Economic Survey of the Western Peloponnesus* (1966), vol. I, p. 1-2; vol. 3, part II, p. 76.

(42) W. A. McDONALD & R. HOPE SIMPSON, «Archaeological Exploration», *MME*, p. 141.

(43) As J. Chadwick kindly reminded me in Athens, the annual contribution of ca. 234 ox-hides in the **Ma** series implies the existence of *at least* 1200 oxen in LH IIIB Messenia. Cf. J. CHADWICK, *The Mycenaean World* (1976), p. 127.

plowings took some 50 days of labor by 23 plowing teams made up of the 12 horses and 22 oxen (11 teams) in the village (14 of the oxen owned by single families which then pooled resources)<sup>44</sup>. One can imagine the utility of the oxen and the intensive labor required to farm the extensive lands which would have been needed to support the ration-dependent labor employed by the mainland and Cretan palatial economies. To bring us back to Crete, in 1948 when the economy was recovering from the disturbances of World War II, 35,000-45,000 oxen provided the main source of farm power for ca. 52,350 farms (ca. 10,000 farms owning pairs of oxen)<sup>45</sup>. I think we must conclude that the Mycenaean administrations at both Pylos in Messenia and Knossos on Crete were dealing with much larger numbers of animals than our extant texts reflect.

Thomas G. PALAIMA.

(44) ASCHENBRENNER, *MME*, p. 57-58. According to the United Nations Special Fund Report (*supra* n. 41), 42 percent of mature oxen participated in farm work.

(45) ALLBAUGH (*supra* n. 17), p. 248-249.