

SEAL-USERS AND SCRIPT-USERS/NODULES AND TABLETS AT LM I B HAGIA TRIADA*

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INTRODUCTION

The study of Aegean sealings has advanced considerably during the last decade by careful analysis of the typology of their shapes, the patterns of occurrence of their seal impressions, their counter-inscriptions or lack thereof, their contextual associations with artifacts and/or inscribed materials, and the status of the sites at which they occur within the overall regional and extra-regional economic and administrative systems of the Minoan (Cretan) and Mycenaean (Greek mainland and Cretan) palatial civilizations of the second millennium B.C. I hope that non-Aegean specialists interested in the subject of this paper will find sufficient general background in the following studies listed in the bibliography: WEINGARTEN, J. 1986; OLIVIER, J.-P. 1986b; PALAIMA, T.G. 1990a; CHADWICK, J. 1987.

My original intention when invited to this conference was to concentrate on a single site that provided ample evidence for interaction or cooperation between sealing administration and written administration at some critical stage in the development of economic bureaucracy in the Middle (ca. 2100-1600 B.C.) and Late (ca. 1600-1065 B.C.) Bronze Age Aegean¹. For in the Aegean (Fig. 1), evidence for a period of administration that would correspond to that of the title of this conference is minimal: we know very little about Aegean 'archives before writing' and what little we know has been the subject of considerable debate. Mycenaean 'archives before writing' simply do not exist. At Knossos, Mycenaean administration adapted Minoan sealing practices during a phase (LM II ca. 1425-1390 B.C.) in which Linear B writing either was created or was already in existence². Thus sealings and Linear B texts are found in the same contexts in many areas of the Palace of Minos, reflecting the less centralized approach to record-keeping used by the Knossian administrators³. On the mainland also, there are no finds of clay sealings, which alone represent positive proof of the administrative application of seals, at any major site (Pylos, Mycenae, Tiryns, Thebes: Fig. 1) prior to the appearance of the tablet archives of the full Mycenaean palatial period (ca. 1400-1200 B.C.). This, of course, raises the major question of the purpose of seals on the mainland from the period of the Shaft Graves at Mycenae until the date when one can be reasonably certain that the conditions for writing and for palatial or proto-palatial administration first existed: LH II⁴. Earlier on the mainland, we have the EH II sealings from the 'House of Tiles' at Lerna (Fig. 1). But they are so far an isolated phenomenon, useful mainly as an analogy for interpreting the controversial early Cretan material with which they are closer chronologically. The very existence of Minoan 'archives before writing' is also doubtful. The chief evidence is furnished by the single sealing (*CMS V* no. 20) from the EM II Cretan site of Myrtos⁵. Ingo Pini has attempted to supplement the limited Cretan evidence by compiling a group of 24 other early Cretan clay nodules that were impressed by seals that cannot be dated stylistically within the proto-palatial period (later than MM I: 19th century B.C. onwards)⁶. These come mainly from sites that subsequently had major administrative bureaucracies (Knossos, Phaistos, Palaikastro, Arkhanes: Fig. 1) which implicitly supports the possibility that these early clay nodules might have been used in some proto-stage of those bureaucracies. Pini has also cited some instances where seals were used to impress other objects that, unlike the nodules made by

stylistically earlier seals, were actually *found* in pre-MM II contexts: a jar-mouth stopper from Knossos, two loom-weights and a jar handle from Palaikastro⁷. Both Weingarten and Poursat were correct to stress that *find-context* is all-important in dating sealings since there are confirmed examples of stylistically earlier seals being used, for example, in the MM II levels at Mallia⁸. Thus the nodules cited by Pini cannot be used as evidence for the use of sealings before the earliest evidence for the use of writing by and within the record-keeping economic systems of the early Minoan palaces. The term *system* is also important here, for these pre-palatial applications of seals, whether on clay nodules or other objects, document an 'impulse toward economic control' and might even be the only extant traces of the early stages of 'local, small-scale, isolated and sporadic' *administration*, but they do not prove the existence of the kind of continuous and *systematic administration* on a larger scale that would produce 'archives before writing'⁹. However, within the proto-palatial period (ca. 1850-1700/1650 B.C.) we have clear evidence for the administrative use of writing (both Cretan hieroglyphic and Linear A) and the systematic use of seals on sealing devices, some even inscribed¹⁰. Thus sphragistic and written administrative techniques in Minoan palatial society and economy exist in a healthy symbiosis from the start. The very fact that signs of the Cretan hieroglyphic script were carved onto seals so that those signs could then be applied to clay sealings indicates the strong influence sealing practices had on the origin of writing and the range of its early uses. No comparable use of the main administrative scripts of Minoan and Mycenaean palatial culture, Linear A and Linear B, is known¹¹. Additional evidence for the early interaction of sealing and written administration are the sealings which have both hieroglyphic and representational seal impressions on their surfaces¹² and the appearance of hieroglyphic sign groups both in seal impressions and in written clay texts. The latter suggests that seal-users were directly involved in some of the same economic activities that involved written administration, without necessarily being able to write¹³.

This is precisely the sort of verifiable interaction between sealings and written economic texts that I wished to investigate. It was the main focus of my paper on Mycenaean sealing practices for the Eighth International Colloquium on Mycenaean Studies in Ohrid, Yugoslavia in 1985, which provided a survey of the Minoan evidence (now superseded by the series of detailed studies of periods and special sites by Weingarten) and focused on the contexts of sealings from Mycenaean Knossos and the mainland sites (Fig. 1) and the function of sealings within the Mycenaean palatial administrative system. The Mycenaean system clearly came to rely much more on written records for monitoring economic activities and transactions than the earlier Minoan systems did, and we should ask why. Did the sealings serve purposes within the Minoan bureaucracies that no longer were important to the later Mycenaean bureaucracies? Did the techniques of written and personal administration develop to such a degree in Mycenaean times that they could take over the tasks that Minoan sealings used to fulfil? To what extent must we take into account the nature of our evidence, for example the types of sites from which the evidence comes? Or should we seek the solution, as Judith Weingarten suggests, in the historical circumstances surrounding the administrative systems? For the Minoan system was internally developed and undoubtedly relied on transactional procedures with long and relatively constant histories among parties known to one another and trusted by one another. The Mycenaean system, however, was superimposed upon a subject Cretan population and the surviving skeleton of the Minoan administrative system by a controlling group that had every reason to be more careful, almost obsessive, about transactional information involving previously non-Mycenaean land, goods, materials and persons.

In Ohrid I argued that the mainland evidence supported a view that "sealings at Mycenae, Pylos and Knossos may have served as primary contractual and performance records within the economic system of the palace and its three-stage micro- and macro-economic chain of control. The sealings thus would have identified the parties responsible for transactions, which information might or might not be recorded on the 'monitoring' documents of the workshop areas or the central administration"¹⁴. From the Linear B tablets, we know that the Mycenaean mainland palatial economy is based on a three-tiered hierarchical network, which I identified in macro-economic and micro-economic terms. On the macro-level, authority decreases as one moves:

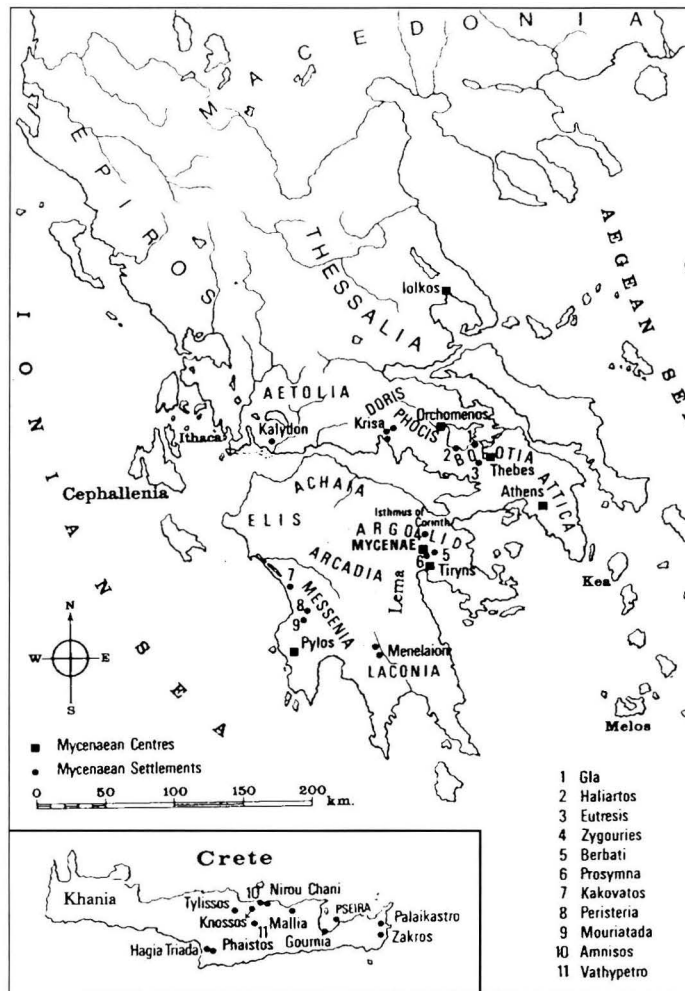


Fig. 1 - Map of Principal Minoan and Mycenaean Sites (after K.P. Kontorlis, *Mycenaean Civilization, Athens 1974*).

- from (a) a central regional controlling site
to (b) major second-order centers in control of sub-regions or districts
to (c) the lesser settlements which the second-order centers control.

The micro-economy operates in the same way moving down the chain:

- from (a) officials at settlements and centers of any size
to (b) any subordinate collective group, such as workshops and their stewards, collectors and collector/owners, guilds and their leaders, major land-owners who lease out their land in parcels with specific obligations and/or benefits attached, or the collective *da-mo* which also manages land allotments
to (c) individual cloth-workers, shepherds, bronzesmiths, farmers and leasers of land.

Fixed or contractual relationships and transactions between any one tier and the other would have provided the occasion for the use of sphragistic or written recording devices, at least to note the responsible individual(s) involved, and, in fullest terms, to note the conditions under which a transaction was conducted or an obligation fulfilled¹⁵. It was my aim to look at the Hagia Triada material from this perspective to see whether or how it compared with the mainland patterns. I intentionally wished to

contrast mainland practices with those at a single well-documented Minoan site. For evidence on the mainland is centered on just such a site: the Pylos tablets and sealings afford us a clear picture of sealing applications within a well-understood and versatile record-keeping system. At Pylos, the written records attest to many varieties of economic transactions at all levels of authority, and the sealings have a wide distribution and occur in contexts both with and without tablets. The other mainland sites, even now the special group of sealings from Thebes¹⁶, only reinforce in selected ways the impressions we have from Pylos. As for Mycenaean Knossos, its sealing and written administration should be peculiar because of the historical circumstances surrounding the Mycenaeanization of the site and the entire island of Crete. I think, therefore, its system may also be unusual because of the scale of its economic operations¹⁷. Of course, given my training in Aegean pinacology and my primary interest in Minoan-Mycenaean scribal bureaucracy, I cannot but approach the sealing material from a different perspective than that of students of glyptic. However, since they must occasionally venture onto my terrain, I thought that my venturing onto theirs might prove useful.

My proposal to work on the evidence from LM I B Hagia Triada (Figs. 2-3) had several points to recommend it. First, the Minoan sealings, Linear A tablets and site itself have been well-studied recently: in particular, one can now begin with Weingarten's masterful 'first outline of Ayia Triada's sealing structure—an amalgamation of nodule, seal and scribal mark—which defines the sealing system at any site', a study which even traced the interconnections between the seal-holders who impressed numerous nodules and the literate individuals, tentatively identifiable, who inscribed mostly one, occasionally two, rarely more signs on the impressed nodules¹⁸. There are also studies of the scribal hands and their groups of tablets which appeared subsequent to Weingarten's study¹⁹. These provide inter-links among tablets known to have come from different locations and thus establish a critical point for our analysis: the probable contemporaneity of all the sealings and tablets from the site or the 'unity of the archives'²⁰. Thus we can study a 'snap-shot' or 'freeze frame' in the life of an administrative system that used both sealing methods and writing concurrently. Second, the site has yielded still the largest number of Linear A tablets (147), approximately 1043-1165 nodules – many inscribed, and some 21 roundels. Third, this material is dated to LM I B (1480-1425 B.C.), the acme of neo-palatial bureaucracy, a final stage before the transition to Mycenaean administration on the island, during which there is some evidence for proposing that the site of Hagia Triada, under the place name *da-wo*, was integrated into the Mycenaean system of economic administration through a hierarchy of regional centers²¹.

For all its virtues, the site has one major and several minor vices or disadvantages. A first problem is that we do not have precise evidence about the find-spots of individual tablets and sealings. When we can determine that sealings or tablets were found in specific areas, we often do not know which tablets and sealings. Using the information that we can reconstruct, we recognize another major disadvantage: as is typical of the LM I B period, the sealings from Hagia Triada are found clustered in large batches²² and not broadly distributed across the site (Fig. 3). Consequently they are associated directly neither with the main tablet find-spots²³ nor with a variety of areas or artifacts that might provide clues about the nature of the transactions in which they were used. Again this pattern of distribution differs from that which prevailed at the two best excavated later Mycenaean palatial sites: Knossos and Pylos, and we should ask why. Where tablets and inscribed sealings can be associated at Hagia Triada, we can study the possible relationship of their texts. This Weingarten has done for the six tablets that she thought could be assigned to a main area of sealing finds, Room 11²⁴. Although the assignment of the tablet and sealing finds to this specific area has been called into question by the careful work of Militello with the original documentation concerning their discovery²⁵, there are still strong indications for the association of tablets, nodules and roundels in the general northwest area (Figs. 2-3). So I shall want to take another look at this relationship. Another disadvantage is that the Linear A tablet inscriptions are clustered away from the sealings and come from a few specific locations, so that their archaeological contexts are of minimal help in reconstructing the overall patterns of economic administration at the site²⁶.

Weingarten provides a concise description of the situation at Hagia Triada:

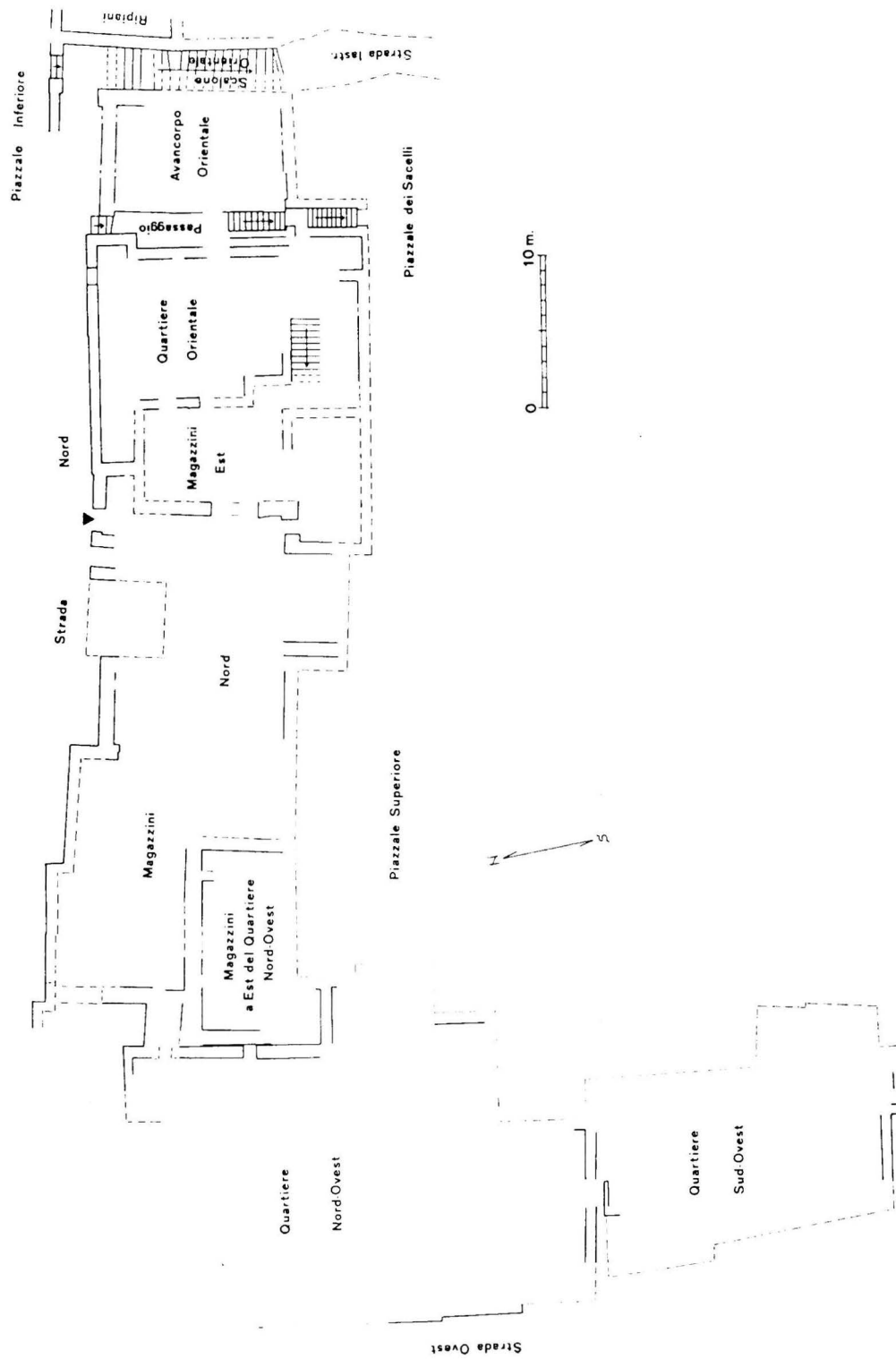


Fig. 2 - General Sections of the Villa at Hagia Triada (from F. Halbherr, E. Stefani and L. Banti 1977, fig. 7).

The sealings are overwhelmingly hanging types, and they were concentrated in the luxurious North-West Area of the villa, well away from the magazines; they had almost certainly sealed containers of small-size, high-value goods. Few tablets were found with the sealings, but, on the contrary, over half the tablets were just beyond the magazines where villa administrators were obviously controlling the receipt and or dispatch of goods. There were, however, no sealings with this group of tablets nor in the magazines. No sealings at all were found in the surrounding town where the other half of the tablets were discovered²⁷.

Given this spatial separation of sealings and written records, the two types of administration seem for the most part complementary rather than integrated and thus constitute virtually separate topics for study. Weingarten stresses this dichotomy. We can contrast the written tablets from the magazines of the villa and two locations in the 'Casa del Lebete' (Fig. 3) with the intensive pattern of seal use (involving a restricted number of seal-users) on rather delicate hanging nodules found in concentrated groups in the northwest portico area (Fig. 2). The sealing procedures in the northwest portico area were relatively independent of scribal activities except for the intervention of persons who knew how to write in order to place simple, generally single-sign, countermarks on about 70% of the nodules²⁸.

Having explained my original intentions and some of the drawbacks of which I subsequently became aware, I shall persevere and offer here some remarks on the administration at LM I B Hagia Triada that may be appropriate in the context of this conference. I must make one final preliminary comment. I have been working on this material from the starting point of Weingarten's studies, and I assume that her analysis represents our current understanding of administrative activity at this specific Cretan neo-palatial site. I obviously cannot repeat all of her arguments or conclusions, but I hope that I have sketched sufficient background to make the important issues understandable to the non-Minoan experts among us. I shall try to present any of my observations in a way that makes clear how I think they add information to our current view or why we should consider different perspectives or interpretations. Thus I am not arguing for any new synthetic interpretation nor am I calling for any major revisions of our current view. Rather I am trying to define our current state of understanding and some areas which strike me as still problematical and worth further investigation.

SEALING AND WRITTEN ADMINISTRATION AT HAGIA TRIADA

As I see it, our current view of the nature of sealing and written administration at Hagia Triada is based mainly on the following points of interpretation:

1. An overwhelming percentage of sealings (nearly 80%) are the sorts of hanging nodules (Fig. 4: mainly types VII-IX) which are constructed so as to make their use on heavy items or bulk commodities shipped over long distances impractical²⁹. The one type of hanging nodule (type VI) most suited to this kind of transport is very poorly represented (2.6%). In contrast to other sites, such as Zakro in east Crete (Fig. 1), there are relatively low percentages of flat-based nodules (types IV-V: 6% vs. Zakro 24.7%) which are the kind impressed on leather strips that sealed records on ephemeral materials. These in Zakro House A can reasonably be interpreted as having been used in conjunction with legal or commercial records relating to transactions involving trade commodities or the movement of goods to and from the palace near the harbor and points in other parts of the island³⁰. The same point can probably be made about Khania which even outstrips Zakro in this regard (types IV-V: 63.9%) and must have been a major shipping and receiving center in the Minoan period as it was in the later Mycenaean period in, for example, the special stirrup-jar trade. Thus one could conclude from these statistics that the economic or transactional focus of Hagia Triada must have been different from those of Zakro or Khania. It should be pointed out that, while relative percentages of sealing-types found may reflect the relative interests of a



- 1: HT 1-5 and roundels Wc 3001-3005 from area of Rooms 4-12-47-48-49.
- 2: tablet fragments and sealings from Portico 11 and Room 13.
- 3: a fragmentary tablet and 45 *noduli* from Room 26.
- 4: Room 13.
- 5: tablets, sealing and roundel from area of Magazine 59.
- 6: tablets from Room 72.
- 7: tablets from Room 7 of the 'Casa del Lebete'.
- 8: tablets from Room 9 of the 'Casa del Lebete'.
- 9: area with inscribed wall plaster, a calculating mechanism.
- 10: storeroom with inscribed ingots.

Fig. 3 - Plan of Hagia Triada With Main Locations for Tablet and Sealing Finds
(after S. Marinatos and M. Hirmer, *Kreta, Thera und Mykenische Hellas*, Munich 1986, p. 130 fig. 13).

given site or location within a site, the actual numbers and special circumstances of the finds should not be neglected. Hagia Triada has yielded more flat-based nodules than Khania (63 vs. 55), and those from Zakro were found in a structure, separate from the palace, that probably played a very special role in the interaction between the site and the interior. The special nature of House A might well skew the Zakro statistics. Likewise Hagia Triada was probably engaging in the activities connected with flat-based nodules to an extent which the special deposit of hanging nodules tends to distort. In fact the most frequent users of hanging nodules avoid using flat-based nodules, implying that other parties with other responsibilities were involved in the transactions with which the flat-based nodules were connected.

2. 17 seal-users stamped 81.2% of all the extant nodules. These seal-users constitute an 'administrative elite' who dominated sealing use at the site. Four of these elite-members employ 26 of the 27 Type VI nodules (the practical transport nodule) found at the site, but only four use each a single flat-based nodule (Fig. 4: Types II, IV and V) (4 flat-based nodules of 76 total)³¹. The 127 other seal-users accounted for 210 nodules. Here the term '*administrative elite*' is predicated on the interpretation of the hanging nodules as a special class connected with operations centered on a single, architecturally special area of the villa. I would rather avoid the term *administrative* which for me implies an active participation in the management and control of the site's economic life. The seal-users are doubtless involved intimately in the economic life of Hagia Triada; but actual scribes intervene in many cases to place written characters on the sealings.

3. 12 of the 17 elite-members almost monopolize the practice of counter-inscribing sealings, mainly with single incised signs. Their inscribed sealings account for 89.6% of the Linear A signs on sealings. 5 elite-members do not have counter-inscribed seals³². One of these (AT 118) is peculiar both in sealing typology and location, in that this seal impresses exclusively 41 *noduli* (type XI) found in a separate location (Room 26) at the south entrance to the site in proximity to a single Linear A tablet, perhaps HT 12³³. If the tablet ascription here and the tentative identification of scribal hands in *GORILA* vol. 5, 84, are both correct, then the administrative isolation of this unit is lessened by the fact that HT 12 is apparently written by Scribe 11 HT whose other tablet is HT 7, which with reasonable certainty is placed in the northwest area in the vicinity of room 11, and perhaps HT 27, which should come from one of the other two villa deposits (magazine 59 or magazine 72)³⁴. 45 of the 127 non-elites account for the remaining signs. It should be pointed out here that the remaining sealings of type XI impressed by elite-members all belong to non-countermarked seals: AT 106 and AT 12.

4. The single-sign counter-inscriptions are of twelve signs that are derived from the Linear A repertory of characters³⁵. 3 of these counter-signs are of extremely rare occurrence: AB 01 (*da*), AB 08 (*a*), AB 61 (*o*)³⁶. The other signs are classified by higher frequency: AB 77 (*ka*), AB 81 (*ku*), AB 02 (*ro*), AB 41 (*si*), A 301 (-), AB 74 (*ze*); and lower frequency: AB 28 (*i*), AB 59 (*ta*), AB 04 (*te*). The six most common signs, with single exceptions, divide the 12 elite seal-users into four groups: AT 125 which is associated with these six as well as AB 59 and AB 04; AT 95, AT 105 and AT 79 which use all of the first four higher frequency signs; AT 19, AT 116, AT 32 and AT 34 which use two or three of the first four higher frequency signs; and AT 13, AT 45, AT 99 and AT 9 which use the last two higher frequency signs. The four most common signs also break down into pairs of matched frequency of occurrence: AB 77 (143 nodules) and AB 81 (148 nodules) vs. AB 02 (87 nodules) and AB 41 (87 nodules). The statistics seem too good to be haphazard. When two signs are inscribed on a nodule, only one sign from a pair will be represented. Therefore, Weingarten conjectures that the pairs of signs might signify transactions or activities that stand in binary opposition: in/out, due/received, to/from³⁷. In any case, all the signs, except A 301, occur both in Linear A and Linear B primarily as phonetic signs. A 301, judging by its occurrences in Linear A, also has a chiefly phonetic function: there are 23 verifiable occurrences from a range of sites and types of inscriptions in which the sign appears in the beginning or middle of a phonetic sign-group. This would seem to rule out the possibility that the countermarks served to label

physical objects or commodities by direct reference to them. This is a function of some of the Linear B sealings, in fact the simplest and not at all the most common function: there are two sealings with simple wine ideograms from the Wine Magazine at Pylos (Wr 1358 and 1361) and another sealing that has written on it 'joining devices' (Wr 1415) from the Southwest Area. 7 sealings from the House of the Sphinxes at Mycenae are inscribed simply with the names of vases (Wt 501-507). Only 19 out of 56 inscribed sealings from Thebes refer solely to livestock or the ideogram *190. The other 37 sealings all include transactional (*o-pa*, *qe-te-a₂* and *qe-te-o*, *a-pu-do-ke*), descriptive (*a-ko-ra-jo*), locational (*pa-ro te-qa-jo*, *a-ma-ru-to*, *ka-ru-to*) or destinational (*te-qa-de*) vocabulary³⁸. 6 of 17 pure nodule sealings from Knossos merely 'label', e.g., listing 'javelins' phonetically (Ws 1705) or 'barley' ideographically (Ws 8500)³⁹. We should not rule out the possibility that the Hagia Triada countermarked sealings function in some way equivalent to the greater number of Linear B inscribed nodules in conveying such transactional information. This would be in keeping with Weingarten's hypothesis about the binarily opposed sign pairs. Nor should we assume that all twelve single phonetic signs on the Hagia Triada nodules convey messages in the same category⁴⁰. Phonetic abbreviations in Linear B can be ideographic equivalents (*pa* = 'cheek-pieces of helmets'; *ko* = 'coriander'; *o* = 'platelets for body armor and helmets'; *ta* = 'bull'), descriptive terms (*pa* = 'old'; *pa* = 'sage-scented'; *ne* = 'new'; *ta* = 'steading' [of livestock]), or transactional specifiers (*o* = 'owed or due'). We shall discuss this important topic more below.

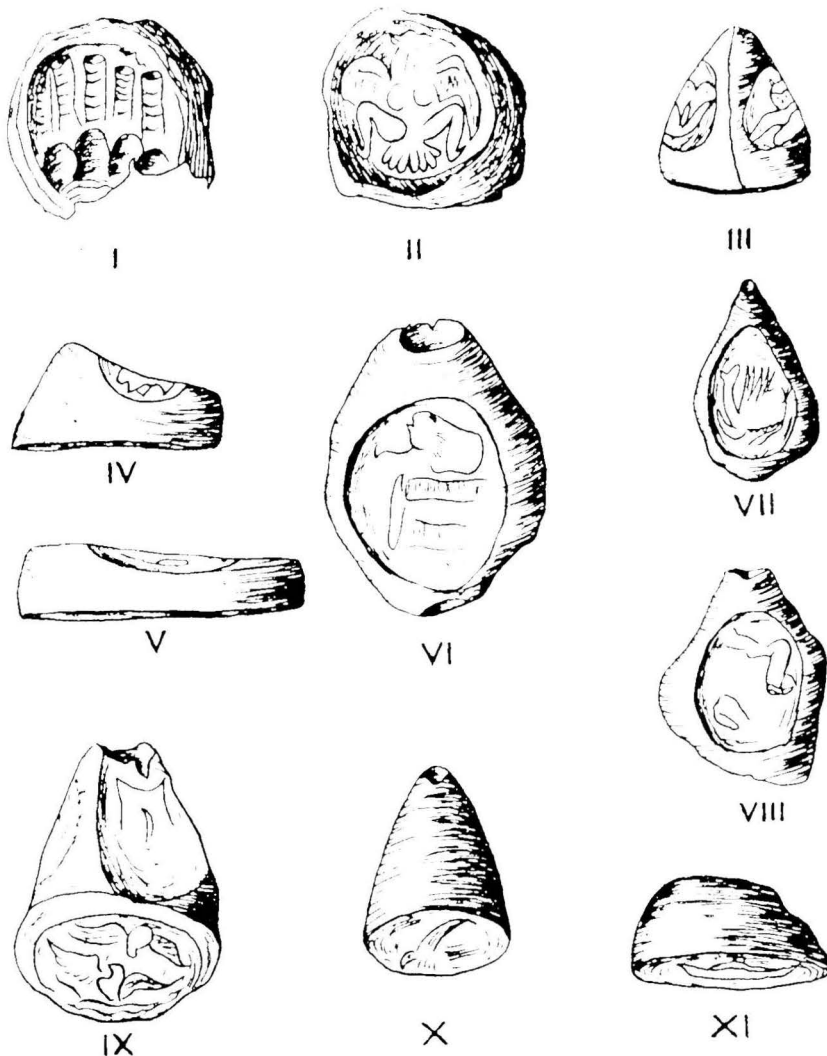


Fig. 4 - Standard Typology of Minoan Sealings (from Weingarten 1987, p. 4 fig. 1).

5. The counter-inscriptions, so far as palaeographical analysis of such meager evidence can indicate, seem to have been written by a number of different scribes for individual seals⁴¹. If the palaeographical analysis is valid – and no such identifications based exclusively on single, formally simple, signs written repetitively on uneven and awkward surfaces would ever be proposed for the Linear B material, where a repertory of ca. 30 signs and other corroborating features was considered a standard minimum until the recent work on the Room of the Chariot Tablets material by Driessen⁴² – then the seal-users cannot have been the same as the writers of the counter-inscriptions⁴³. 17 seal-users are associated with sealings counter-marked with A 301 by perhaps 9 to 12 scribes. This number of scribes is then taken as a minimum for the number who would have been active among the 57 total seal-users who have inscribed nodules. This is a good way of reckoning, given the fact that these simple inscriptions do not allow for comparison between sealings incised with one sign and those incised with another.

6. Tablets HT 6-11, which are considered to have definitely come from the area of the major cache of sealings, bear some relation to the counter-inscriptions. This is not an absolutely secure *a priori* assumption, because many of the mainland Mycenaean sealings come from areas either without tablets or where tablets were found dealing with subjects different from those explicitly defined on the sealings⁴⁴. There are enough sign-groups in common among the six Linear A texts to suggest that they formed a coherent batch⁴⁵. Three tablets seem to use the counter-inscribed signs AB 77 and A 301 directly: HT 10a.2 and HT 11b.2-5. Unfortunately neither of these texts contains an identifiable ideogram. A nexus of other less certain associations might link the signs with oil⁴⁶.

7. The above points are interpreted on the basis that the peculiar features of sealing practices that they reveal at Hagia Triada are somehow linked to the presumed administrative level of the site as ‘domainal’ and concerned with local ‘estate management’⁴⁷. By this it is meant that the perceived differences in sealing activities between the Minoan sites (perhaps even including pre-Mycenaean Knossos⁴⁸) and the later Mycenaean sites are determined by the scale of the site and of its administrative interests. Thus the relative rarity of the sturdier Type VI nodules at our chief Minoan LM I B sites vs. its dominant use in the later Mycenaean period is interpreted as indicating that the Minoan sites had more localized concerns and therefore the transactional relationships between these centers and other parties operated on a more intimate level, because of a reduced geographical orbit or a reduced number of participants in the transactional processes or reduced numbers and frequencies of transactions. Cited as proof of the radical difference between Minoan and Mycenaean centers is the single tablet from Mycenaean Knossos F(2) 852 that records 10,000+ units of grain (ca. 1,000,000 liters) connected with the site of *da-wo* =? Hagia Triada. I would certainly not argue against this as evidence of the scale on which Mycenaean-administered Knossos had interests in the production levels and economies of other areas of the island. It is, however, dangerous to assume that all Mycenaean sites were operating at that level or that even Mycenaean Knossos would not have had to engage in localized transactional activities that must somehow be reflected in its administrative system and records. That old monster, the hazards of discovery, should also make a fear-inspiring appearance here, since we have from earlier in the Minoan period comparably large numbers recorded on hieroglyphic texts: 9,400, 7,000, and so on, while the Mycenaean palatial site of Pylos rarely gets to this level (1,239 units of flax being the largest recorded figure)⁴⁹. The other Mycenaean palatial sites (Thebes, Mycenae, and Tiryns) together have a total number of more fully inscribed documents that is comparable to that at Hagia Triada, yet their information is just as ‘small-scale’ and ‘domainal’ as the Linear A records from Hagia Triada seem to be⁵⁰. The chief reason for this, I am sure, is the places of discovery of the tablets and fully inscribed sealings. They all are associated with workshops, storerooms, or rooms within smaller self-contained structures that may have had some independence from the higher-level concerns of the palatial administration. Buildings such as the House of the Oil Merchant, House of the Sphinxes, and West House at Mycenae all have tablets that record rather mundane activities such as allotments of oil

or barley to individuals (sometimes connected with small-number totals), lists of individuals and craftsmen, lists of spices, despite strong evidence for luxury crafts activities taking place in them⁵¹. The single tablet from the House of the Shields, X 508, that records wool cloth shipment to Thebes would, if the Linear B script were undeciphered, seem unexceptional and 'domainal' in its numerical contents and brief phonetic explanations. Yet it now is our sole textual corroboration of the widespread trade contacts we know the site of Mycenae had in this period⁵². Turning the argument around, we might say that if Hagia Triada in the Mycenaean palatial period could be associated with 10,000+ units of grain, then the site in LM I B must have been administratively connected to a territory with a roughly equivalent production capacity, particularly if, during this period, it was continuing to take over from Phaistos as the dominant control center for the Mesara⁵³. Thus I am loathe to use a line of reasoning that interprets our limited evidence for sealing and tablet administration at Hagia Triada as proof that the site was 'domainal', while using the idea that the site was 'domainal' to guide our interpretation. It will be useful, however, to present some evidence bearing on this point that will also lead to an examination of some of the points of interpretation discussed above.

What is the level of economic activity at Hagia Triada attested by the inscribed tablets? Here I should note that – to be properly cautious – we are limited to a knowledge of Linear A ideograms (including numerals), the words for total and grand total, and the record-keeping structure of the tablets, which allows us to isolate certain signs as 'transactional' because they appear in isolation at the end of the headings of tablets or sections or to mark an entry or section as special. I think it is dangerous procedure to begin to identify the phonetic values of sign-groups in the tablets and begin to attach meanings to them. From the extant Hagia Triada tablets we can extract information about two main spheres of economic activity: the woolen cloth industry and agricultural production. The limitation of our texts mainly to these interpretable ideographic topics should not lead us to conclude that the site was totally concentrated on these areas.

Two ideograms are connected with the woolen cloth industry:

- (1) AB 54 generally accepted as the Linear A equivalent of Linear B TELA = cloth;
- (2) A 559 = AB 80 + AB 26 = Linear B LANA = wool.

AB 54 is found ligatured in Linear A with two of the same phonetic signs with which the cloth ideogram is ligatured in Linear B: AB 81 (=Linear B *ku*) and A 312 (accepted generally as Linear B *zo*). *Communis opinio* cannot find any better explanation than that these ligatured ideograms identified a particular kind of Minoan cloth that was then manufactured by the Mycenaeans when they took over the Minoan wool industry on Crete⁵⁴.

These ligatured cloth signs are found on tablet HT 38.3 in quantities 2 and 1 respectively. We do not know what units are being used. The pure cloth ideogram occurs on two other tablets HT 16.2 and HT 20.4 by the same scribe (10 HT), in both cases followed by a fractional sign. This may indicate that the units in question are fairly large and are then subdivided by fractional amounts. Finally cloth appears on roundel HT Wc 3019, again in connection with a fractional sign written over a seal impression on the edge of the roundel.

Wool occurs on two Hagia Triada tablets HT 24 and 12 and on tablets from Phaistos PH 3.3 and Khania KH 43.1. Again we do not have any way of determining with absolute certainty the size of the units listed. But on the *recto* (front side) of HT 24 there are six entries with respective quantities: 6; 10 [;] 9 + fraction; 6; [; [⁵⁵. And on the *verso* (back side) there are three entries (1 + fraction; 1 + fraction; and 1) without commodity ideograms or heading – and therefore it is reasonable to suggest a continuation of the subject of the *recto*, i.e., wool – following the metrical sign L which signifies a talent (= 30 kg.) in Linear B. So the *recto* records 31 extant units plus 2 completely lost quantities. If we say that the missing entries were of the same scale: $31/4 = 7.75$ units on average, then the whole *recto* would have recorded ca. 46-47 units of wool. The Mycenaean wool ideogram = 3 kg. as a unit of measure, so the total here might be 93 kg. extant, 138-141 kg. restored. The *verso* lists more than 90 kg. (and the two fractional

signs make it possible that the total would be of the same order of magnitude as the *recto*). On HT 12.5 the wool ideogram precedes L 5, i.e., possibly 150 kg. of wool in a long list of various, mostly unidentifiable, commodities. In comparison, on PH 3.3 the wool ideogram precedes A 717 which resembles the later Mycenaean M = the sign standing for 1/30 of a talent or 1 kg. On KH 43.1, the wool ideogram is followed by a phonetic adjunct and the number 2.

While this is not overwhelming evidence for an intensive regional industry at Hagia Triada, it does indicate that the site was concerned with diverse kinds of wool and cloth (2 ligatured varieties of cloth; 3 adjoined varieties of wool). The rule of thumb for wool is 4 sheep to 3 kg.⁵⁶, so the 150 kg. as a single entry on HT 12 would equal the yield from a flock of 200 sheep, significantly the kind of round number (multiple of 50) in which flocks of sheep are usually reckoned in the Linear B tablets from Knossos and Pylos. Another reminder of how selective our view is, especially in Linear A, but also in Linear B, is the fact that the quantities of oil listed in the Pylos and Knossos documents would hardly offer convincing proof for the large-scale oil production industries we know were operating in Mycenaean Messenia and Crete at the time of the tablets. The near absence of any texts from Mycenaean Knossos referring to bronze should persuade one to be very cautious. In fact, a clue as to why the Hagia Triada texts deal overwhelmingly with the agricultural commodities analyzed below is perhaps offered by their find-spots: most of the tablets from the villa proper come from the area of storage magazines (rooms 59 and 72), while the other major group of texts comes from two rooms in the 'Casa del Lebete'. It is not unreasonable to conclude that this distorts our view in the direction of storing and dispersal of agricultural goods in the villa proper and the specialized interests of an individual architectural unit ('Casa del Lebete'). Any full recording of technical details of a cloth production industry have not survived. It is interesting to note in this regard, that HT 12, which has the largest single entry of wool, might have been found separate from the other texts: in room 26 with the 45 special noduli. In the same way, the Aa, Ab and Ad series from the main archives at Pylos treat the *feeding and maintenance* of women cloth workers, thus providing us with *secondary* information about the industry and its locations throughout Messenia. Flax production and cloth proper are dealt with in other series and even other locations in the Palace of Nestor. All the wool and cloth tablets at Hagia Triada appear to have come from the villa proper.

What about agricultural interests? Here is a compilation of the quantities of three basic agricultural commodities listed on the HT texts: AB 120 = grain; AB 30 = figs; A 302 = olive oil. Of course, in many cases because of the structure of the Linear A texts, their minimalist entries, and their fragmentary state of preservation, it is not possible, except when one has a total listed at the end of a text, to know whether a series of numerical entries refers to an ideogram listed earlier in a text. For this reason, I list below only quantities that refer with certainty to the commodities⁵⁷. Therefore, this list presents a cautiously low estimate of quantities. Alphabetic letters with or without superscripts preceding numbers (e.g., HT 13) indicate fractional increments connected with the commodity ideograms – obviously some sort of standard, but so far undetermined, sub-units of measure. Italicized numerals ahead of numbers designate the sign number of phonetic adjuncts or ligatures qualifying the commodity ideogram (e.g., on HT 18 the phonetic sign 78 modifies the ideogram for grain in one entry). Plus sign (+) following a number means that the number is followed by a fraction of a whole unit. [means that part or all of a quantity missing. ? means that restoration of a specific commodity ideogram is certain, but not whether a ligatured or unligatured version is required.

GRAIN (AB 120)

30 / 47 (HT 14); 684 / L³L³ 570 (HT 15); 78 20 / 10 (HT 18); 161 (HT 21); L² 230 (HT 22); 78 5 / 5 / 20 (HT 28); 200 (HT 34); 78 44+ (HT 36) [with A118 = L = Myc. talent in heading]; 207 / 134 (HT 40); 03 5

(HT 43); F [(HT 44); [(HT 50); 201 (HT 52); 81 6[(HT 61); 15+ (HT 62 [+] 73); KL² 20 / B 20 (HT 86); 20 / 1 (HT 90); fraction (HT 91); 680 (HT 92); 28 03 26+ / 5 (HT 93); 5 / 40+ (HT 96); 78 [(HT 99); 78 40 (HT 101); 976 / 03 33[/ 03 33 / 10 / 3 / 10 / 5 / with a total of 1060[(HT 102) [the total here proves that AB 120+03 is some descriptive variant of the grain ideogram measured in the same units, i.e., it is not a fractional sub-unit of AB 120]; H 70 (HT 108); [(HT 110); 10 (HT 114); fraction (HT 115); 16 / 40 / 16 / 5 / 12 / 20 / with a total of 100[(HT 116); KL² 74 / 03 62+ / 03 20 / B 60 / 03 48 (HT 120); 5 (HT 121); 2 / 03 20 / F 7+ (HT 125); 10 / 81 12[/ 03 fraction / 81 6 / 81 4 / 81 6 / 81 1 / 81 6 (HT 128); 33+ / 40+ (HT 129); 58[(HT 131); 01 55 (HT 133); 3[(HT 137); 1 (HT 139); [/ [(HT 154).

Summary

39 tablets list AB 120 in 74 entries. Quantities of the unqualified ideogram AB 120 in individual entries range from a fraction of a unit to 976 units. Tablet HT 102 lists a total of 1060 units; while HT 116 lists 100[. 8 entries on 7 different tablets exceed 100 units: 684, 161, 200, 207, 134, 201, 680, 976. These alone total 3,243 units of wheat. If we are dealing with a full unit comparable to the Mycenaean unit of 96 liters, the total for these 8 entries is 311,328 liters. The total for all entries of ideograms *unqualified by fractions* is: 4,148 units (398,208 liters). We should observe, however, that 3 entries of AB 120 with fractional adjuncts record 820 units. It is also possible that the entry cited on HT 36 refers to 44+ L (1320 kg. or ca. 2900 lbs. = 1.45 tons) of grain, which would raise the total quantity much higher.

Commentary

To indicate the scale of activity on these haphazardly preserved texts, the total amount of grain conservatively calculated from these 39 tablets (4,148 units) – again admitting an ideographic unit of measure roughly equivalent to the Mycenaean ideographic unit – would be enough to supply rations for 20,740 women workers for a month or 1,728 women workers for a year. The total comes half-way to meeting the 10,000+ figure for *da-wo* on the Linear B tablet F(2) 852 from Knossos. It would also indicate that the Minoans at Hagia Triada were dealing in quantities in excess of 1,000. Using Halstead's optimistic figures for land yield⁵⁸, the amount of land needed to produce this total grain quantity would be ca. 830 hectares, with half in use and half fallow. This is an area of roughly 8 km² of *arable* land. This does not move us necessarily beyond the local territory of a site like Hagia Triada, but it does give us a view of the site as being involved in intensive productivity that must have required careful management and must have involved numerous transactions in the same sort of three-tiered level of authority and control that existed on the Mycenaean mainland. We should also note that such impressive amounts of grain are generally associated with a need to support dependent workers and to reward specialized craftsmen and officials with land grants. Thus Hagia Triada seems less and less like a local estate and more like a full-scale 'palatial' or at least 'second-order' operation.

We cannot, of course, determine whether or not some of the grain entries are duplicates, i.e., referring to the same grain being handled in different ways, e.g., coming in and going out of storerooms⁵⁹. It is likely that the 7 tablets with entries exceeding 100 units are handling the grain in different ways than a tablet like HT 128 with entries ranging from 1 to 12. One way to deal with this possibility would be to study the tablets in sets according to the identification of scribes in *GORILA* vol. 5, although even then one could not be absolutely sure that texts within a single set might not deal with more than one way of handling a commodity⁶⁰. An extreme safety precaution would be to assume that all entries are duplicates and halve all the figures. Even so the figures would still be quite large, especially considering that these limited number of tablets can hardly reflect the total concerns of the site. The tablets with large entries (HT 14, HT 15, HT 21, HT 34, HT 40, HT 52, HT 92, and HT 102), judging by their identification numbers, would seem to come: the first six from the villa and last two from 'Casa del Lebete' Room 7. But the same scribal hand is judged to have written HT 92 from the 'Casa del Lebete', HT 40 and possibly

HT 15 from the magazine areas of the villa⁶¹. This link means either that the scribe moved between villa and town or that the assignment of general find-spot is wrong. The former is made probable by the fact that the same scribe is credited with writing HT 8 (an oil tablet) possibly from the chief area for hanging nodules near Room 11, and so he would have had to move there from the tablet areas near the magazines. In any case, the area of the hanging nodules might not be totally isolated within the overall administrative scheme of the site.

FIGS (AB 30)

15 / 15+ (HT 6); 1 (HT 12); 10 (HT 18); 10+ (HT 27); 2 / 2 / 6 (HT 28); 7+ / fraction (HT 30); 1 / [(HT 44); 2+ (HT 89); 10 / 1 (HT 90); fraction (HT 91); 3+ / fraction / fraction (HT 94); 20 / 2 / 2+ (HT 96); 4[/ 6 (HT 99); 2+ (HT 100); 40 (HT 103); 15 / 1+ (HT 110); 1 (HT 114); 2 (HT 121); 23 (HT 125); 22 (HT 129); 6̄ (HT 130); 6̄2 / 30[(HT 131); 14[(HT 154E).

Summary and Commentary

23 tablets list 337+ units of AB 30 in 35 entries. Again this is a conservative total. For example, in HT 6 we have only added in the two entries of 15 and 15+ units that are directly juxtaposed to the fig ideogram. In fact, since no other ideogram figures on the tablet, it is likely that the other 12 entries totalling 191 units (n.b. an average of 15.4 units per entry) also refer to figs. Thus this single tablet would increase our total by more than fifty percent. But, since the tablet has no total, we have not included these amounts. On the very fragmentary tablets HT 67 and HT 70, a sign that appears to be AB 30 is followed by the transactional sign AB 04 and then quantities 400[and 30[respectively. Since these readings are not absolutely secure they have not been included. Quantities of the unqualified ideogram in individual entries range from a fraction of a unit to 6̄2 units. If we are dealing with a full unit comparable to the Mycenaean unit of 96 liters, the total for all entries of ideograms unqualified by fractions is: 337 units (32,352 liters). Figs are used in Mycenaean texts chiefly as ration distributions, along with barley, to dependent workers. It is, therefore, probably more than coincidence that HT 6 might have been found with HT 7, a tablet listing single men and groups of men, in the area of the hanging nodules. Our conservative total would provide monthly rations for 1,665 men. If we added in the amounts on HT 67 and HT 70, we would have enough figs being recorded on a mere 25 tablets to provide 4,790 workers with rations for a month. Again the fig tablets are probably spread, according to identification numbers, over most of the known find-spots on the site. HT 6 is written by two distinctive hands who have no identifiable work elsewhere.

OIL (A 302)

10 20[/ 08 17 / 38 3 [/ 10 54[08 47 (HT 2); 67 10 (HT 8); 07 5 (HT 12); 73 3 / 07 3 / 73 5 / 07 4 (HT 14); 67 2 (HT 18); 10 11 / 38 3+ (HT 21); 24 fraction / 69 fraction / 53 fraction / ? fraction (HT 23); 10 2 / 67 fraction / 73 1 / 6̄9 fraction / 07 1 / 07 3 / 07 10 / 07 5 / 07 3 (HT 28); 59 fraction / 59 fraction (HT 30); 24 fraction / 24 [(HT 32); 35 [/ 59 [(HT 35); 67 8 / 10 [/ ? ? / 67 8 / 10 2[/ ?]2 / 73 2 / 67 [/ ?]fraction / 10 [(HT 42 [+] 59); 67 3 / 10 5[/ 60 5 (HT 44); 67 fraction / 73 [/ 38 fraction / 67 [/ 07 i[(HT 50); 67 20 (HT 56); 10 19 / 73 [/ 38 3 (HT 58); 53 fraction (HT 60); 07 3 / 73 1 (HT 90); 67 fraction / 10 fraction / 73 fraction / 73 fraction (HT 91); 10 4 (HT 96); 10 2+ / 73 3 / 24 fraction (HT 100); 10 8 / 73 8 / 6̄7 2 / 10 / 10 2 / 67 2[(HT 101); 7 (HT 114); 07 5 / 67 1 / 73 6̄ / ? 5 / 73 1 / with a total of 17 units of

A 302 recorded on *verso* (HT 116); 78 07 10 / 4 (HT 121); 67 1+ / 10 [/ 73 1+ / ? 1 (HT 125); 07 1[/ 67 6 / ? [(HT 129); 12+ (HT 131); 73 6[/ 2 (HT 137); fraction (HT 139); 67 1+ / 10 3 / 10 1 / 10 2 / 10 6+ (HT 140).

Summary and Commentary

424+ total units of A 302 are securely recorded at Hagia Triada in 85 entries on 31 tablets. If we assume an ideographic unit of liquid measure equivalent to the Mycenaean (28.8 liters), the total oil on the HT texts amounts to some 12, 211+ liters. A 302 appears with 12 different phonetic ligatures which should designate different types of oil (e.g., on analogy with Linear B records, different grades with different uses or different scents of perfumed oils, etc.)⁶². It is possible that, unlike Linear B, the Linear A ligatures might specify container sizes of the oil being handled in individual entries, but the use of fractions of units following ligatured signs (HT 28; HT 32; HT 42 [+] 59; HT 60 etc.)⁶³ and the sum total on HT 116 which adds up together at least three different ligatured ideograms would tend to argue against such a view. 4 of the ligatured ideograms are unique (07, 08, 38, 60). But again a good illustration of the selective and hazardous nature of discoveries is that 5 of the ligatured ideograms are paralleled on a single tablet from Tyliossos TY 3, a tablet which itself records another 3 unique ligatured versions of A 302. Only two Linear A tablets are known from Tyliossos. TY 3, although fragmentary, records in its 20 entries a total of at least 169+ units of A 302 and might have originally recorded as much as 220+ or even 389+ units, depending on the function of the final partially preserved entry on the *verso* of the tablet.

The largest entries of A 302 on the HT tablets are 54, 47, 20, 19 and 17 on the three tablets HT 2, HT 56, and HT 58. The remaining 79 entries record 10 units or less, 3 (11x), 2 (11x) and 1 (12x) units being most frequent. By contrast the single tablet from Tyliossos contains 5 entries over 10 (51, 22, 21, 15+, 11[) and its total might approach half or all of the total of A 302 listed on the HT tablets. Again the HT oil tablets are spread over known find-locations. HT 8 perhaps from the area of the hanging nodules lists a modest amount (10 units), but HT 2 lists several fairly high quantities. HT 8, we should recall, is linked by scribal hand to two or three of the tablets listing grain that were found elsewhere.

OTHER ITEMS

We should make note of some other ideographic entries which help fill out this picture of the economic interests of the tablet administrators at Hagia Triada. Olives are recorded on eleven tablets (HT 123a totals up 93+ units; HT 58 41[units) and wine on 21 tablets.

PERSONNEL

Human beings – we cannot differentiate the sex of the ideogram – are listed by the plain ideogram AB 100/102 on 18 tablets; qualified by the ligatured sign AB 77 (a ligatured variation that appears on several Khania roundels: Wc 2004, Wc 2029-2032) on another four tablets; and with a ligature of some version of sign A 313 on two other tablets as well as one more on which AB 100/102 + 77 was used. Thus 24 tablets focus on personnel. In many cases the ideogram for human being appears in a brief heading preceded by a word or a single sign. On HT 94 and HT 105 the heading is the sequence of signs AB 77 - AB 03 and the humans are totalled as 110 and 234 (or 235) respectively. On HT 72 AB 100/102 appears with the heading AB 41; on HT 85a in a heading that begins with the phonetic sign AB 08⁶⁴; on HT 58 (a

record of oil and olives) in a heading that begins AB 78. On HT 94 an individual entry that is totalled along with the humans is specified as AB 59. On HT 27a the tablet begins with a listing of AB 100/102 90 and later totals 355 without any intervening ideograms. Below this total are listed bulk quantities of figs (2+ units), wine (2+ units), oil (5+ units) and ideogram A 303 (probably some agricultural commodity: 5+ units). On HT 102.3 AB 100/102 seems to qualify the grain ideogram, just as AB 100/102 + A 313 seems to qualify wine on HT 28a.4. Other tablets list humans in totals of 90 (HT 27a), 107 (HT 93), 66 (HT 85), 68 (HT 119). So people are recorded in sizable numbers and are connected with single signs or headings that involve 3 of the common counter-mark signs and 1 of the rare signs. They are also listed with agricultural products that should represent either their produce or rations allotted to them. The tablets come from various locations. The other end of the scale is represented by HT 7a perhaps from the area of the hanging nodules: below a heading of AB 100/102 preceded by sign-group AB 78 - AB 37, are 7 entries opposite sign-groups in the quantities: 3, 4, 1, 1, 1, 1, 2. Two of the sign-groups begin with AB 01, and one each with AB 59, AB 28, and AB 04. Thus there are two more common and one more rare counter-mark signs that could reasonably be associated with terminology used by the villa and town administration at Hagia Triada to monitor the activities of human beings.

POTTERY

Two very remarkable texts HT 31 and HT 39 record vases by means of identifiable ideograms that are ligatured with phonetic signs that might give the names of the vases. In the present context, they give some sense of scale of production and villa interest: HT 31 lists a tripod (unfortunately the number is broken away), a series of other vessels in quantities of 10 to 30[, and finally 3 varieties of what appear to be simple conical cups (differentiated again by ligatured signs): 400, 300 and 3,000. On HT 39.5, we have listed a total of 100 of a vase form that perhaps is a larnax or 'tub'⁶⁵.

MISCELLANEOUS

Texts like HT 1 are particularly frustrating. It is a complete record, from the general Northwest area of the villa, with five separate large number entries after individual sign-groups: 197, 70, 52, 109, and 105. But we have no understanding of what is being reckoned.

What are the salient points of the above analysis? First, the contents of the tablets do not reveal any division between the villa and the 'Casa del Lebete' in terms of administrative concerns, if we are to judge, as we must, by subjects, scale, and procedures for recording. The tablets refer to considerable quantities of basic agricultural products (classified by a number of different ligatures and adjuncts) with a range of entries from fractional or single units to very large amounts. The overall production which our selected extant texts document is certainly in line with the large figure for grain that appears in context with the site in the later Linear B archives from Knossos. The monitoring of pottery by scribe 31 HT on two tablets is probably our best evidence for special concerns by an administrative official or department, and his texts should be placed somewhere in the neighborhood of magazines 59 and 72. The general appearance of relative homogeneity is further reinforced by the interlinks of scribal hands that cross any hypothetical boundaries between the 'Casa del Lebete' and the villa and perhaps between the area of the hanging nodules, entrance room 26, and the magazines. In fact, tablets HT 6-11 perhaps from the area of the nodules serve collectively as a microcosm of recorded activities from the entire site:

- HT 6: records figs in widely varying amounts (1-66) in at least 15 different entries. Its heading begins with AB 77 - AB 03, the same sign sequence used as a heading for the two lists of large numbers of human beings from the 'Casa del Lebete' (see above). It then has the 'transactional' sign AB 04 (which occurs as a counter-mark on 25 sealings).
- HT 7: as we have noted, lists 13 human beings in 7 entries.
- HT 8: contains two lists (divided at line .2 of the *verso*). On the *recto* it first registers 10 units of a specific type of oil after the heading AB 46 - AB 07. It then possibly proceeds to divide up these ten units in amounts varying from fractions of a unit to 3+ units. The *verso* section likewise begins with a declaration of quantity (5) and then divides this quantity up perhaps among 6 entries.
- HT 9: The *recto* tabulates 31+ units of wine in 7 entries again using the 'transactional' sign AB 04 in its heading (see HT 6). HT 9b is inscrutable, but we can figure out that it lists 7 entries following word-groups and then totals them as 24. The heading reads: AB 77 - A 305. A 305 appears in 9 other texts from Hagia Triada, both villa and town, in an ideographic function. So it would seem here that AB 77 is serving as a 'transactional' sign in its proper place preceding the ideogram which the following text then treats. AB 77 appears 157 times as a counter-mark on the nodules.
- HT 10: neither the *recto* nor the *verso* has ideograms, but they have entries consisting of mostly phonetic sign groups followed by numbers (1 to 16+). The heading is AB 81 - AB 31 - AB 58. The sign A 301 appears alone before a numerical entry (6) either as an ideogram or as a phonetic abbreviation.
- HT 11: has two sections, the second of which on the *verso* records 5 numerical entries totalled as 180 units marked by the the phonetic sign AB 77, perhaps used in some way as a 'transactional' sign or phonetic ideogram (see HT 9).

This collection of texts not only demonstrates that administrators, perhaps in the area of the hanging nodules, had the same range of concerns that they had elsewhere, but it also offers some evidence that three of the counter-mark signs (AB 77, AB 04, and A 301) served in the written texts in isolation as 'transactional' signs or ideograms. The same case could be made for our other counter-signs:

- AB 81: one of our chief counter-signs, appears ideographically on two Hagia Triada texts and begins the word which heads tablet HT 10. Its appearance on the nodules could be derived from its meaning in either of these contexts.
- AB 41: is used as a 'transactional' sign or an ideogram in parallel positions and contexts on HT 30 and 130.
- AB 74: occurs ideographically on HT 16, a tablet which otherwise records entries of cloth and AB 188 + 81.
- AB 28: is found as a 'transaction' sign in headings on HT 43.2 and HT 115a.1. HT 43 is a single-entry record. HT 115 is a long list of moderate to small quantities of grain (from 5 units down to fractions).
- AB 59: apparently functions as a phonetic abbreviation designating a category of human being on HT 94a.
- AB 61: is a rare sign and is used as an ideogram on HT 113.3.
- AB 76: is another rare sign that only occurs 3 time outside of the Hagia Triada corpus of signs (twice on Zakro tablets, once on a vase from magazine 33 from Phaistos). It is attested with disproportionate frequency in the Hagia Triada tablets in the sequence AB 31 - AB 76: 21 times vs. 19 occurrences in other words. On 8 nodules it is found in the sequence AB 28 - AB 76. AB 28 is an independent counter-sign on the nodules and a common phonetic sign as well as a 'transaction' sign in the texts. We might want to interpret the two signs on the nodules as an actual word-group employing a sign especially useful for a local dialect – the fact that AB 76 never appears alone on the nodules being more persuasive than the fact that AB 28 - AB 76 never occurs on any of the tablets⁶⁶.

This last case points us in the direction of two unsealed *noduli* that are inscribed with multiple signs. Wa 1020, apparently a three-sided *nodulus*, has a text on one face that reads A 304 + AB 03 - AB 81 - AB 03. A 304 + AB 03 is an ideogram that appears frequently with the ideogram A 303 in lists. On HT 110, after a heading word, A 303 is followed by the sign group AB 81 - AB 03 which has a small entry (1). It is then followed by the Minoan word for total with its large entry 100[. On a second side of our nodule occurs a Minoan fraction sign. On the third side is a word: AB 46 - AB 59 - AB 06. Thus this *nodulus* replicates the kind of transactional record found in HT 110: identifying word, ideogram and transactional phrase, small quantity.

On the three-sided *nodulus* Wa 1021, the ideogram AB 188 is followed by AB 51. This same sequence recurs in HT 123b.3 (followed by the number 10: the *verso* deals with AB 188 following a *recto* dealing with olives) and on roundel Wc 3020 (which contains on its other face the sequence of agricultural ideograms mentioned above: A 304 + AB 03 - A 303 D). The second side of the *nodulus* again bears a fraction. The third side has a pair of two-sign ligatures without parallel in the texts, taken individually or as a whole, regardless of the order in which the signs are read. Thus the roundel and tablet are parallel in their collocation of agricultural ideogram and the sequence AB 188 - AB 51. The *nodulus* gives two of these three shared elements, omitting, of course, any reference to the general context provided by the other agricultural commodities on the tablet and the roundel.

Thus these two three-sided *noduli* behave much as nodules do in the Mycenaean period, providing important, but tachygraphic information about the transaction in which they were involved. The roundel just discussed is typical, too, of Hagia Triada. Unlike the roundels at Khania, which normally record simply the ideogram of the object being handled⁶⁷, the roundels from Hagia Triada tend to give some fuller information besides or even instead of the mere ideogram. For example, Wc 3001 and Wc 3002 bear a phonetic sequence that recurs on tablet HT 93a.8. We should recall that at least 15 of these fuller phonetic roundels come from the area of the hanging nodules, further revealing the tendencies of the Hagia Triada administrators for fuller, phonetic expression of economic information. The hanging nodules from Hagia Triada, I believe, also fit into this picture. Given the restrictions of space, the scribes resorted to a brief counter-inscription that would designate the kind of transaction involved in the same way that such 'transaction' signs function in the tablets. Unfortunately, given the undeciphered state of the tablets, we cannot tell exactly what was denoted by these important signs. Nonetheless, we should imagine that at least some of them would have been virtual antonyms of one another, as some of the terms and phrases are in the later Mycenaean texts and nodules. This would explain the binary pairs Weingarten discerned in the hanging nodules. I think it also explains the nodules with multiple counter-marks better than the theory that the signs stand for phonetic abbreviations designating storage facilities. What would it mean to place the mark of two storage facilities on a nodule? An object cannot be in two places at one time, and an explanation that these would mark a transference of objects would leave the direction of the transfer ambiguous. For this reason the Mycenaean nodules clearly differentiate location ('at Amarynthos', 'at Karystos', 'in the presence of Thebaios') from destination ('to Thebes'). The association of the counter-marks with transactional vocabulary also explains better why the nodules of 5 of the intensive seal-users have no counter-inscriptions. If it were important to designate location, the failure to do so could be explained as a tacit reference to an acknowledged main location. But I think it more likely to assume that there were transactions, as we see in the later Linear B nodules, that required no specification of their nature, because their fulfilment did not have any special conditions attached which had to be noted. Finally, this would also explain why a seal-user at Khania and a seal-user at Hagia Triada could both impress nodules that are then counter-inscribed with the same signs A 301 and AB 74. This does not arise from administrators at the two sites calling pairs of storerooms by the same names, but from the fact that, as in the later Mycenaean world, the administrations at major sites shared an economic vocabulary that facilitated the handling of economic matters⁶⁸. We should recall, for example, that Khania roundels and Hagia Triada tablets both deal with the same ligatured variation of the ideogram for human being AB 100/102 + AB 77; and I am fairly certain that the Mycenaean term *o-pa* meant *o-pa* whether at Pylos, Knossos, and Thebes. What I am proposing here is that a scribe from Khania could visit Hagia Triada and

pick up some of the hanging nodules that we are puzzling over and say, "Oh these are A 301 and AB 74 transactions," or the Minoan equivalent thereof.

CODA

1. I hope that this analysis might eventually provoke some discussion of the reason why the scribes of the nodules do not overlap with the scribes of the tablets, despite some possible evidence for movement of tablet scribes into the area of the hanging nodules deposit. Is this simply a product of the separate study of the two groups, and that the single signs on nodules do not offer certain enough features for identifying their scribes in turn with tablet scribes? I am not so certain that valid identifications can be made on the basis of these single signs. I am not convinced by the analysis of A 301 in Weingarten 1987, p. 20 fig. 6. There may have been much fewer scribes making the counter-marks. I would not rule out the possibility that some of the sealings were inscribed by tablet scribes.

2. The statistics on the number of seal impressions (e.g., WEINGARTEN, J. 1987, p. 18) would seem to conform readily enough to the idea that this obviously intentional collection of hanging nodules represented a record of activities by the individual seal-users over a single administrative period. AT 125 with 231 counter-inscribed sealings is the most important and active individual. There is, however, a steep fall-off in frequency after AT 19, the fifth most frequent. I think that the statistics would support either view of the counter-inscribed sealings: storeroom designations or transactional vocabulary.

- * For the site of Hagia Triada, I use the numbering scheme and plan of HALBHERR, STEFANI, BANTI 1977. A smaller version of the plan of the villa proper is provided in WATROUS, L.V. 1984, p. 124 ill. 1. For the convenience of non-Aegean scholars, I give dates for different archaeological periods according to the absolute chronology proposed by the authors of the most comprehensive recent treatment of the evidence: WARREN, P., HANKEY, V. 1989, p. 169 Table 3.1. Readers should be aware, however, that there is considerable controversy now surrounding the dates for the late Middle and early Late Bronze Age in Crete and the Aegean. I would like to thank Judith Weingarten and Pietro Militello for suggestions and corrections that have improved this final version.
- 1 For a comparative perspective on the evidence of the Late Bronze Age Mycenaean mainland, see PALAIMA, T.G. 1987. For an overview of Aegean administrative practices, see PALAIMA, T.G. 1990b, pp. 83-99.
 - 2 For sealing practices from the Late Minoan destruction levels at Knossos, see WEINGARTEN, J. 1988, pp. 5-11. For the creation of the Linear B script, see PALAIMA, T.G. 1988b.
 - 3 PALAIMA, T.G. 1987, p. 262.
 - 4 PALAIMA, T.G. 1988b, pp. 336-341, which surveys the earliest evidence for 'palatial' architecture at Mycenaean sites.
 - 5 WEINGARTEN, J. in PALAIMA, T.G. 1990a, p. 56, mentions two other pre-palatial sealings. One can also argue for still unattested evidence on Crete parallel to the sealings from the EH II mainland site of Lerna.
 - 6 PINI, I. 1990, pp. 34-36.
 - 7 PINI, I. 1990, pp. 36-37.
 - 8 In PALAIMA, T.G. 1990a, pp. 55-57.
 - 9 See PALAIMA, T.G. 1990b, p. 85 and the comments of Weingarten and Palaima in PALAIMA, T.G. 1990a, pp. 56-57.
 - 10 Vano 25 at Phaistos: PALAIMA, T.G. 1990b, p. 86.
 - 11 There are, however, two odd exceptions to the general rule that script characters are never carved onto seals: (1) an ivory lentoid seal (CMS V no. 415) from an LH III C (i.e., post-palatial) tomb context (Tomb No. 239) from Medeon in Phokis with three fairly accurate 'imitation' linear signs inscribed, and (2) a black steatite biconvex discoid seal (CMS II, 3 no. 213) from Knossos, which has three linear signs engraved on one side and a boar's head in profile on the other.
 - 12 For example, the sealing from the Hieroglyphic Deposit at Knossos P.71a in EVANS, A. 1909, end plates and text-figure 123 on p. 272.
 - 13 OLIVIER, J.-P. 1990, p. 18.
 - 14 PALAIMA, T.G. 1987, p. 264.
 - 15 J. Weingarten has pointed out to me that record-keeping was not always hierarchical, i.e., that there would be occasions when transactions took place within the same tier and certainly between the two spheres of reckoning (sphragistic and epigraphic).
 - 16 ARAVANTINOS, V. 1990; PITEROS, C., OLIVIER, J.-P., MELENA, J.L. 1990.
 - 17 WEINGARTEN, J. 1988, pp. 10-11, discusses the peculiarities of Knossos sealing evidence.
 - 18 Sealings, their find-spots, and classification: WEINGARTEN, J. 1987 and WEINGARTEN, J. 1986; POPE, M. 1960, pp. 200-210; GODART, L., OLIVIER, J.-P., vol. 2, xx-lv. Tablets, inscribed nodules, roundels and *pithoi*: GODART, L., OLIVIER, J.-P., vols. 1, 2, 4. Find-

- circumstances of tablets: GODART, L., OLIVIER, J.-P., vol. 1, xxi-xxii; WEINGARTEN, J. 1987, p. 24 n. 37; PUGLIESE CARRATELLI, G. 1945, pp. 429-430 fig. 1 and pp. 432-434; HALBHERR, F., STEFANI, E., BANTI, L. 1977, pp. 40 [32], 83-84 [75-76], 134 [126], 168 [160], 258 [250]; RAISON, J., POPE, M. 1980, pp. 33-144.
- 19 GODART, L., OLIVIER, J.-P., vol. 5, pp. 83-104, with remarks in WEINGARTEN, J. 1987, p. 9 n. 11. MILITELLO, P. 1988, pp. 233-261, and MILITELLO, P. 1989, pp. 126-147.
- 20 MILITELLO, P. 1989, p. 145.
- 21 BENNETT, J. 1985, p. 247.
- 22 According to HALBHERR, F., STEFANI, E., BANTI, L. 1977, pp. 84 [76] and 86-87 [78-79], in area 11 (179 sealings in a batch from the northwest angle) and hall 13 = the stanza dei sigilli (more than 450 sealings from the earth fill and a single inscribed sealing from among the two stones of the mouth of the drain in the room), and mainly in the 'noble' northwest area of the villa. However, earlier reports provide different information, most notably, PUGLIESE CARRATELLI, G. 1945 (*supra* n. 18) who places 900 nodules in room 11 and ca. 250-300 in a gypsum chest in an adjoining room, perhaps hall 13. They, like the tablets and roundels from this area, probably fell from above. See WEINGARTEN, J. 1987, p. 23 and n. 33. From Room 26 come 45 *noduli*, i.e., sealings that were never attached to strings, along with a single tablet: PUGLIESE CARRATELLI, G. 1945, p. 434; WEINGARTEN, J. 1987, pp. 6-7.
- 23 The same situation prevails at Zakro, see PALAIMA, T.G. 1987, p. 256 n. 30, and WEINGARTEN, J. 1990a, p. 108.
- 24 WEINGARTEN, J. 1987, pp. 24-31 and n. 37 for a discussion of information about tablet find-spots.
- 25 MILITELLO, P. 1988, pp. 236-239.
- 26 Since the find circumstances reported in the literature are so difficult to reconstruct, I shall report fully here the proposed assignments and the doubts cast on them by the work of Militello. First the traditional assignments: those which are 'doubtful' are marked with an asterisk (*). According to HALBHERR, F., STEFANI, E., BANTI, L. 1977, pp. 40 [32], 83-84 [75-76], 134 [126], 168-173 [160-165], 258 [250], the principal tablet finds come from: *villa* portico 11 (2 tablets* and 4 fragments* along with 15 roundels in a stratum with decorated wall plaster), room 26 (on the threshold to light-well 9 in the same general area as 45 *noduli* from the door to the court to the east), magazine 59 (an unspecified number of tablets, a sealing and a roundel from and among two *pithoi* standing to the east of stairway 60) and magazine 72 (an unspecified number of tablets along with *pithoi* and special forms of vases: censers, braziers, large amphora, a disk-shaped vase of uncertain use, etc.); and the *Casa del Lebete* (in magazine 7 on the threshold of the door to room E and probably originally contained on a shelf or in a storage box) considerably northeast of the main villa. These last are associated by Raison and Pope 1980, pp. 79-98, with tablets HT 85-113 and 154 A. HT 113 ter, 114, 125-127, 135-147, are assigned generally to the town. HT 115-123*, 128-131*, 154* are assigned to a location described by Karo in *Archäologischer Anzeiger* 1913 as a plaster-lined quadrangular chamber, perhaps a 'kasella', of one of the houses south of the Casa del Lebete*. The fragmentary tablets HT 154 B-N are of unknown provenience. Doubts are raised about exact find-spots by such joins as HT 23 + 150 and HT 70 + 151, the first fragments of which were supposed to come from the villa, the second from the town. In total, 77 tablets are assigned to the villa, while 29 are assigned to the Casa del Lebete, 14 to the 'kasella*', and 15 generally to the town*.
- MILITELLO, P. 1988 discusses carefully the evidence for attributing tablets to find-spots. MILITELLO, P. 1989 uses this information in examining scribal identifications. It is not germane in either article to provide a definitive concordance or index for the provenience of tablets. Until this appears, it is necessary to do a lot of cross-checking, often with unsatisfying or uncertain results. Fortunately in Rome in October 1991, Pietro talked to me about his important work. From our discussion and from his published work, I can report here that the main important corrections and confirmations are as follows: Tablets HT 1-5 and roundels Wc 3001-3005 come from the general area of Rooms 4-49-12 and 47-48, probably fallen from above. A concentration of sealings occurs in Room 13. There are various unidentified tablet fragments and sealings from Portico 11 and generally distributed between Portico 11 and Room 13 – thus the doubts about Weingarten's six specific tablets HT 6-11 coming from Portico 11. The finds in Room 27 and Corridor 9 in the Southwest Quarter and in Rooms 59 (West Magazines) and 72 (Eastern Quarter) are confirmed. From the 'Casa del Lebete' come two deposits of tablets: one on the threshold of the door in Room 7, the other from Magazine 9. No other tablet find-spots are reported. Despite confusion in the numerical cataloguing in the Herakleion Museum, the tablets from the villa are most likely HT 1-84; from the 'Casa del Lebete' HT 85-154: MILITELLO, P. 1988, p. 246 n. 43. The tablets from Room 59 and the 'Casa del Lebete' could be earlier than the rest of those from the villa, but there is an overall appearance of palaeographical and 'archival' homogeneity: MILITELLO, P. 1988, p. 245.
- 27 WEINGARTEN, J. 1990, p. 108.
- 28 POPE, M. 1960, p. 203; WEINGARTEN, J. 1987, p. 1 and n. 2.
- 29 WEINGARTEN, J. 1986, p. 282, fig. 1 with percentage breakdown for Zakro, Hagia Triada, and Khania. Zakro is extremely low in hanging nodules (types VII-IX: 0.6%); Khania is also low (22.1 % all of type VII).
- 30 WEINGARTEN, J. 1988, 12, with a comparison of the situation of House A to that of the House of the Shields at Mycenae which contains the only Linear B tablet that explicitly refers to extra-regional trade. However, study of the find-context of the Zakro nodules indicates that the building was also involved in local agricultural concerns. The nodules were found at the entrance to a storage room close together with agricultural implements and a single Linear A tablet that records grain and figs in quantities that would sustain 200 working women for a month. See PALAIMA, T.G. 1990b, pp. 95-96. I should say here that I think that, judging from the find circumstances and the distribution of tablets from the houses outside the walls at Mycenae, there is a chance the tablet (X 508) from the inner face of the southern wall of the West Room of the House of the Shields might in fact have fallen into it from the House of the Oil Merchant wherein Rooms 1 and 2 contained 1 and 37 tablets respectively, the latter group definitely fallen from an upper story. Whether this is also true of Fo 101 found behind a *pithos* in Room 1 is unreported. The 29 Oe tablets from the House of the Oil Merchant Room 2 all deal with wool and therefore provide a much more suitable context for the wool cloth recorded on X 508 than do the ivory fragments and stone vases of the House of the Shields. In addition the whole area where X 508 was found and south toward and into the House of the Oil Merchant was disturbed by later building until Hellenistic times and even by modern touristic foot traffic. Thus tablet X 508 could have fallen into the West Room of the House of the Shields from the upper story of the contiguous House of the Oil Merchant. For detailed information about find circumstances, see BENNETT, JR. E. L. 1958, pp. 4-18.
- 31 WEINGARTEN, J. 1987, pp. 5-6, fig. 1, tables B and C.

- 32 WEINGARTEN, J. 1987, pp. 6-16. AT 118, AT 106, AT 67, AT 12 and AT 33 are elite-members without counter-inscriptions, as deduced from WEINGARTEN, J. 1987, tables C and E (correcting the second AT 19 to AT 99 on table E) and summarized in table I.
- 33 For find-spots see supra n. 26 and WEINGARTEN, J. 1987, pp. 6-7. Pope 1960, p. 201, bases his assumption that the tablet is HT 12 on the report of Paribeni in 1903 that 11 tablets were found in the north-west portico, and 1 tablet with 45 nodules in room 26. This identification is not made by RAISON, L., POPE, M. 1980, nor by MILITELLO, P. 1989, p. 136. In MILITELLO, P. 1988, p. 235, we learn that the tablet in question was found on the threshold of vestibule 26 in fragmentary condition and not otherwise well identified.
- 34 MILITELLO, P. 1988, pp. 239-241. HT 27 is attributed to this scribe by RAISON, L., POPE, M. 1971. See MILITELLO, P. 1989, *passim*, for these earlier identifications.
- 35 In WEINGARTEN, J. 1987, p. 15, states: "Twelve Linear A signs occur on nodules at Ayia Triada." Of course, she means *as single signs*. A thirteenth sign (AB 76) and a fraction occur in two-sign combinations on nodules as what GODART, L., OLIVIER, J.-P., vol. 2, pp. 4-7, considers 'inscriptions', because they occur on the same face. Weingarten's analysis of the sealings shows that these are probably not to be taken as phonetic word-units but as independent phonetic counter-signs juxtaposed.
- 36 Using the numeration of signs according to the charts and concordances in GODART, L., OLIVIER, J.-P., vol. 5, xxii-lii, 114-125. Phonetic values in parentheses are simply Linear B mnemonics for my own and the reader's convenient reference and do not stand for proposed values for the Linear A signs.
- 37 WEINGARTEN, J. 1987, pp. 15-21. We should note, however, that only one combination from among the most frequent signs occurs: AB 41 and AB 77 (7 times among two different seal-users). Still other signs occur in the few longer nodule inscriptions (Wa 1019-<1021> *bis*).
- 38 ARAVANTINOS, V., 1990; PITEROS, C., OLIVIER, J.-P., MELENA, J.L. 1990.
- 39 See additional discussion in PALAIMA, T.G. 1987, pp. 259-264.
- 40 We might at least suppose that the three rarely occurring signs conveyed a different message from the other nine.
- 41 WEINGARTEN, J. 1987, pp. 7-15, 20.
- 42 DRIESSEN, J. 1989. Weingarten's analysis was based not on clustering by palaeographical similarity, but on differentiating by differences in sign shapes that seemed to her significant. My caution stands, because in many cases the differences do not strike me as ones that could not be produced by other factors, such as the difficulty and awkwardness of writing on such small surfaces and the repetitive process of counter-inscribing a set repertory of single signs. Both these factors produce variation in the sign shapes of identifiable Mycenaean scribes. On this whole process of identifying scribally significant sign variations, see PALAIMA, T.G. 1988a, pp. 20-27.
- 43 WEINGARTEN, J. 1987, pp. 14-15, 21.
- 44 E.g., the House of the Sphinxes at Mycenae has 7 sealings listing types of pottery and one tablet relating to these, but nine more dealing with spices, persons and two non-vase ideograms.
- 45 WEINGARTEN, J. 1987, p. 33.
- 46 WEINGARTEN, J. 1987, pp. 25-34.
- 47 WEINGARTEN, J. 1987, p. 2; WEINGARTEN, J. 1988, pp. 12-13; OLIVIER, J.-P. 1986, pp. 230-234.
- 48 WEINGARTEN, J. 1988, p. 14.
- 49 PALAIMA, T.G. 1990b, pp. 98-99.
- 50 Most of the tablets and sealings from these sites deal with allocations of small amounts of foodstuffs and raw or finished materials and products, inventories and lists of personnel.
- 51 See BENNETT, J. 1958; CHADWICK, J. 1963, *passim*.
- 52 There are good amounts of imported products in these houses, from faience and ivory to Near Eastern spices. In papers at the PASP mini-conference *Thalassa*TM II, held in Austin on September 23, 1991, E. Cline proposed that there was a directional trade relationship between Mycenae and Egypt, while N. Hirschfeld thinks that the evidence of Cypro-Minoan marked pottery might support a theory that Tiryns conducted directional trade with Cyprus. See CLINE, E. 1990-91 and HIRSCHFELD, N. forthcoming.
- 53 CARINCI 1989, pp. 79-80; and MILITELLO, P. 1988, pp. 260-261 and nn. 99-100.
- 54 MELENA, J. 1975, pp. 107-110.
- 55 Squared brackets [and] indicate a break in a tablet and therefore that an entry or part of an entry is missing.
- 56 VENTRIS, M., CHADWICK, J. 1973, p. 57, using parallels from Alalakh.
- 57 I do not even include instances such as HT 93a.3-7 or HT 95a where the structure of the texts strongly suggests that all entries following the ideogram AB 120 refer to this ideogram, or HT 36 where the entry on lines .2-.3 might also refer to 7 A118 (talents) of AB 120 modified by 78.
- 58 See BENNETT, J. 1985, p. 237 and n. 18.
- 59 John Bennet pointed out this possibility to me in a telephone conversation (5-23-91).
- 60 For example, in the PY Na flax series, taxation and exemption are often treated on the same texts.
- 61 MILITELLO, P. 1989, pp. 128-129.
- 62 That A 302 represents olive oil is supported not only by the interpretation of versions of the ideographic sign (Linear B *130) that develops from it in the Linear B records, but by TY 3 where out of 20 entries the only one which does not contain a version of A 302 lists AB 122 = olive. We can also cite the frequent phonetic – as opposed to fractional – ligaturing of A 302, which is a feature of the Linear B sign for oil, but not of the other possible Linear B sign with which A 302 might be identified: *121 (BARLEY or now, according to Ruth Palmer, WHEAT). Sign *121 is never ligatured and always is composed of two strokes, not three or four as is standard with A 302. The only fly in the ointment of this identification is the lightly scratched graffito on a Minoan *pithos* from the 10th West Magazine at Knossos (KN Zb 35) which, after a sequence of phonetic signs, lists: A 302 100 FIGS 2. Although it might be tempting to assume that this makes reference to two commodities stored together in the *pithos* and, therefore, to posit that A 302 must refer to a dry commodity, I think that this line of reasoning must ultimately be rejected. First, the tremendous disproportion between the two numerical entries 100 of A 302 and 2 of FIGS, makes it unlikely that the light graffito refers to a permanent, or even temporary, storage arrangement in this particular storage *pithos*. Second, the estimated capacities for Bronze Age storage *pithoi* (judging from those in the Wine Magazine at Pylos) range between approximately 72 and 292 liters. If the Minoan maximum units of dry and liquid measure are close to the Mycenaean – a

reasonable hypothesis given the numerous fractional subdivisions of dry and liquid commodities recorded in the Linear A inscriptions, the 100 units of A 302 listed here would fill about 10 (liquid) and 33 (dry) of the largest-sized *pithos* of ca. 190 liters. We should note that other Minoan vase inscriptions refer either to WINE or to FIGS with a maximum of 32 units of WINE on ZA Zb 3 from Zakro. This last was found in storeroom Theta of the farm house at Upper Zakro in a context with 5 other *pithoi*. If the Minoan maximum liquid unit approximates the standard Mycenaean (ca. 28.8 liters), the quantity of wine listed on Zakros ZA Zb 3 (921.6 liters) would fill 6 *pithoi* of moderate size (153.6 liters), i.e., the inscription refers to the storage capacity of all 6 *pithoi* in storeroom Theta. This evidence suggests that the *pithos* inscriptions have to do with the contents of more than a single *pithos*. To conclude then, there is no compelling reason to assume that inscription KN Zb 35 refers to OIL and FIGS stored together in a single container. There is certainly no need, on the basis of this single inscription, to overturn the other compelling evidence – palaeographical, textual, and metrical – for the identification of A 302 as OIL.

- 63 At Hagia Triada, 11 different fractional signs are used in connection with versions of A 302: A 701 (4x with 10, 67, and 73); A 702 (1x with ?); A 703 (2x with 67, 59); A 704 (1x with 67); A 706 (4x with 10, 24, 53, 69); A 707 (6x with A 302, 10, 38, 67, 73); A 708 (1x with 53); A 7092 (1x with 69); A 717 (1x with 59); A 732 (3x with ?, 24, 38); A 738 (1x with 24). Nearly 30% of the entries (25 of 85) contain fractions. This suggests that oil was carefully measured, perhaps because of the value of the specially manufactured varieties. But AB 120 (grain) is listed on 31% of its entries (23 of 74) in association with 11 different fractional quantities, either as adjuncts or ligatures to the ideogram proper (6 different fractional quantities: A 701, A 702, A 705, A 709², A 709² bis, A 740) or, as with A 302, in the numerical entry (6 different fractional quantities: A 704, A 705, A 707, A 730, A 731, A 732). 6 of the fractional quantities are in used with both ideograms.
- 64 See also the ligatured combination of AB 08 that designates entries of humans on HT 94 and HT 100.
- 65 It is ligatured with sign AB 08. If that sign has the value *a*, one thinks of *a-sa-mi-to* = *asaminthos* the pre-Greek word for ‘tub’ found on Knossos sealing Ws 8497. The form of the ‘tub’ on the Knossos sealing is much closer to that on the Hagia Triada tablet than it is to the version from Pylos, where three tubs, specified by their Greek name, are listed on tablet Tn 996 from storeroom 20.
- 66 AB 31 appears as a ‘transaction’ sign or ideogram in HT 97b and HT 27b, so one could advance a theory that AB 31 - AB 76 on the tablets is functioning as a constant ‘pair’ of transaction signs, but that is harder to support. The sequence is found on many texts heading sections of mixed commodities.
- 67 HALLAGER, E. 1990; GODART, L., OLIVIER, J.-P., vol. 3, pp. 114-146.
- 68 The idea that this shared vocabulary could be made up of about a dozen terms that were handy in defining all the daily transactions that took place at sites of this kind is in no way extraordinary.

ABBREVIATIONS

CMS = *Corpus der minoischen und mykenischen Siegel*, Berlin 1964-.

PALAIMA, T.G. (ed.), 1990a = PALAIMA, T.G. (ed.), *Aegean Seals, Sealings and Administration*, in “Aegaeum 5”, Liège 1990.

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