

# TEXTS, TABLETS AND SCRIBES

STUDIES IN MYCENAEAN EPIGRAPHY  
AND ECONOMY

OFFERED TO  
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## THE DEVELOPMENT OF THE MYCENAEAN WRITING SYSTEM

ἐγὼ δέ, ὥσπερ οὖν οὐκ οἶδα, οὐδὲ οἶμαι  
Plato, *Apology* 21D<sup>1</sup>

Glyn Daniel has made the following observation about the study of prehistory:

Prehistory is part of human history and, therefore, suffers from all the problems inherent in historical method —the difficulty of evaluating evidence, the inability of writing without some form of bias, and the constantly changing picture of history according to the changing ways and ideas and preconceptions of historians.<sup>2</sup>

We might mention the problem of changing evidence as well. Of course, Daniel is referring to archaeology that is both prehistoric *and*

<sup>1</sup> This paper is dedicated to the ELB who is interested in the Minoan-Mycenaean inscriptions as physical objects and as abstract puzzles, who has established many of the working principles for textual transcription and palaeographical study of the linear scripts, who continues to use those principles himself with exacting care, and who can appreciate an end result that is very different from an initial design. Preliminary versions of this paper were presented at the Mycenaean Seminar of the University of London Institute of Classical Studies, the Aegean Bronze Age Colloquium of the New York University Institute of Fine Arts, and the Centrum voor Mykeense en Archaisch-Griekse Cultuur of the Vrije Universiteit Brussel. I would like to thank Ellen Davis, James Hooker, Jean-Pierre Olivier, Frieda Vandenabeele, and Malcolm Wiener for making it possible to test my ideas in such helpfully critical scholarly forums. Anna Morpurgo Davies provided a valuable reference. I thank Barry Powell for permission to cite his unpublished work on the early stages of the Greek alphabet. I especially thank Jean-Pierre Olivier, Frieda Vandenabeele, John Bennet and Malcolm Wiener for several references to recent articles and for comments on the actual ms. that improved this final version in caution and accuracy. Remaining shortcomings are solely mine.

<sup>2</sup> G. Daniel, *The Idea of Prehistory* (Cleveland 1963) 156.

*preliterate*;<sup>3</sup> and, in order to distinguish *fact* from *theory*, he refers specifically to attempts to reconstruct the non-material aspects of preliterate and prehistoric societies:

When prehistorians speak of ideas and ideals of men before writing, they are making guesses —intelligent guesses by people best qualified to make them, but nevertheless guesses.<sup>4</sup>

Yet even working with literate prehistory, as we are in the late Mycenaean and to some extent the middle and late Minoan periods, "ideas and ideals," systems of thought and systems that depend on thought, the intellectual and spiritual components of religious belief, of human creativity, of changes in material culture, all remain elusive subjects that reduce prehistorians to educated guesswork and the educated guesses known as theories.

John Chadwick has emphasized this point in a recent paper in which he discusses textual and archaeological approaches to the study of Mycenaean religion, "What Do We Know About Mycenaean Religion?"<sup>5</sup> His implicit answer to the question he poses seems to be

<sup>3</sup> On the distinction between *literate* and *preliterate* prehistory and the different approaches that must be devised for interpreting textual and/or archaeological data for these two categories of prehistory, see J. N. Postgate, "Cuneiform Catalysis: The First Information Revolution," *ArchRevCam* 3:2 (1984) 4-18.

<sup>4</sup> Daniel (*supra* n. 2) 158. The same suggestion was made earlier by C. Hawkes, "Archeological Theory and Method: Some Suggestions from the Old World," *American Anthropologist* 56 (1954) 161-162. I am not trying here to adopt a rhetorical posture of the plain-spoken possessor of common sense who can see clearly what is obscured by complicated theoretical interpretation and jargon. I do think, however, that, despite recent epistemological treatments of interpretative methods in prehistoric archaeology (e.g., L. R. Binford, *In Pursuit of the Past* [London 1983] and C. Renfrew, *Towards an Archaeology of Mind* [Cambridge 1983]), one has simply refined the categories of knowledge to be subsumed under "fact" and "theory" and therefore that "fact" and "theory" (taken in the old sense) remain valid distinctions.

<sup>5</sup> *Linear B*, 191-202. S. Guettel Cole, "Archaeology and Religion," in N. C. Wilkie and W. D. E. Coulson eds., *Contributions to Aegean Archaeology: Studies in Honor of William A. McDonald* (Minneapolis 1985) 49-59, offers additional examples of the difficulty of reaching any secure understanding of various aspects of Minoan-Mycenaean religion from the archaeological and the textual evidence. C. Renfrew, *The Archaeology of Cult (BSA Suppl.* 18, London 1985) 1-4, speaking directly to the problem of identifying and interpreting a cult center, the LH III A 2 to LH III C sanctuary at Phylakopi, rightly stresses the need to steer interpretation between the two extremes of outright skepticism and "excursus far beyond the limits of valid archaeological inference." As this paper illustrates, the

"nothing with certainty." We need not go so far in response to the far less formidable question: "What do we know about the origin and use of the Linear B script?" Yet a survey of the pertinent scholarship and the data that it interprets has convinced me that there are some grounds for a similar healthy skepticism, some room for criticism and suggestions as to how to adjust the prevailing educated guesswork in order better to mark uncertainty and to reveal the structural weaknesses of the supports that prop up various aspects of recent theories. Mycenaean writing is a system that depended on thought for its creation and use. The actual circumstances surrounding its creation will probably always remain squarely in the realm of theory as defined by Chadwick and Daniel. Such is the case with the origin of the archaic Uruk script and the Greek alphabet. Recent researchers in these two areas have even gone so far as to invent hypothetical figures called "*literatus Sumericus Urukeus*" and "the adapter" in discussing single creators of these two writing systems and the possible ways in which they brought their creations into being.<sup>6</sup> I use these particular scripts as examples because theories about their origins and about the ways they were used parallel those concerning the Mycenaean Greek script. Similar cultural, material and economic factors are involved in dealing with all three scripts; similar approaches have been used to understand why and how they came into being and how they were employed.<sup>7</sup> The data pertinent to the origin and development of Linear B are fuller than

same point applies to the study of Aegean scripts and, in fact, to most areas of Aegean archaeology, since we have reached the point where the questions facing Aegean prehistorians require a comprehensive treatment of widely varying types of specialized data in order to arrive at tenable hypothetical answers.

- <sup>6</sup> M. A. Powell, "Three Problems in the History of Cuneiform Writing: Origins, Direction of Script, Literacy," *Visible Language* 15:4 (1981) 422. B.B. Powell, "Adventures in the Greek Alphabet I: The Origin of the Missing Supplementals Φ X Ψ," *TAPA* (forthcoming) following B. Einarson, "Notes on the Development of the Greek Alphabet," *CP* 62 (1967) 1-24.
- <sup>7</sup> For the Greek alphabet, see A. Heubeck, *Schrift (Archaeologia Homerica III, X*, Göttingen 1979) 75-87. For the archaic Uruk script, see M. W. Green, "The Construction and Implementation of the Cuneiform Writing System," *Visible Language* 15:4 (1981) 345-372, and M. A. Powell (*supra* n. 6) 419-424.

the Uruk, more incomplete than the archaic Greek, sufficiently uneven and lacunose to warrant the discussion that follows.<sup>8</sup>

Let us then address the question: "What do we know about the origin and use of the Linear B script?" There is enough firm ground: we have hard inscriptional evidence and a fairly well-defined archaeological and chronological framework. The general outline is clear. The main scholars on this subject (James Hooker, Alfred Heubeck, Jean-Pierre Olivier, Louis Godart, Anna Sacconi, Jacques Raison, Maurice Pope, Emmett L. Bennett, Jr., Sterling Dow, Michael Ventris and John Chadwick, and, to cite the fixed alpha and current omega, Sir Arthur Evans and Yves Duhoux)<sup>9</sup> have agreed that we are dealing with a genetic process. Mycenaean Greek Linear B is a transformation of an earlier script, most likely—in my opinion, *certainly*—Minoan "x-language" Linear A. The Mycenaean script altered, to a greater or lesser extent, the phonetic, ideographic and

<sup>8</sup> The Uruk texts suffer from uncertain chronology and from considerable debate about the nature and longevity of any systems of written communication or accounting that may have preceded them. See S. J. Lieberman, "Of Clay Pebbles, Hollow Clay Balls, and Writing: A Sumerian View," *AJA* 84 (1980) 339-358, and the brief rebuttal by M. A. Powell (supra n. 6) 423-424; Green (supra n. 7) 346. Similar uncertainty prevails in regard to the date of origin and source for the Greek alphabet despite the fact that it and the candidates among Canaanite scripts to be its precursor have longer continuous chronological sequences than the Uruk or the Minoan-Mycenaean scripts. In many instances, the Canaanite scripts and the archaic Greek alphabets offer less documentation for the individual stages of development or regional variation. See, besides Heubeck (supra n. 7), A. R. Millard, "The Canaanite Linear Alphabet and Its Passage to the Greeks," *Kadmos* 15 (1976) 130-144, and A. Johnston, "The Extent and Use of Literacy; the Archaeological Evidence," in R. Hägg ed., *The Greek Renaissance of the Eighth Century B.C.: Tradition and Innovation* (Stockholm 1983) 63-68.

<sup>9</sup> J. T. Hooker, *The Origin of the Linear B Script* (*Minos Supplement* 8, Salamanca 1979) [hereafter *Origin*]; *Linear B An Introduction* (Bristol 1980) 1-79. A. Heubeck (supra n. 7) 1-54; "L'origine della lineare B," *SMEA* 23 (1982) 195-207. J.-P. Olivier, "L'origine de l'écriture linéaire B," *SMEA* 20 (1979) 43-52. L. Godart, "La scrittura lineare A," *PdP* 31 (1976) 30-47; "Le linéaire A et son environnement," *SMEA* 20 (1979) 27-42. A. Sacconi, "La scrittura lineare B," *PdP* 31 (1976) 48-65. J. Raison and M. Pope, "Linear A: Changing Perspectives," in Y. Duhoux ed., *Études Minoennes I* (*BCILL* 14, Louvain 1978) 5-64. M. Pope, "The Date of Linear B," *Kretika Chronika* 15-16 (1961-62) 310-319 [hereafter "Date"]; *Aegean Writing and Linear A* (*SIMA* 8, Göteborg 1964). E. L. Bennett, Jr., "Fractional Quantities in Minoan Bookkeeping," *AJA* 54 (1950) 204-222. S. Dow, "Minoan Writing," *AJA* 58 (1954) 108-129; "Literacy in Minoan and Mycenaean Lands," *CAH* II, 1, 582-608. M. Ventris and J. Chadwick, *Documents*, 31-42, 387-389. A. J. Evans, *SM* I, 8-61, 111-148; *PofM* IV (Oxford 1935) 666-758. Y. Duhoux, "Mycénien et écriture grecque," *Linear B*, 7-74.

metrical-numerical repertoires of its Minoan precursor.<sup>10</sup> The texts which survive in the two scripts are different enough in types and the body of data is sufficiently large on the Mycenaean side, adequately representative on the Minoan, to support a view of more restricted applications of writing in the late Mycenaean period.<sup>11</sup> It would be astounding to find Linear B inscribed roundels, many new Mycenaean nodule shapes matching the rich variety of their Minoan counterparts, or Linear B inscribed religious, dedicatory or decorative artefacts in the LH III B period.<sup>12</sup> The securely dated Linear A inscriptions range chronologically MM II-LM IB, with one possible LM II jar inscription from the Unexplored Mansion; the securely dated Linear B material is restricted to LH III B 1-2.<sup>13</sup> Duhoux is correct in leaving the Knossos texts aside in dealing with matters relating to chronology; for, as Hiller has observed, "Das Knossosproblem...ist letztlich ein stratigraphisches und somit ein primär archäologisches."<sup>14</sup>

It is when we try to move beyond these established points that educated guesswork must take over. Linear A stops in 1450 B.C.; Linear B is securely dated to 1250 at the earliest. Is it possible to date the origin of Linear B? Setting aside theories that stemmed from the

<sup>10</sup> See below pp. 320-329.

<sup>11</sup> On such differences, see T. G. Palaima, "Comments on Mycenaean Literacy," *Studies Chadwick*, 499-510, with bibliography. On the nature of the restricted Mycenaean literacy, a brief, plain-spoken treatment is furnished by Dow (supra n. 9) *CAH* II, 1, 604-605.

<sup>12</sup> These are the principal differences in types of documents between Linear A and Linear B. For a synopsis, see J.-P. Olivier, "Cretan Writing in the Second Millennium B.C.," *World Archaeology* 17:3 (1986) 383-387. Excavation seems to have been thorough enough in appropriate contexts so that, for example, the absence of roundels from locations that have yielded Linear B tablets and nodules is meaningful and not due to the hazards of excavation. J. Weingarten, "The Sealing Structures of Minoan Crete: MM II Phaistos to the Destruction of the Palace of Knossos," *Oxford Journal of Archaeology* 5:3 (1986) 282, provides a convenient chart of the many different shapes of Minoan nodules, most of which are unparalleled in the Linear B period.

<sup>13</sup> LINEAR A: F. Vandenabeele, "La chronologie des documents en linéaire A," *BCH* 109 (1985) 3-20, with bibliography; *GORILA* 5, 82-113. LINEAR B: Heubeck (supra n. 7) 26-32, with bibliography. For the jar from the Unexplored Mansion, see M. R. Popham, M. Pope and J. Raison, "An Inscribed Pithoid Jar from Knossos," *Kadmos* 15 (1976) 102-107, especially 104-107, for archaeological and epigraphical aspects of the dating question. The discussion of this jar offers a good illustration of the need to rely on only the most firmly dated materials when considering the question of palaeographical and/or structural development in Linear A and Linear B.

<sup>14</sup> Duhoux (supra n. 9) 9-10. S. Hiller, "Mykenische Archäologie," *SMEA* 20 (1979) 190-191.

old LM II dating of the Knossos texts, prevailing opinion seems to say we can: to one or another single point during the period MM III-early LM I<sup>15</sup> or more gradually in a series of stages from the period of the earliest Shaft Graves at Mycenae into LH III A 1.<sup>16</sup> Heubeck and Sacconi among recent writers opt for a later date: LM II-III A, although their views are determined largely by the Hood-Popham LM III A 1-early III A 2 date for the destruction of Knossos.<sup>17</sup> I myself have

<sup>15</sup> Godart (supra n. 9) *SMEA* 20 (1979) 34-35; Olivier (supra n. 9) 45; Pope, "Date" (supra n. 9) 318-319.

<sup>16</sup> Hooker, *Origin* (supra n. 9) 41-53; Duhoux (supra n. 9) 26-34.

<sup>17</sup> Heubeck (supra n. 9) 202-203; Sacconi (supra n. 9) 65. M. R. Popham, *The Destruction of the Palace at Knossos: Pottery of the Late Minoan IIIA Period* (*SIMA* 12, Göteborg 1970) 79-84, concludes from the ceramic evidence that the final destruction at Knossos took place very early in LM III A 2 (1400-1375 B.C.). For a critical expose of Palmer's attempts to reinterpret the stratigraphical and ceramic evidence, see M. R. Popham, "'Snakes and Ladders' at Knossos: The Shifting Late Minoan Stratigraphy," *Kadmos* 13 (1974) 117-123. This destruction date is now generally accepted, although disciples of Palmer's hysterochronological school dispute whether the Linear B tablets and associated Mycenaean administration are to be assigned to this "earlier" destruction. A clear statement of this point of view, which takes into account most of the archaeological, and even some epigraphical, dominoes, is offered by E. Hallager, "The History of the Palace at Knossos in the Late Minoan Period," *SMEA* 19 (1978) 17-33. For further bibliography concerning the Knossos dating controversy and the Hood-Popham dating, see Heubeck (supra n. 7) 28-30, nn. 232-233, and E. Hallager, *The Mycenaean Palace at Knossos* (Stockholm 1977). W.-D. Niemeier, "Mycenaean Knossos and the Age of Linear B," *SMEA* 23 (1982) 219-287, attempts a comprehensive survey of all facets of the dating controversy in arguing for an LM III B date for the tablets. This is an expansion of the convenient analysis in Niemeier, "The Character of the Knossian Palace Society in the Second Half of the Fifteenth Century B.C.: Mycenaean or Minoan?" in O. Krzyszkowska and L. Nixon eds., *Minoan Society Proceedings of the Cambridge Colloquium 1981* (Bristol 1983) 217-236, which provides a clear chart of various chronologies on p. 221. From an epigraphical and palaeographical perspective, there are some problems with Niemeier's thesis. I have argued against his interpretation of the inscribed stirrup jar evidence in "Inscribed Stirrup Jars and Regionalism in Linear B Crete," *SMEA* 25 (1984) 189-203. See now also H. W. Haskell, "Were LM III B Inscribed Stirrup Jars Palatial?" *Kadmos* 25 (1986) 85-86, with additional arguments and bibliography. Otherwise Niemeier (p. 272) cites the single sign on the *imported* bronze cauldron from Shaft Grave IV as proof that "Linear A seems to have been in use on the mainland about 1500 B.C." Neither *CTLA* nor *GORILA* classifies this mark as a Linear A inscription, nor do any of the mainland marks or "inscriptions" of this period prove that Linear A was in active use on the mainland (infra n. 99). In the same context (pp. 272-273), Niemeier uses Hooker's theory of a necessarily long development for Linear B, which I intend to demonstrate in this paper is untenable, in support of a late date for the Knossos texts. However, in so doing, he totally disregards Hooker's arguments, which depend on an assumed palaeographical starting point in MM III

suggested LM I B-LH II, without thoroughly considering the implications of such a proposed date.<sup>18</sup>

Where was the script created? Among some Mycenaeans installed at Knossos at the turn of MM III/LM I;<sup>19</sup> among Minoan scribes in Minoan colonies in the 16th c. Argolid;<sup>20</sup> at LH II Mycenae after various stages of contact with Linear A including apprenticeship of Mycenaeans to Linear-A-writing Minoan scribes at Mycenae;<sup>21</sup> at Knossos during the post-LM I B Mycenaean takeover;<sup>22</sup> at multiple sites on the Greek mainland according to the apprenticeship principle;<sup>23</sup> and even partly on

and an active interplay between Minoan and Mycenaean writing in the periods LM I and II. It is illogical to make use of conclusions, while rejecting the arguments on which they were based. In fact Niemeier himself elsewhere (*Minoan Society*, 226) implicitly disagrees with these arguments by maintaining that the essential starting data for the Hooker-Pope view of the chronological development of Linear A, the painted cups from the Area of the Monolithic Pillars at Knossos, ought not to be dated MM III A, but LM II! Most problematical in my view, however, is the fact that, if the Linear B tablets are assigned to LM III B, we are faced with a total absence of administrative documents of any kind associated with the major destruction in early LM III A 2. Even if the Linear A pithoid jar from the Unexplored Mansion were manufactured and inscribed in LM II, as Hallager and Niemeier suggest (*Minoan Society*, 226 and n. 96, and *supra* n. 13), such an isolated non-administrative document hardly removes this large *lacuna* nor does it remove the obligation to explain how *the* major palace center in early Mycenaean Crete could have been destroyed by severe fire without producing any clay administrative texts. It is also interesting to note an inconsistency of argumentation along archaeological lines: the possibility that this pithoid jar from the Unexplored Mansion, which constitutes the only possible evidence for Linear A post-LM I B, could have been manufactured and inscribed perhaps *no more than 50 years earlier* in the preceding LM I B period is dismissed (despite the views of Popham [*supra* n. 13] that this is an undismissable possibility given the construction and occupation history of the Unexplored Mansion, the associated context pottery, which includes LM I material, and the fact that the pithoid jar itself cannot be dated stylistically), while "[m]ost of the pithoi in the West Magazines" are interpreted as surviving *some 250 years* from LM I B until late LM III B, since in both the LM III B magazine from the South Propylaeum and the 'Stoa' at Hagia Triada "pithoi of the type usual at the beginning of the Late Bronze Age were found together with those of LM III B" (*Minoan Society*, 220 and 226).

<sup>18</sup> T. G. Palaima, "Linear A in the Cyclades: The Trade and Travel of a Script," *TUAS* 7 (1982) 18.

<sup>19</sup> Olivier (*supra* n. 9) 45-48.

<sup>20</sup> Godart (*supra* n. 15).

<sup>21</sup> Duhoux (*supra* n. 9) 32-34. Cf. J. Chadwick, "Who Were the Dorians?" *PdP* 31 (1976) 106-107.

<sup>22</sup> Heubeck (*supra* n. 9) 202; Sacconi (*supra* n. 9) 65; Godart (*supra* n. 9) *PdP* 31 (1976) 47.

<sup>23</sup> Duhoux (*supra* n. 9) 65, n. 69.

Crete, partly on the mainland, with significant input from a Knossian school.<sup>24</sup> Again my own suggestion was through contacts between Crete and the mainland in the Cyclades.<sup>25</sup>

What was the nature of the transformation of Linear A into Linear B? Here, as is already clear from the qualifications to theories about when and where, there are two main schools: the creation of Linear B was a single, discrete act that radically altered the sign repertory, the internal structure and the bookkeeping procedures of Linear A;<sup>26</sup> or the Linear B we now possess is the product of a gradual transformation, no less radical in its end results, during which the external form and internal structure were altered at one or several stages—one of the "gradual transformation" theories even has Linear B developing not from Linear A, but from hypothetical variant scripts existing in the Middle Minoan period.<sup>27</sup>

<sup>24</sup> Hooker, *Origin* (supra n. 9) 53. Neither Hooker nor Duhoux, in advancing stages of gradual development from Linear A into Linear B, explain exactly how such a gradual development would have been effected in practical phonological, palaeographical and administrative terms (see below, n. 26). Nor are they or the proponents of an MM III/early LM I date worried about the total absence of any epigraphical evidence supporting their views.

<sup>25</sup> Palaima (supra n. 18).

<sup>26</sup> Olivier (supra n. 9) 51, argues that the sign repertory and structure of the script were changed at its point of origin and that the alterations in bookkeeping techniques may have taken place gradually thereafter, but certainly were finished by the time Linear B was introduced to the mainland.

<sup>27</sup> Duhoux (supra n. 9) 30-31, outlines a four-stage development, although he does not explain precisely what modifications would have taken place at each stage. Hooker, *Origin* (supra n. 9) 14-16, 19-20, 32, 36, 50-53, 71-73, advances the theory of various predecessor scripts, from which the Linear B script eventually evolved. In this he follows E. Grumach, "Die Kretischen und Kyprischen Schriftsysteme," in U. Hausmann ed., *Allgemeine Grundlagen der Archäologie* (Munich 1969) 240-246, 250-253, who emphasized that even Evans had proposed that Linear B was not a direct development from Linear A, but a parallel system built from the series of Linear A and pictographic scripts that existed in MM III. Some of these variant scripts are now seen to be: (1) wishful figments of imagination, e.g., TY 2, where the presence of at least three variant forms of a rare Linear A sign (A 309a, b, c) and the structure of the text convinced Hooker (supra n. 9) *Origin*, 18, that this was a hybrid text merely incorporating some Linear A elements; or (2) totally unrelated to the eventual development of the Mycenaean Linear script, e.g., the Phaistos disk, which cannot be dated with certainty ("peut tout aussi bien être hellénistique que minoen") and which is not affiliated in any demonstrable way with Linear A (only 3 of 45 signs paralleled in Linear A) or with the Arkalochori axe (Godart [supra n. 9] *SMEA* 20 [1979] 37). Not only was TY 2 found in context with a typical Linear A text TY 3 in room 5 of House A at Tylissos, but the structure of TY 2 is seen to be perfectly normal: probable ideograms (A 309a, A 309b, A 309c, and —clearly parallel— A 100/102)

Why was the script invented? So that the Mycenaean traders at late MM III-early LM I Knossos might keep track of economic and trade activities in their own script and language;<sup>28</sup> so that Shaft Grave Mycenae could monitor its complex, centralized, redistributive, and surplus economy;<sup>29</sup> so that the Mycenaean conquerors of LM II Knossos could manage their new acquisition;<sup>30</sup> and finally, at first within a strictly Minoan context for purely scribal aesthetic purposes, but ultimately, within the Mycenaean sphere of influence, to control Mycenaean economic activities.<sup>31</sup> The multiplicity of divergent theories, the intricate argumentation, the vast array of evidence marshalled in support of arguments, the acknowledged and unacknowledged historical implications of the individual theories are bewildering, and a fair indication that no genuine consensus has been reached by experts in the Minoan-Mycenaean scripts.

The reasons for such diversity of opinion become clear, but not comforting, when one examines the procedures, assumptions and data which the proponents of these various theories share. What follows is an attempt to take into account the many implications of single lines of interpretation and how these lines of interpretation affect one another.

with preceding, following or adjoined simple (probably phonetic) signs and accompanying numerical entries. We may compare these features with those of other normal Linear A texts, e.g., TY 3a and 3b, PH 31a and 31b (especially for adjoined signs at smaller scale than ideograms), and HT 33 (rare ideogram, smaller scale adjoining signs, and bare list of ideograms). One should also stress the totally different concept of symbol representation, "printing," on the Phaistos disk, which allies itself therefore with the tradition of Minoan seals, and hieroglyphic writing, rather than with the tradition of linear writing. See A. Bradshaw, "The Imprinting of the Phaistos Disc," *Kadmos* 15 (1976) 1-17, and Dow (supra n. 9) *CAH* II, 1, 595-598, for analysis and commentary on the disk, the manner of its imprinting, and its relationship with Minoan-Mycenaean writing. Dow views it as an import and strongly objects to seeing any connection between the disk and the Arkalochori axe. Heubeck (supra n. 7) 7-10, provides a balanced survey of scholarly opinion on the provenience and pedigree of the disk and of the other inscriptions which are anomalies within the Cretan hieroglyphic-linear tradition.

<sup>28</sup> Olivier (supra n. 9) 45.

<sup>29</sup> Godart (supra n. 9) *SMEA* 20 (1979) 35-36. This assumes that the Mycenaean economy was sufficiently complicated and centrally organized during this period to require the use of writing in its administration.

<sup>30</sup> Heubeck (supra n. 22).

<sup>31</sup> Hooker, *Origin* (supra n. 9) 71-73. Grumach (supra n. 27) 246, argued strongly that Linear B was produced by Cretan writers in a totally Minoan context, thus explaining the "minoische Stil und Duktus der Zeichen und ihr bildlicher Gehalt." See also F. Schachermeyr, "Die Entzifferung der mykenischen Schrift," *Saeculum* 10 (1959) 70-71.

I think that there are areas in which we can now come close to a consensus by examining the old evidence anew, by taking into account new evidence, or by merely shifting our perspective slightly.

There are six main points to consider:

1. palaeography: the study and comparison of the forms of characters in Linear A and B;
2. phonological aspects of the two systems;
3. structure of the scripts: the relationship between their phonetic and ideographic (logographic) components;
4. the nature of the recovered documents;
5. chronology;
6. historical considerations: the probability or even plausibility of any proposed theory when viewed within the general archaeological picture.

The first point is the most fundamental and has thus far proved to be most problematical, so I shall deal with it at greatest length. It consists quite simply of comparing the external forms of the signs of the Linear B system and related Minoan scripts. Although there are hazards, as Pope and Chadwick have pointed out,<sup>32</sup> in using this method exclusively in order to establish genetic relationships between writing systems, that does not create problems in this case. We know that the Minoan hieroglyphic and the Minoan-Mycenaean linear scripts are related to one another. Rather problems arise in trying to use palaeography to determine the date of origin of Linear B, the reasons for its invention, and the degree of required alteration of the mother-script, Linear A. The same procedure has been used to try to date the origin of the archaic Greek alphabets from a specific Canaanite script. Heubeck explains the thinking behind this method:

<sup>32</sup> Pope, *Aegean Writing and Linear A* (supra n. 9) 15 and fig. 4, presents formal similarities between Minoan characters and medieval masons' marks and Japanese *katakana* characters as cautionary examples. J. Chadwick, "The Minoan Origin of the Classical Cypriote Script," *Acts of the International Archaeological Symposium "The Relations between Cyprus and Crete, ca. 2000-500 B.C."* (Nicosia 1979) 139, illustrates how mere resemblance hunting can be used to "prove" a relationship between the Classical Cypriote syllabary and *katakana*.

es scheint legitim anzunehmen, dass in der Phase der Entwicklung, in der die deutlichsten Übereinstimmungen zwischen den phoinikischen und den ältesten griechischen Buchstabenformen zu erkennen sind, auch die Übernahme des Alphabets durch die Griechen erfolgt ist.<sup>33</sup>

There are two major difficulties with this procedure which still plague studies of the Greek and Semitic alphabets:

1. non-parallelism of data: an imbalance in quantity or kind;
2. subjectivity of the actual procedure of formal comparison.

This method has led to wide disagreement in proposed dates for the invention of the Greek alphabet, proposals ranging from the late 12th century (relying totally on the formal comparative method, disregarding historical factors and the absence of any corroborating Greek alphabetic data between 1100 and 750 B.C.) to early to mid-8th century (placing more emphasis on the earliest Greek texts and the historical circumstances of the early archaic period).<sup>34</sup> The Minoan-Mycenaean inscriptional data present the same problems and more. We have a gap of at least 200 years between the latest Minoan and earliest securely dated Mycenaean texts, a greater difference in kinds of texts surviving in the two writing systems, and ironically a most troublesome agreement, really an assumption, among a group of leading scholars that the chronological starting point for Linear B, or for the process that finally led to Linear B, has been fixed by palaeographical analysis.

The proponents of an early date for the invention of Linear B, whether sudden or gradual, rely on M. Pope's cursory study of the sign forms of the two scripts, "The Date of Linear B," *Kretika Chronika* 15-16 (1961-62) 310-319.<sup>35</sup> At a period when the documentation of Linear A was considerably less substantial, Pope undertook a comparative analysis of the style and handwriting mainly of the LM I B Hagia Triada tablets and other documents, mostly of current *GORILA* classes Z- and W-, from Knossos, Palaikastro, and the few other palace, villa, or

<sup>33</sup> Heubeck (supra n. 7) 79.

<sup>34</sup> For a survey of theories with bibliography, see Heubeck (supra n. 7) 75-76; for a concise critical analysis of the problems involved in using the method of formal comparison, see Millard (supra n. 8) 141-142.

<sup>35</sup> Hooker, *Origin* (supra n. 9) 49-50; *Documents*, 396; Duhoux (supra n. 9) 25, 62, n. 46; Grumach (supra n. 27) 242-243; Heubeck (supra n. 9) 195-197. Olivier (supra n. 9) 47, holds the same opinion about palaeographical similarities without specifically citing Pope.

sanctuary sites which had then produced rather limited numbers of inscribed tablets, sealings, pithoi, libation tables, and other non-archival inscriptions. His analysis concentrated on *ten* phonetic signs common to Linear A and B (AB 04, 06, 07, 08, 37, 54, 55, 60, 69, 81). Particular attention was paid to the painted cups from the Area of the Monolithic Pillars at Knossos (KN Zc 6 and 7) which were then thought to be MM III A, but for which Vandenabeele now thinks a general attribution to MM III probable, though uncertain.<sup>36</sup> The forms of the signs painted on the insides of these cups were held to be closest to later Linear B. The forms on the cups were also thought to be most similar to those on other non-archival texts from the Middle Minoan period. Early MM III Knossos was therefore considered the point of origin of Linear B. In Pope's opinion, the Hagia Triada material produced no comparably close resemblances to the style of later Linear B characters, except for tablet HT 28 and roundels with the impression of seal Levi 31. These exceptions were all thought to be in the same hand and so their variance from the other Hagia Triada material was explained as a reflection of an "old-fashioned, perhaps pedantic...more conservative school of scribal tradition."<sup>37</sup> In any case, the general difference of LM I A and B character shapes from the style of the characters painted on the MM III [A] clay cups was used to fix early MM III not as a *terminus post quem*, but as a *terminus ante quem* for the origin of Linear B.<sup>38</sup> In determining resemblances, much weight was placed on the direction in which a single sign (e.g., AB 60) was turned. Subjective judgments were made about the degree of cursiveness of the Linear B characters. Differences between the Hagia Triada and Linear B inscriptions in terms of the sizes and shapes of tablets, the formats and layouts of texts upon tablets, and the principles for handling discrete syntactical entries were all used to prove that "the Linear A of Hagia Triada is an unsuitable parent for Linear B."<sup>39</sup>

I deal in such detail with a piece of scholarship that is a full generation old not merely in order to set up a straw man for dismantling, but because this particular straw man, in whole, in part, or in contemporary guise, is enlisted in support of nearly every theory I

<sup>36</sup> Pope, "Date" (supra n. 9) 311-314, figs. 1 and 2; Vandenabeele (supra n. 13) 9. As mentioned above (supra n. 17), Niemeier even proposes that Evans' original dating of the cups to the palace style period (LM II) is correct.

<sup>37</sup> Pope, "Date" (supra n. 9) 317-318, fig. 5.

<sup>38</sup> Pope, "Date" (supra n. 9) 318-319.

<sup>39</sup> Pope, "Date" (supra n. 9) 311.

surveyed at the outset. Not only is Pope's article cited as incontrovertible proof of the MM III origin of Linear B, or of its prototype according to the "gradual development theory," but similar arguments are used about the direction of single signs or even of whole lines, about tablet shapes and textual formats, about the cursive nature of Linear B. No one has checked systematically the much fuller Linear A material discovered since 1961 or questioned the soundness of the arguments advanced in 1961. To be fair, Pope has taken the new material somewhat into account in his joint article with Jacques Raison, "Linear A: Changing Perspectives," *Études Minoennes* I (Louvain 1978) 38, wherein he points out that now a dozen signs or so from Zakro, Arkhanes, Khania (all LM I B) have forms "very much closer to their Linear B counterparts than in the Hagia Triada tablets, and on the superficial level of outward appearance this goes quite a long way to close the gap between the two scripts."<sup>40</sup> Yet he does not reassess his views about the origin of Linear B, nor have the two major recent studies which make Pope's 1961 analysis the starting point for their own theories.<sup>41</sup>

I present here, in figures 1-25, Linear A sign forms, including especially those ten signs upon which Pope concentrated, site by site, indicating the inscriptions (and their dates) on which they occur and also the forms which are similar to Linear B counterparts. One can distinguish in certain signs (e.g., 04, 08, 54, 80) an ongoing development from MM III into LM I B toward their eventual Linear B forms. For others (e.g., 04, 06, 07, 08, 28, 37) there is an obvious and consistent range of variant forms at different sites, in different periods, and even inscribed on different media. Nor is it simply the recently excavated material that changes the picture. Among the Hagia Triada inscriptions, one finds examples of LM I B sign shapes that are similar to Linear B shapes but were apparently overlooked by Pope (e.g., 04, 07, 08, 13, 17, 28, 30, 37, 54, 55, 60, 67, 74, 79, 80, 81). These do not belong to inscriptions of a single hand. In fact, the recent tentative ascription of scribal hands in *GORILA* 5, 83-113, assigns even the tablet and roundels (HT 28, HT Wc 3001-3012) of Pope's "old-fashioned" hand to five distinct hands (14 HT, 107-110 HT Wc). More

<sup>40</sup> Olivier and Godart, as editors of *GORILA*, have an assumed familiarity with the palaeography of the Linear A texts. It is understandable that their articles (supra n. 9), written when *GORILA* was just underway, offer opinions on this question based on the new, partially edited material, but provide no detailed discussion.

<sup>41</sup> Hooker and Duhoux (supra n. 35).

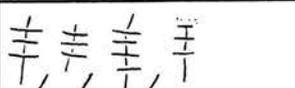
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
04	92		APodoulou	Za 2.2	MM III	cylindrical stone jar very decorative script
04	92		ARkalokhori	Zf 1	---	incised gold double axe
04	92		ARKHanes	2.1 / 4a.4	LM I B	
04	92		HT	13.2 / 9a.1 / 98a.3 / 98b.2	LM I B	23 times with continuous horizontals
04	92		HT	14.1 / 44b.1 / 52a.1 / 67.3 / Wa 1122	LM I B	26 times on tablets with separate side horizontal strokes
04	92		HT	8a.3 / Wa 1125 / Wa 1126 / Zb 158b	LM I B / Zb 158 = LM I	versions with more than three horizontals on each side of vertical attested on tablets, nodules, vases
04	92		IOuktas	Za 2b.2	---	extremely careful decorative script with signs inscribed in carved panels on the side of this table of libations
04	92		KHania	6.2 / 6.7 / 10.4	LM I B	only attested in this form at Khania
04	92		KNossos	28b.2 / Zf 13 / Zf 31	MM III? / MM III-LM IA/ LM I A	Zf 13 (gold ring) has much more linear, angular style than Zf 31 (silver pin)
04	92		MAlia	10b.1 / Zc 11	MM III / ---	

FIG. 1

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
04	92		PHaistos	13c / 12c / 15a / Wb 36 / Zb 4	MM II / Zb 4 = MM III	
04	92		PK	1.8 / 1.3 / Za 8a / Za 11a / Za 18	PK 1 = LM I / others = ---	
04	92		PLatanos	Zi 1	LM I	silver pin with script tinier than that on KN Zi 31
04	92		PRassa	Za 1a	MM III B-LM IA	rough linear inscription on table of libation; cf. also transitional form of AB 08
04	92		ZAkro	6a.2 / 19 / 29.2	LM I B	all stages of AB 04 represented at Zakro on clay tablets
04	92		ZAkro	9.6 / 10a.1, .2, b.3	LM I B	
04	92		ZAkro	20.3	LM I B	
05	39		ARKHanes	2.2	LM I B	only attestation
05	39		HT	97a.3 / 120.6 / 122b.6 / 132.2	LM I B	
05	39		KHania	11.4	LM I B	twice in same word on tablet

FIG. 2

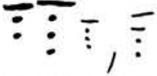
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
05	39		PK	Za 16	---	shallow inscription on upper border of libation table
05	39		PRassa	Za 1.b	MM III B-LM I A	worn surface; cf. AB 04, 08
05	39		ZAKro	4a.2 / 11b.1	LM I B	same two simple variations as at HT
06	26		APadoulou	Za 2.1 (four examples) Za 2.2 (two examples)	MM III	cylindrical stone jar; decorative, linear script; cf. AB 04, 16, 28, 80, 81; see IOuktas for style of sign
06	26		ARKHanes	5.1 / 6.1	LM I B	
06	26		HT	1.4	LM I B	
06	26		HT	2.3, 6b.6, 7a.4, 8a.5 / 117a.2.,5, 119.3, 120.5 / Zb 159	LM I B / LM I B / LM I	form with double horizontals normal at HT
06	26		IOuktas	Za 2a.2, d.1, Za 6 / Za 8	--- / MM III-LM I	stone inscriptions prefer version with easily bored dots; cf. AP, KN, KO, PR, PS, SY, VRY; TL exceptional
06	26		KH	5.3, 7b.2 / 7a.2, 59.3 / Wc 2005 / 5.3, 79+89.1 / 36.2 / 60.1	all LM I B	similar range of versions seen at HT
06	26		KNossos	Zc 6.3 / Zc 7.2, Zb 20	MM III? / MM III?, LM I A	same version attested in LM I B at KH (tablet) and ZA (jar inscription)

FIG. 3

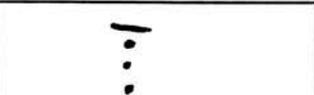
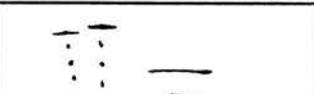
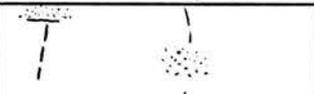
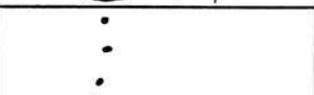
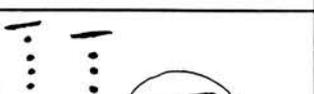
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
06	26		KNossos	Za 10.b / 22c.1, Za 19.2	LM I / ---	
06	26		KN	Zb 40.1	LM II?	
06	26		KOphinas	Za 1c, c, d	---	cf. IOuktas
06	26		MAllia	2c.1, .1	MM III	
06	26		PHaistos	16a.1 / Zb 5	MM II / LM I	
06	26		PK	Za 8a, b, b, Za 10 / 11c, c, d, 12c / 1.6	--- / --- / LM I	
06	26		PRassa	Za 1a	MM III B-LM I A	cf. IOuktas
06	26		PSycho	Za 2	---	cf. IOuktas
06	26		SYmi	Za 2b, b	MM III B-LM I A	cf. IOuktas
06	26		THEra	Zb 2	LM I A	cf. PK 11c, 12c

FIG. 4

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
06	26		TL (Troullos)	Za 1b, c	MM III	cf. LM I B forms at KH, ZA; cf. LM I A form at KN; cf. MM III? clay cup KN Zc 7
06	26		VRYSinas	Za 1a	---	inscription carved along edge of upper surface of libation table
06	26		ZAKro	6.1, 15a.1 / Zb 3.2 / 10a.1, .2, .2, .4	all LM I B	10a has closest to Linear B forms, yet still three versions attested at ZA
07	51		HT	4.3 / 8a.1 / etc.	LM I B	exclusive form at HT; found 64 times, even ligature to A 302
07	51		IOuktas KHania	Za 2.b 1 / Za 5  6.1	----  LM I B	
07	51		KNossos	22b / Zf 13 / Zf 31 / Zc 6.2 / Zb <27>	--- / MM III / LM I A/ MM III?/ MM III B	
07	51		PHaistos	1a.1 / (?) 31a.2 / 2.2 / 7a.1 / Wc 39a	---/--- /--- / MM II / MM II	
07	51		PK	Za 11a / Za 15	---	
07	51		ZA	14.1 / 11a.1 / 26a.1 / 4a.8 / 15b.1 / Zb 3.1.1	LM I B	forms on Zb 3 match odd Linear B variant
08	52		ARKHanes	1a.4.5, b.1, 2.2.5, 4a.2 / 1a.2	LM I B	on 1a.5, the upper vertical is a separate stroke

FIG. 5

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
08	52		CR (?)	Zf 1 (bis)	LM I A	gold pin with most forms extremely close to Linear B: AB 08, 30, 37, 54, 55, 59, 67, 73, 77, 80
08	52		HT	1.4, 2.1, 9a.5, b.2, Wa 1147 / 14.3, 92.1, 118.3 / 109.4 / Zb 159 / Wa 1148, 1149	LM I B / Zb 159 = LM I	form on 109.4 seems transitional between styles; forms on Wa texts are single signs
08	52		IOuktas	Za 2a.1 / Za 3 / Zb 10	--- / --- / MM III - LM I	libation table versions are decoratively ornate
08	52		KH	5.1.1, 9.1.1.2, etc. / 20.2 / 83.1	LM I B	for form on KH 20.2, cf. HT 109.4
08	52		KN	Zb 5 / Zb 40.1.2, Zb 20 / Zc 6.2, Zc 7.1.1.2 / Zε 16 / Zf 31 (bis)	MMIII B/LM II?, LM IA/MM III? / --- / LM I A	tholos tomb from Kephala and silver pin have most advanced forms
08	52		KOphinas	Za 1c / (?)Zf 2	--- / ---	
08	52		MAlia	1b, Wc <5>a.1, 4[b] / 10b.2	MM III	form on 10b.2 occurs in ligatured sign A 654
08	52		PApoua	1	---	
08	52		PHaistos	2.1, 27b, 14b	MM II	
08	52		PK	1.2 / Za 4 / Za 11a, b, 12 a, c, etc.	LM I / --- / ---	form on 1.2 has separate top vertical; cf. ARKH 1a.5, etc.

FIG. 6

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
08	52		PRassa	Za 1c	MM III B-LM I A	transitional form as at HT, KH, and perhaps PK Za 4
08	52		SKhinia	Zb 1	---	
08	52		SYmi	Za 2a,d, Za 3	MM III B-LM I A	
08	52		THera	Zb 2 / Zb 3 / Zb 4	LM I A	all forms matched in Linear B
08	52		TL (Trouslos)	Za 1a	MM III	
08	52		TYlissos	Zb 4 / 3a.3.5.6.7	LM I / LM I B	transitional form appears four times on TY 3
08	52		Zakro	8.1.2, 11a.5, 7a.1, 7b.1 / 7a.2 / 10a.1.2.3.3, b.4.4, Zb 3.1.1.2	LM I B	note occurrence of two variant forms on 7a.1.2.; full Linear B form found on tablet and vase inscriptions
13	84a		HT	10a.4 / 120.1 / 86a.4 / 85b.3 / 95a.2 / 95b.2	LM I B	
13	84a		KH	7a.3	LM I B	
13	84a		PRassa	Za 1c	MM III B-LM I A	

FIG. 7

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
13	84a		PSykhro	Za 2.2	---	
13	84a		ZAkro	14.1 / 21 a.1	LM I B	only ZA form comes close to Linear B
16	62		APodoulou	Za 2.2	MM III	
16	62		ARKHanes	1a.1	LM I B	
16	62		HT	8a.3, b.3, 23a.4, 31.2, 44a.1, 85b.5, 86a.3, etc. / 12.1, 70.2, 118.2.2, 131a.2	LM I B	Linear B style well represented along with more common variant style
16	62		KHania	7a.4 / 10.3 / 88.1	LM I B	for form on 88.1, cf. AB 17
16	62		KNossos	Zf 31 (bis) / Wb 33a	LM I A / ---	
16	62		PK	1.1 / Za 12d	LM I / ---	
16	62		TL (Troullos)	Za 1a	MM III	
16	62		ZAkro	14.2	LM I B	

FIG. 8

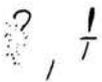
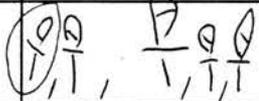
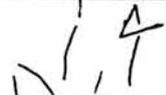
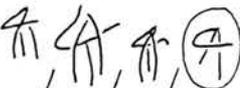
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
17	23		HT	13.2, 85a.3, etc. / 10.2a.3.4	LM I B	first form found 8 times; abbreviated version found only on one tablet, but 3 times
17	23		KHania	11.1 etc.	LM I B	5 times; only this form
17	23		KNossos	Zc 7.1 / ZI 31	MM III?/LM I A	second version occurs 3 times on silver pin
17	23		PK	1.2.3.7	LM I	very simple style
17	23		ZAkro	15a.4, 14.3 / 5a.2 / 6b.4 / 10a.5 / 10b.1	LM I B	
21	48b etc.		HT	38.2	LM I B	
21	48b etc.		KH	Wc 2063 / Wc 2102	LM I B	
21	48b etc.		PHaistos	Wc 44	MM II	
21	48a etc.		HT	112a.1 / 7b.1 / 132.2 / 136a.2	LM I B	first two versions occur 17 times
21	48a etc.		KH	88.1	LM I B	only attestation

FIG. 9

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
21	48a etc.		ZAkro	14.1 / 22.5 / 26b.1 / 26a.2	LM I B	
24	61		ARKHanes	1a.5 / 1a.6 / 3a.1 / 4a.4	LM I B	
24	61		HT	7b.1 etc. / 13.6 / 29.6 / 115a.4 / 103.5	LM I B	simplified version (7b.1) occurs at least 16 times
24	61		KHania	5.2 / 6.3 / 83.1 / 53.1	LM I B	
24	61		KNossos	Zc 7.2 / Zf 31	MM III?/LM I A	
24	61		PHaistos	7a.3	MM II	a version of this early form is still extant at LM I PK
24	61		PK	1.1 / 12c	LM I / ...	for first version, cf. PH 7a.3
24	61		THera	Zb 3	LM I A	
24	61		TYlissos	3a.1-2	LM I B	
24	61		ZAkro	10b.6 / Zb 3.1	LM I B	good parallel to Linear B version attested only here

FIG. 10

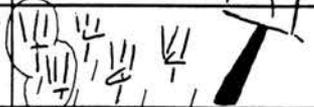
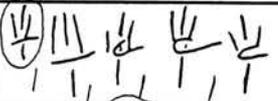
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
27	54		passim	xxxxxxxxxxxxxxxxxxxx	xxxxxxxxxxxx	AB 27 has a fairly uniform style throughout the Linear A corpus
28	100a etc.		APodoulou	Za 1 / Za 2.1	MM III	
28	100a etc.		ARkalokhori	Zf 2	---	
28	100a etc.		ARKHanes	2.3 / 4b.3	LM I B	
28	100a etc.		GOurnia	Wc 1a.3	---	
28	100a etc.		HT	28a.6 / Wa 1008 / 25a / Wa 1151 / Wa 1012 / Zb 158b	LM I B except Zb 158 = LM I	version on 25a, Wa 1151, Wa 1012 most common at HT, occurring at least 24 times
28	100a etc.		IOuktas	Za 3 / Za 5 / Za 7	--- / --- / MM III - LM I	
28	100a etc.		KHania	7a.2 / 32.1 / 7b.2 / 10.3 / 16.2	LM I B	
28	100a etc.		KNossos	Wc 3 / Za 10b / Zc 6.3 / Zf 31 (bis)	MM III B/LM I / MM III?/LM I A	
28	100a etc.		MAllia	1a	MM III	

FIG. 11

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
28	100a etc.		PHaistos	Zb 4	LM I	
28	100a etc.		PK	1.4.7.8 / Za 18 / Za 11a / Za 11 d / Za 12a	LM I / ---	LM I tablet version most similar to Linear B form
28	100a etc.		PLatanos	Zf 1	LM I	
28	100a etc.		PSykhro	Za 2.1 / Za 2.2	---	
28	100a etc.		SYmi	Za 1 (bis)	MM III B-LM I A	
28	100a etc.		TL (Troullos)	Za 1a	MM III	
28	100a etc.		ZAkro	5b.3 / 10a.4 / 6b.1	LM I B	see ARKH, KH, HT, PH parallels
30	60		ARKHanes	5.1 / 4a.1	LM I B	
30	60		CR(?)	Zf 1	LM I A	gold pin with many signs of Linear B form: AB 08, 09, 37, 54, 55, 57, 59, 67, 73, 77, 81
30	60		HT	6a.2 etc. / 94a etc. / 114a.3	LM I B	first two versions frequent; third version, similar to Linear B, occurs only once

FIG. 12

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
30	60		KH	5.4 etc. / 9.2 etc. / 88.2 / Wc 2005	LM I B	first two versions appear frequently; last two versions once each
30	60		KNossos	Zb <39> / Zb 35	---	both versions on these vases rather clumsy
30	60		KOphinas	Zf 2	---	
30	60		PHaistos	16a.2	MM II	
30	60		PLatanos	Zf 1(ter)	LM I	extremely simplified version
30	60		THEra	Zb 1	---	clumsy version
30	60		ZAkro	5a.2 / 15a.3 / 5a.2, 8.1.3, 14.2	LM I B	note occurrence of different versions on 5a.2
31	31		ARKHanes	1a.6	LM I B	
31	31		GOurnia	Wc 1a.2	---	
31	31		HT	6b.5 etc.	LM I B	ca. 65 times

FIG. 13

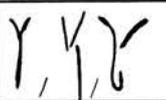
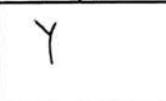
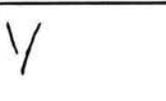
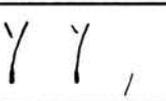
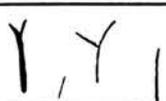
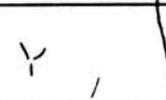
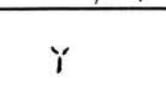
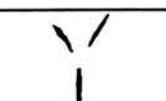
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
31	31		IOuktas	Za 2b.1 / Za 9 / Zb 10 (bis)	--- / --- / MM III - LM I	
31	31		KEos	1.1	MM III	
31	31		KHania	5.2 etc.	LM I B	5 times
31	31		KNossos	Za 10a (bis) / Zf 31	LM I / LM 1 A	
31	31		KOphinas	Za 1b / Zf 2	---	
31	31		MAlia	Wc <5>a.1 / Zb 8	--- / MM III-LM I A	
31	31		PHaistos	2.4 / 16b.1	--- / MM II	
31	31		PK	Za 4 (bis) / Za 8b	---	
31	31		PLatanos	Zf 1	LM I	
31	31		PRassa	Za 1c	MM III B-LM I A	

FIG. 14

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
31	31		THEra	Zb 2	LM I A	
31	31		ZAkro	5a.3 / 15a.3 / Zb3.1	LM I B	
37	20 etc.		ARKHanes	4a.5	LM I B	
37	20 etc.		CR(?)	Zf 1	LM I A	forms of AB 08, 09, 30, 54, 55, 57, 59, 67, 73, 77, 81 also similar to Linear B
37	20 etc.		HT	6b.2 et passim / 12.1 / 10b.1 / 10b.4 / Zd 155	LM I B	difficult to tell how intentional and careful central stroke is on 10b.1
37	20 etc.		IOuktas	Za 2b.2 / Za 6 / Za 7 / Za 8	--- / --- / MM III-LM I / MM III-LM I	
37	20 etc.		KHania	7a.4 / Wc 2005	LM I B	
37	20 etc.		KNossos	1a.1, 1b.1 / Za 10 / Zb 5 / Zc 6.1.2 / Zf 31 (bis)	MM III B/ LM I / MM III B/ MM III?/LM I A	central vertical attested in MM III - LM I on all media
37	20 etc.		LArani	Zb 1	---	
37	20 etc.		MAllia	1c / 2b.1 / 2c.2	MM III	

FIG. 15

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
37	20 etc.		PHaistos	Zb 5	LM I	
37	20 etc.		PK	1.1.3.7.8 / Za 11c	LM I / ...	
37	20 etc.		PLatanos	Zf 1	LM I	
37	20 etc.		PYRgos	1.1	LM I B	
37	20 etc.		PSykhro	Za 2.2	...	
37	20 etc.		ZAkro	4a.3, 6b.1, 9.1 / 15a.3 / 12a.1, b.2 / Zb 3.2.2	LM I B	
54	70 etc.		ARKHanes	2.5	LM I B	only attestation
54	70 etc.		CR(?)	Zf 1	LM I A	forms of AB 08, 09, 30, 37, 55, 57, 59, 67, 73, 77, 81 also similar to Linear B
54	70 etc.		HT	6b.1 / 86a.3 / Wc 3006a / 16.2 / 20.4 / Wc 3019	LM I B	simple forms similar to Linear B; more elaborate forms on both tablets and roundels
54	70 etc.		IOuktas	Za 2a.1 / Za 3 / Za 8, Za 7	... / ... / MM III-LM I	

FIG. 16

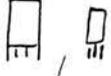
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
54	70 etc.		KNossos	Za 10b / Zf 31	LM I / LM I A	miniature size of pin creates simplification corresponding to Linear B form
54	70 etc.		KOphinas	Za 1a / (?)Zf 2	---	
54	70 etc.		MAlia	10b.1	MM III	
54	70 etc.		PHaistos	6.1 / Zb 5	MM II / LM I	
54	70 etc.		PK	Za 11 / Za 12a	---	
54	70 etc.		TYlissos	3a.6	LM I B	
54	70		ZAKro	6a.1 / 10b.1	LM I B	
55	25		ARKHanes	3a.4	LM I B	
55	25		CR(?)	Zf 1	LM I A	cf. comments on AB 54 for CR(?)
55	25		HT	1.3 / 26a.3 / 47a.6 etc. / 3.6 / 25a.3 / 49 a.7	LM I B	version with straight horizontal strokes found 21 times

FIG. 17

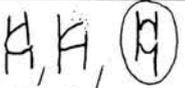
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
55	25		IOuktas	Za 2b.2 / Za 6	---	
55	25		KArdamoutsa	Zf 1	---	
55	25		KHania	6.2 / 86.2 / 88.1	LM I B	
55	25		KNossos	Wb 33b / Za 10 a / Zc 7.1 / Zc 6.3	--- / LM I / MM III? / MM III?	versions on clay cups not similar to Linear B; those on scellés and libation table are
55	25		MAlia	1a	MM III	
55	25		PHaistos	(?)31a.3	---	
55	25		PK	Zc 13	LM I A	
55	25		PLatanos	Zf 1 (bis)	LM I	
55	25		ZAkro	5b.1 / 9.1	LM I B	
60	53		ARKhanes	1a.2 / 2.1	LM I B	only these 2 attestations; both similar to Linear B

FIG. 18

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
60	53	2/ (L) / (L)	HT	1.4 etc. / 28a.5, 80.1, Wc 3006b, Wc 3011, Wc 3012a / Wa 1021	LM I B	facing left: 48 times on 32 tablets; facing right on tablets, nodules, roundels
60	53	2/ (L) / (L)	IOuktas	Za 2a.2 / Za 6 / Zb 10	... / ... / MM III-LM I	
60	53	2/ (L)	KH	5.1 etc. / 31.2, 91.4	LM I B	facing left 7 times; facing right 2 times, both in ligatured sign A 652
60	53	2/ 2/ (L) / (L)	KNossos	1b.1, Wc 30 / Zf 31 (bis) / Za 10a / Zc 7.1.1	MM III B / LM I A / LM I / MM III?	note LM I occurrence of right-facing form on libation table
60	53		KOphinas	(?) Zf 2	---	
60	53	2/ 2/ (L)	PHaistos	1a.1, 2.1 / 7b.2 / 3a.3	... / MM II / MM III	
60	53	(L) / L	PK	1.6 / Za 4, Za 11c, Za 12b	LM I / ...	all forms right-facing
60	53	2/	PLatanos	Zf 1	LM I	
60	53	2/	PRassa	Za 1	MM III B-LM I A	
60	53	2/	PSykhro	Za 2.2	---	

FIG. 19

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
60	53		SKhinia	Zb 1	---	
60	53		TL (Troullos)	Za 1b	MM III	Inscription has very odd orientation
60	53		ZAkro	7a.1 / 8.1 / 11a.1 / 20.4 / 22.3 / 9.2.3.6 / 6b.2, 15b.3	LM I B	right-facing prevalent; versions on 6b.2, 15b.3 are ligatures to AB 131a
67	103		ARKHanes	1a.6 / 4b.4	LM I B	
67	103		CR(?)	Zf 1	LM I A	see comments on form of AB 55 on CR(?)
67	103		HT	1.1, 87.3 etc. / 93a.2, b.1 / 8a.4.5/ 40.2	LM I B	simple, right-facing: over 45 times; left-facing only 2 times
67	103		IOuktas	Za 2b.1	---	
67	103		KEos	Zb 3	LM I B	sign oriented to suit form of handled cup on which it is drawn, thus explaining its facing left
67	103		KHania	5.1 / 10.3 / 20.2	LM I B	
67	103		KNossos	Zb 40.1 / Zc 6.2	LM II? / MM III?	

FIG. 20

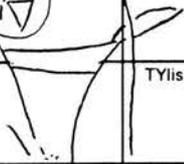
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
67	103		PK / 	Za 8a / Za 11a / Za 12a / Za 15	---	forms in both directions, simple and ornate, all on libation tables
67	103		MI (Melos) / 	Zb 1	---	
67	103		PHaistos / 	2.2 / 28a.2 / Wa 32	--- / MM II / MM III	
67	103		TYlissos	2.3 / 3b.1 / Zb 4	LM I B / LM I B / LM I	
67	103		ZAkro	4.7 / 5a.1 / 8.1 etc. / 15a.5, 21b.2	LM I B	right-facing: 10 times; left-facing: 2 times
69	6		ARKH	6.1	LM I B	only attestation
69	6		HT	3.5 etc.	LM I B	41 occurrences
69	6		IOuktas	Za 2b.1	---	for elaborate style on libation table, compare KO Za 1b
69	6		KAr damoutsá	Zf 1	---	
69	6		KHania	7b.3 / 91.3 / 51.2 / 57.7	LM I B	

FIG. 21

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
69	6		KNossos	Zb 5	MM III B	
69	6		KOphinas	Za 1b	---	cf. IO Za 2b.1
69	6		LArani	Zb 1 (bis)	---	
69	6		PHaistos	2.1 / (?)31b.2	---	
69	6		PK	Za 14a / Za 8a / 1.6	--- / --- / LM I	
69	6		ZAKro	4a.4 / 8.2 / 14.3 / 20.3	LM I B	
74	16		HT	16.4 / Wa 1285 etc. / Wa 1293 / Wa 1296 / Wa 1298	LM I B	variety of forms; 41 attestations
74	16		KHania	Wa 1005 / Wa 1007	LM I B	6 attestations
79	101		ARKHanes	2.3	LM I B	
79	101		HT	1.2 / 25a.2 / Wc 3012a	LM I B	18 attestations

FIG. 22

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
79	101		IOuktas	Za 6	---	
79	101		KHania	5.3	LM I B	
79	101		KNossos	Zc 6.3 / Zc 7.1	MM III?	
79	101		PHaistos	6.2 / 13c	MM II	
79	101		TYlissos	3b.2	LM I B	
79	101		ZAkro	4a.5 / 15a.2	LM I B	
80	95		ARkalokhori	Zf 1 / Zf 2	---	
80	95		CR(?)	Zf 1	LM I A	abstract, linear; see other signs on CR(?) Zf 1, e.g., AB 30
80	95		GOurnia	Wc 1a.2	---	
80	95		HT	89.2 / 118.1.4 / 117a.3.4	LM I B	over 50 attestations

FIG. 23

AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
80	95		IOuktas	Za 2d.1	---	
80	95		KHania	14.1 / 62.1 / 88.1	LM I B	versions abstract like Linear B; third example most similar
80	95		KNossos	Za 10a	LM I	
80	95		KOphinas	Za 1.d	---	
80	95		MAllia	1b	MM III	impossible to seek Linear B prototype in such an MM III form; all close similarities from LM I
80	95		PH	7a.3 / (?)31a.2 / Zb 4	MM II / --- / LM I	abstract form similar to Linear B occurs in LM I; cf. CR(?), KH, ZA
80	95		PK	1.8	LM I	
80	95		SYmi	Za 2a	MM IIIB-LM I A	
80	95		VRYSinas	Za 1a	---	
80	95		ZAkro	8.3 / 8.4 / 5b.1 / 4a.6	LM I B	

FIG. 24

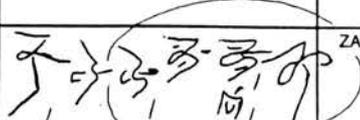
AB NO.	ITLA NO.	FORMS (Similar to LB circled)	SITE	INSCRIPTION NOS.	DATE	COMMENTS
81	98		APodoulou	Za 2.1	MM III	
81	98		ARKHanes	2.1 / 6.1 / 3a.6	LM I B	these versions share cursive form of Linear B versions
81	98		HT	115a.3 / 25b.4 / 88.5 / Wa 1598 / 93a.6 / 90.1 / Wa 1614	LM I B	most often simple and angular, especially on nodules; cursive version also occurs
81	98		KHania	29.2 / 18.2 / 18.3	LM I B	very cursive; similar to Linear B
81	98		KNossos	1a.1 / Zc 6.3.3	MM III B / MM III?	more cursive on cups, but cf. other sites
81	98		MAlia	2b.2	MM III	
81	98		PApourea	1	---	
81	98		PHaistos	(?)31a.3 / (?)31a.4	---	
81	98		TYlissos	3a.7	LM I B	
81	98		ZAKro	6b.1 / 11a.3.5 / 15a.1, b.2 / Zb 3.2 / 20.4	LM I B	all forms very ornate and cursive; cf. other LM I B sites

FIG. 25

importantly, the fact that features of the writing style of HT 28 and Wc 3001-3012 are now matched broadly in LM I B at Hagia Triada and other sites makes it impossible to support a notion of idiosyncratic conservative survivals. Rather we should deduce that the sign forms of the Linear A script were developing *in the direction of the sign forms of Linear B right to the very end of LM I B*. For Pope's absolute certainty about MM III depended on sign forms similar to Linear B being found in that period and before, but never —or only exceptionally— afterwards. This is not to say that Linear B or a hypothetical prototype *could not have been* invented in MM III, only that the palaeography of sign forms offers no proof of this idea. Quite the contrary. The closest palaeographical matches are between LM I B character shapes and the character shapes on the later Linear B clay documents. Those who would wish to argue for an MM III origin of Linear B should find it far more difficult to face the complete absence of any Linear B or pseudo-B inscriptions from the period 1650 to 1450 without the illusion of a firm *terminus ante*. We must also reject the idea that a special variety of Linear A, exclusively resembling later Linear B, was developed in MM III for restricted aesthetic or calligraphic purposes. For the practical clay inscriptions of this and the succeeding chronological phases, as we shall see, provide the fullest parallels to the Linear B script.

What about the reversal of signs? This second prop also must be removed: both on logical grounds and because of the evidence presented in the figures. Pope had made the following point:<sup>42</sup> sign L 53 (AB 60) is found facing rightward (the Linear B direction) on the Knossos MM III [A] cups; but, on an MM III B tablet (KN 1a) and roundel (KN Wc 30) and subsequently and normally at Hagia Triada, it is found facing leftward. The one exception then known (libation vessel KN Za 10 from the House of the Frescoes, LM I) was viewed as an heirloom. Despite the fact that some more of its signs (AB 05, AB 06, AB 37, AB 57, AB 55) have forms matching Linear B,<sup>43</sup> Pope stressed that still other signs (AB 31, AB 54, AB 55, AB 80) had forms unlike Linear B. This had the effect of subterfuge since he failed to note clearly that AB 31 and AB 80 never appear in forms very similar to Linear B, AB 55 on KN Za 10 actually does have the curving interior horizontals that typify the Linear B versions, and AB 54 is found equivalent to the Linear B

<sup>42</sup> Pope, "Date" (supra n. 9) 312-314.

<sup>43</sup> Pope, "Date" (supra n. 9) 313, fig. 2, object I 8 sacral, leaves AB 57 out of consideration and places AB 55 in the category of non-resemblance to Linear B.

forms only on material from the latest period—a direct contradiction to Pope's thesis: LM I B tablets from Hagia Triada, Arkhanes, Tyliisos, and Zakro, the LM I pithos Zb 5 from Phaistos, and the gold pin CR Zf 1 of unknown provenience and tentative date (LM I A?) which exhibits many signs in shapes which parallel LM I B Linear A as well as later Linear B tablet forms. Elsewhere on stone inscriptions AB 54 does not resemble its Linear B counterpart.

The same line of reasoning was used to dismiss the evidence of the Palaikastro material, mainly the post-MM III inscriptions: tablet PK 1 (LM I) and painted cup Zc 13 (LM I A). These two documents, as Pope notes, exhibit L 53 (AB 60) in the Linear B direction and AB 55 with the Linear B curved interior horizontals. The tablet is also of the size of smaller Mycenaean page-shaped tablets, ruled somewhat like them, and even keeps syntactically unified entries, for the most part, on the same lines. Rather than deduce a development toward Linear B, Pope again stressed the dissimilarities of other isolated signs (AB 04, AB 31, AB 67, AB 81) found on these two and other Palaikastro inscriptions (chiefly the undatable libation tables Za 4, Za 8, Za 10-12). Again one must remark that this is extremely misleading. AB 81 is only attested at Palaikastro in a non-Linear A text: Brice IV 6 (a hieroglyphic clay bar, see below). AB 67 is not attested on the datable Palaikastro inscriptions and occurs on the libation tables in forms that approximate the later Linear B in shape and/or orientation (Za 8a, 11a, 12a)—only the highly embellished version on Za 15 stands out as a decorative and exceptional form. AB 31, as mentioned above, nowhere matches its Linear B counterpart closely, certainly not here on the libation tables Za 8, 11, 16. AB 04 uniformly on all the Palaikastro texts where it occurs, PK 1 included, at least has developed the concept of separate and multiple strokes on either side of the vertical that differentiates the Linear B tablet versions theoretically from some variant forms of its Linear A counterpart. AB 27 and AB 37 on PK 1, Za 8, Za 16 are almost identical to their Linear B counterparts—Pope misread an occurrence of AB 37 on Za 8. AB 16, AB 17, and AB 30 on PK 1 are very close to the Linear B forms, as is AB 66 (the rare Linear B *ta*<sub>2</sub>) which occurs with certainty but seventeen times in the Linear A corpus, always on tablets of the LM I or I B period (Hagia Triada, Khania, Palaikastro, Zakro), again suggesting development toward later Linear B. We may also notice that sign AB 60 is found facing in the Linear B direction on LM I or I B tablets and roundels from Arkhanes, Hagia Triada, Palaikastro, and Zakro. It is not the exclusive form of a

hypothetical proto-Linear B which was invented in MM III A and then developed independently.

The trend is for sign forms in Linear A to develop from MM III through LM I B *in the direction of Linear B*. One does not arrive at the end of the Minoan palace period with a Linear A that is an exact formal equivalent of our datable Linear B. Nor should we expect this. After all, Linear B is an adaptation of the Minoan script and, as such, undoubtedly would have been modeled on the ideal characters of its predecessor, i.e., the standard forms of signs used to teach the art of writing, purer forms unadulterated by the modifications brought about by habitual use. Moreover, from the end of LM I B we must still cover a span of approximately a century, it seems, to arrive even at the controversial Knossos Linear B material. We have, however, in LM I B the closest equivalents for the greatest number of the later Mycenaean sign forms that we can trace in any period, and these equivalent signs are represented uniformly at all the sites that produce our main Linear A administrative documents. They may be present among other traditions. For example, notice in figure 5 at Arkhanes AB 08 in five strokes (one being a small separate vertical above the horizontal cross bar) and AB 08 in the full Linear B style of five strokes (one being a second horizontal above the cross bar). At Khania, Hagia Triada and Tyllisos (also LM I B) we can detect the transitional stage where the vertical stem extends above the cross bar and is then surmounted by the second horizontal stroke. This form occurs at each site together with the other versions noted in figures 6-7. The full Linear B forms are found on LM I B clay accounting documents at Arkhanes, Hagia Triada, Khania and Zakro alongside non-Linear B variants. One may cite a similar pattern for AB 07 at Hagia Triada, etc. Such a mixture of relatively closely allied traditions is what we find at Pylos, Knossos, and Mycenae among the Linear B tablet writers. It is worth mentioning that, by concentrating on the Linear A tablets and sealings from the LM I B period, we are able to compare like with like, since our primary Linear B comparanda are administrative clay documents from economic and political centers and must have been produced under fairly similar working conditions. We thus avoid the problem of non-parallelism of data introduced when inscriptions in other media are used for formal comparison without taking into account the differences in sign formation that would thereby arise due to differences in artistic

conception, practical execution, or relative familiarity of the inscriber with the art of writing.<sup>44</sup>

What then are we to make of some of the other differences that have been cited to separate Linear A from Linear B? On logical grounds the differences in sign direction, the few instances of retrograde lines, the presence or absence of rule lines, and the splitting of entries from one line to the next should not be drawn at all, as they have been, into the discussion of where in the development of Linear A to place the invention of Linear B. These characteristics should only be used if one can establish that their appearance, like boustrophedon or *Schlangenschrift* in archaic Greek inscriptions, is limited to one or another period, and that a given practice was prevalent enough to have influenced Linear B across the centuries, or that the absence of a given practice in Linear B was a significant departure. This has not been demonstrated. Eight possible examples of boustrophedon or sinistroversive writing in Linear A are cited by Duhoux.<sup>45</sup> These are:

(1) PH 32.1(=SM I P.121) is not classified by *GORILA* as Linear A, since it is in fact a hieroglyphic text. Moreover, it is only partially sinistroversive, and for reasons of expediency at that, in the placement of two numerical (10) signs and a fraction sign in the lower right cramped corner of its fully used surface.

(2) KE Z 4 (KE Zb 4) consists of three signs AB 57-AB 41-AB 38 incised, before firing, on the rim of a clay lamp from an MM III context.<sup>46</sup> An impressed point is inscribed at the beginning or end of

<sup>44</sup> E. L. Bennett, Jr., "The Inscribed Stirrup Jar and Pinacology," *PhilEp* 1, 143, makes a distinction, for the Linear B period, between a pinacological (clay) writing tradition and a papyrological (painted vase, as representative of other unpreserved painted inscriptions) tradition. For the Linear A period, one should add also a strictly epigraphical (inscribed stone objects) tradition. The inscriptions on metallic objects, e.g., the gold and silver pins, the gold and silver miniature axes, the gold ring, etc., approximate the pinacological tradition, undoubtedly because of the similar techniques of execution inscribing into moist clay and malleable metallic surfaces. The best example is CR Zf 1, for the sign forms of which see figures 6, 12, 15-17, 20, and 23.

<sup>45</sup> Duhoux (supra n. 9) 59, n. 25. The following eight inscriptions are given according to the *ITLA* numeration used by Duhoux. In parentheses I give the *GORILA* (for those texts classified as Linear A) or other (for those which are not) numeration.

<sup>46</sup> *CTLA*, 152; Vandenabeele (supra n. 13) 7.

this sign-group. Since both sign AB 57 and sign AB 38 occur with good frequency at the beginning or the ends of word-groups and since each of the signs is reversible in form, this is not proved to be sinistroverse.

(3) KN Z 18 (KN Za 18) is a stone libation table of undetermined date, the surface of which is extremely damaged and bears discernible traces only of the directionally ambiguous signs AB 54 and AB 57. The text nonetheless appears to begin flush at the upper left, i.e. to run left to right. *ITLA*, p. 228, records Paul Faure as thinking this might be retrograde. Neither the editors of *GORILA* nor I share this opinion.

(4) KT Z 2 (*CMS* XII 96) is a black and green serpentine (*hieroglyphic*) seal dated stylistically to MM III. *ITLA*, p. 244, proposes quite reasonably that the text is sinistroverse on the seal, which is functionally a matrix, so as to appear dextroverse on the impression. It is not classified as Linear A by *GORILA*.

(5) PK 3 (= Brice IV 6) is a clay bar of unknown context and date from Palaikastro. It, too, is a hieroglyphic inscription and therefore not classified as Linear A by *GORILA*.

(6) KN Z 19 (KN Za 19) is a stone libation table of unknown date with inscription in two lines on a single side. The upper line runs left to right, the lower line right to left. The reversal of AB 73 on line .2 and the space at the left of the last character of line .2 prove that this text is definitely boustrophedon.

(7) VR Z 1 (VRY Za 1) is a stone libation table of unknown date with characters incised on the border of the horizontal surface. Word-group AB 28-AB 39-AB 06-AB 80 is written sinistroverse, as is word-group AB 41-AB 26-AB 04 as the inscription turns a corner. Both words are found dextroverse on other tables of libation (from Apodoulou, Symi, Kophinas and Iouktas), even together in the same order (KO Za 1). AB 41 is written upside down, thus showing us the disorientation of the engraver.

(8) PL Z 1 (PL Zf 1) is a silver pin dating to LM I with a long sinistroverse formulaic inscription. The sign-group AB 57-AB 31-AB 31-AB 60, which recurs on other texts in dextroverse, confirms the right-to-left reading.

To this list we may now add IO Za 9 and IO Za 11:

(9) IO Za 9 is a fragment of a table of offering which has six signs preserved on its horizontal surface. These are divided by a *punkt* into groups of three signs, each group corresponding to the beginning of full sign-groups found on libation tables from other sites. The leftmost group on IO Za 9 reads *right-to-left*; the right group reads *left-to-right*.

(10) IO Za 11, a two-line fragment from the vertical side of a libation table, appears to be genuine boustrophedon, to judge by the reversed (right-to-left) direction of three of the six preserved signs on line .2 and the normal (left-to-right) direction of the two directionally unambiguous signs preserved on line .1.<sup>47</sup>

We can observe then that no Linear A clay administrative texts show any variation from dextroverse writing. This is in distinct contrast to, and a development toward regularity from, administrative Cretan hieroglyphic texts which read in either direction as noted often by an initial "x" mark. The definite instances of Linear A sinistroverse (nos. 6-10 above) all occur on non-administrative objects where unfamiliarity with the technique of writing, the exigencies of available space and oddities of shape, and/or "inscribing for the convenience of the inscriber" come into play.<sup>48</sup> This is especially clear on the tapering pin

<sup>47</sup> For details on these two inscriptions including the interpretation of direction of script, see A. Karetsou, L. Godart, J.-P. Olivier, "Inscriptions en linéaire A du Iouktas," *Kadmos* 24 (1985) 97-101, 126-127, 140-143, plates IV and VI.

<sup>48</sup> The same factors come into play in archaic Greek alphabetic texts where reversal of letters and sinistroverse or boustrophedon writing are found occurring in some cases haphazardly on graffiti and even on inscriptions obviously carved for public display. The principle that in the archaic period "writing was always done for the convenience of the writer" was first demonstrated to me by H. R. Immerwahr in a seminar at the American School of Classical Studies at Athens in 1979-80. Good examples of this principle are: (1) the 19 fragments of public inscriptions from Tiryns which "constitute probably the most extensive example in Greek of 'serpentine writing' and had been engraved for 'conspicuous publication'": N. Verdelis, M. Jameson, I. Papachristodoulos, "'Αρχαϊκὰὶ ἐπιγραφὰὶ ἐκ Τίρυνθος," *AE* (1975) 150-205; and (2) many of the Theran grave inscriptions,

(PL Zf 1), where the inscription runs right to left toward the point so as to make fullest use of the widest surface for the bulk of the text,<sup>49</sup> and on VRY Za 1, where turning the corner creates problems for the inscriber. On IO Za 9 there is also confusion at the corner, from which two sign-groups head out in opposite directions. In the same way in Linear B it is the class of inscribed stirrup jars (the only non-archival documents besides nine other painted vase inscriptions) that show the most problems with sign forms and the only possible example of sinistroversal (cf. TH Z 866 and 867 with TH Z 868). Although this has to do with confusion in the direction of a mere two letters and is probably not intentional retrograde, it is yet another example of how unfamiliarity with a script can produce abnormalities.<sup>50</sup> In Linear A, besides the text of the silver pin, only the boustrophedon texts of the two libation tables (KN Za 19 and IO Za 11) exhibit what one would call a consciously chosen reversal of the direction of writing.

The evidence for ruling in Linear A is also minimal. Besides the libation tables KN Za 19 and IO Za 11, we have among administrative

e.g., *IG* 12.3.487 and .762. I prefer such a practical explanation to that of Einarson (*supra* n. 7) 4-5, who attributes boustrophedon in early Greek inscriptions to "the desire to keep the chain of letters unbroken." Yet A. G. Woodhead, *The Study of Greek Inscriptions*<sup>2</sup> (Cambridge 1981) 25, does explain how both *Schlangenschrift* and boustrophedon could benefit especially the novice reader. For the random reversal of letters, especially 3-bar sigma, in early Attic inscriptions of various types, see L. H. Jeffery, *The Local Scripts of Archaic Greece* (Oxford 1961) Plate 1.1 (Dipylon oinochoe ca. 725 B.C.); Plate 2.9e (ostrakon, 7th c. B.C.?); Plate 3.20 (limestone base for a grave, ca. 560 B.C.); etc. Practical considerations may also have caused the inscriber of the Boeotian "Mantiklos" bronze statuette dedication to inscribe left-to-right rather than right-to-left as would have been normal for so early an inscription. See Jeffery, 91, plate 7.1.

<sup>49</sup> The reversal of the miniature script on this exceptional decorative object may be related to the reverse carving on seals, where it has the practical effect of making the impression read dextroversal. One might speculate that this particular "miniaturist" carved the characters in the form and direction of seal models perhaps under the influence of seal-carvers.

<sup>50</sup> J. T. Killen in H. W. Catling, J. F. Cherry, R. E. Jones, J. T. Killen, "The Linear B Stirrup Jars and West Crete," *BSA* 75 (1980) 91, even speculates that these particular stirrup jar inscriptions might be "decorative motifs, like the nonsense writing in alphabetic script which is used as decoration on vases of a much later period." Bennett (*supra* n. 44) 137-139, 143, prefers to think, for some of the inscribed stirrup jars, in terms of "practically illiterate" painters who would have copied archetypes painted by literate hands. Another interesting case of sign transposition is furnished by Thebes and Tiryns jars of Bennett's batches 3-6. At least the painter of EL Z 1 has scribal sensibilities and may, therefore, have had a greater familiarity with the art of writing.

texts only some 30 examples out of 318 tablets and hundreds of nodules, scellés and roundels:<sup>51</sup>

(1) from MM II, PH 8 and PH 16. PH 8 is a fragment. Face .a preserves 3 single ruled lines; face .b shows no sign of ruling above the preserved signs. PH 16 is a tablet of leaf-shaped style with a single central rule-line making two lines for the text on both sides a. and b.

(2) from LM I, PK 1 and MI 2. PK 1 is ruled roughly into several single lines and one double line of text; MI 2 is a fragment which is lined very neatly into compartments of one or two lines of text.

(3) from LM I B, HT 96 and TY 3. Both are two-sided tablets. TY 3 is lined on both sides into compartments of one or two lines of text (mostly two); HT 96 has one compartment formed by a dividing line on face a. HT 45b, not cited by Duhoux, also has a neatly lined compartment for three lines of entries.

(4) also about 20 examples, all LM I B (HT 8b, 9b, 22, 41b, 49a, 49b, 50a, 56a, 86a, 101, 106, 108, 117a, 130, 131b; ZA 6b, 15b; KH 3, 7b; ARKH 1b, 7), where single rule-lines mark off large sections of text one from the other.

It is clear then that regular line-by-line ruling is a feature of later Mycenaean texts not shared by Linear A. One reason for this may be the relative brevity of the texts presented on Linear A tablets. The longest Linear A texts like HT 93 a, b and 117 a, b contain only ca. 50 and 70 signs (excluding numerals and fractions) and very few syntactical units consisting at most of 3 or 4 word-groups.<sup>52</sup> These usually occur as text headings and need no ruling to be demarcated from the following catalogue lists that are most often arranged as simple single entries running continuously one line to the next. It is general sections that need on occasion to be distinguished, and this is done in the LM I or I B lists by means of the ruling device.

<sup>51</sup> Duhoux (supra n. 9) 58-59, n. 23.

<sup>52</sup> That Linear A was capable of longer syntactical expressions is proved by inscriptions classed as "autres documents," e.g., AP Za 2, PK Za 11, PK Za 12, ZA Zb 3, KN Zf 31, PL Zf 1. See the synoptic table in *GORILA* 4, 172-177.

One would not be safe in drawing categorical inferences from the poorly represented earlier (pre-LM I B) periods. However, if we expand our view to take in the hieroglyphic clay archival texts, which begin at a phase contemporary with the Phaistos proto-Linear A material (MM II), we might tentatively suggest, as we have with the sign forms, a roughly continuous chronological development in the direction of Linear B. There seems to be, from the early hieroglyphic clay texts onward, a gradual tendency toward systemization in recording information, a movement, like that which M.W. Green has traced chronologically within the archaic Uruk texts, toward a coherent method of organization which "could encompass more, detailed information within a single tablet record."<sup>53</sup> One would move:

1) *from the early hieroglyphic clay bars and medallions*, which show but occasional traces of multiple and compartmentally separated entries (71 M/H 267 and 268 from Mallia Quartier Mu [MM II]; P.121 from Phaistos [date and context unknown]; P.85a, b [a medallion from the Hieroglyphic Deposit at Knossos: MM II]; P. 100a, b, c, d [clay bar from the same deposit: MM II]; H. 21a, c, d; H. 22a, b, c, d; H.24 [all clay bars from the Hieroglyphic Deposit at Mallia: MM III?];<sup>54</sup> H.27 a, c [clay tablet from H.D. at Mallia: MM III?]);

2) *to the Linear A nodules, roundels and tablets*, which become fuller and fuller to the point of needing compartmental ruling-dividers on occasion;

3) *and then to the full systemization of the Linear B page-shaped texts* with line-by-line ruling separating individual phonetical-syntactical entries one from the other.

<sup>53</sup> Green (supra n. 7) 351. Although hieroglyphic and Linear A in their earliest stages seem to be co-existent and primarily separate, there is some cross-fertilization of accounting techniques between the two systems: administrative hieroglyphic may have borrowed the numerical and ideographic repertory from Linear A, and Linear A presents a *contaminatio* in its use of hieroglyphic tablet shapes at MM III Mallia. See Godart (supra n. 9) *SMEA* 20 (1979) 33.

<sup>54</sup> On the problematical dating of the Mallia material from the Hieroglyphic Deposit according to graphic parallels and the pottery in the immediate vicinity, see F. Chapouthier, *Les écritures minoennes au palais de Mallia (ÉtCrét 2, Paris 1930) 5-7*; and more recently, J.-P. Olivier, "La scrittura geroglifica cretese," *PdP* 31 (1976) 21-22. Evans, *PofM* IV, 676, n. 3, objects to an MM III date for the true hieroglyphic material in this deposit.

Even the shorter leaf-shaped Linear B tablets use advanced formatting devices like majuscule heading words and partial tablet ruling that differentiates sub-entries (e.g., KN DI 944, Dk 1064, Lc 7377; PY Ab 553-555 [partial ruling], Ea 820 [majuscule heading]). These not only allow more information to be entered per tablet, but also make that information more accessible by distinguishing its various parts and assigning relative values to the individual pieces of data entered by means of such ingenious formatting practices.

In contrast to the lengthiest Hagia Triada texts of 50 and 70 non-numerical non-fractional signs, the Linear B tablets constitute a genuine information revolution with texts like PY En 74 containing nearly 325 such signs. Of course, we have clear proof from LM I B of frequent use and large centralized collections of clay nodules which were attached to Minoan leather or papyrus documents.<sup>55</sup> It may well be that the Minoan scribes of the most fully developed phase of neopalatial bureaucracy relied much more on such ephemeral media to record the details which are not found on their "bare-bones" clay documents. The LH III B Mycenaeans at the very least did not use the same system for sealing documents on temporary materials. Keeping in mind the possibility of historical circumstances that might have limited the supplies of ephemeral writing materials in the period of our firmly dated Linear B data, e.g., interruption of trade in papyrus, and perhaps parchment, with Egypt<sup>56</sup> or the necessity to use hide for purposes other than parchment, etc., in the tumultuous mid- to late LH III B period, one wonders whether the much fuller exploitation of clay documents by the Mycenaeans, especially but not exclusively in centralized archives, was a forced response to changes in the Mycenaean bureaucratic economic system which made the particular Minoan use of papyrus or parchment obsolete, or whether the attainment of greater skill in using

<sup>55</sup> J. Weingarten, "The Use of the Zakro Sealings," *Kadmos* 22 (1983) 8-13; I. Pini, "Neue Beobachtungen zu den tönernen Siegelabdrücken von Zakros," *AA* 98 (1983) 559-572.

<sup>56</sup> For the use of leather, parchment, and, most extensively and commonly, papyrus for Egyptian writing at least from the Old Kingdom onwards, see C. Singer, E. J. Holmyard and A. R. Hall eds., *A History of Technology* I (Oxford 1954) 756-757. There is some evidence for the use of papyrus already in predynastic times, and its exportation to the Levant and Near East at least by the mid- to late 2nd millennium seems relatively certain. See N. Lewis, *Papyrus in Classical Antiquity* (Oxford 1974) 84 and nn.1-2. For its use during the 2nd millennium in Crete and Greek-speaking areas, see E.G. Turner, *Greek Papyri: An Introduction* (Oxford 1980) 1-2.

clay for full and systematic records led to the abandonment of this Minoan record-keeping technique.

The last points I wish to take up under palaeography are the subjective judgment that "in general Linear B writing is of a more cursive and florid kind than that seen at Ayia Triada"<sup>57</sup> and the way this perception is used in discussing the origin of the Linear B script. Pope again links this idea directly to the date of Linear B. Since, in his opinion, the Hagia Triada signs are "more economical of line, less curvaceous, and in many cases specifically different from their Linear B equivalents," their very appearance is viewed as constituting a departure from the new Linear B script which he and other theorists want to see developing from the time and the style of the MM III [A] clay cups onward. Quite independently of the foregoing discussion, I dispute this particular view chiefly on two grounds:

1. that this judgment about the relatively greater complexity and floridness of the Linear B characters (and by association of the sign forms on the MM III clay cups) vis-à-vis later Linear A is questionable, since it has never been supported by thorough palaeographic analysis of the Linear A and B signs;<sup>58</sup>

2. that the inferences drawn from it are neither compelling nor correct.

Hooker carefully notes that Evans in several discussions of Linear A and Linear B writing observed that certain Linear B characters, in his opinion, seemed closer to their original pictorial form than their

<sup>57</sup> Hooker, *Origin* (supra n. 9) 33.

<sup>58</sup> A table of 3 conventionalized drawings of characters (J. T. Hooker, "The Beginnings of Linear B," *Europa*, 134 fig. 1) in support of the notion that Linear B, as a palaeographical "improvement" upon Linear A, could only have been devised by Minoan scribes—illiterate Mycenaeans being capable of only degenerate signs—hardly constitutes a proper demonstration of the chronological, regional and scribal palaeographical subtleties involved in the two writing systems, particularly because, even according to Hooker's own view of matters, our Linear B palaeographical data come from a period when the Mycenaeans would have "drawn themselves up" from their own illiterate beginnings; i.e., the texts we possess do not represent the first Mycenaean attempts at writing, but an accomplished stage of script.

advanced Linear A equivalents.<sup>59</sup> At a time when Evans believed the Linear B inscriptions to be Minoan, to be dated to LM II, and to express the same language as Linear A,<sup>60</sup> he quite naturally theorized that the scripts might be parallel, "of more or less equal antiquity," and that Linear B must have taken over in the latest Palace period "owing to some political change" within a purely Minoan context.<sup>61</sup> What he then understood of the general chronological, archaeological and cultural circumstances made this view quite sensible. He had to account for the existence of two scripts in one culture; and he did so, as we might have expected from his interest in the Egyptian connections with Cretan writing, by adapting, purely for the purposes of explanation, the later hieroglyphic-hieratic-demotic model.<sup>62</sup> We should note, however, that nowhere does Evans make the observation that Linear B as a whole is more florid and cursive. He rather remarks that Class B "illustrates in many of its features [chiefly textual format, rule lines, etc.] a more fully developed stage in the Art of Writing," although one or two characters (AB 81 and AB 69) stood "in a nearer relation to the pictorial prototypes."<sup>63</sup>

Starting from Evans' own chart (Fig. 666 [A], [B], and [C] in *PofM* IV, 684-85) it is difficult for me at least to understand how the notion of the generally greater cursiveness of the Linear B script has been maintained. Even allowing for incorrect groupings such as AB 26 and AB 24 under B 23 and both being contrasted with the simple Linear A version of AB 26, or forms of Linear B \*29 being contrasted with what appear to be Linear B versions of AB 28 that were mistaken for Linear A, there is very little to substantiate the claim, beyond the signs Evans mentioned and a few signs new to Linear B (e.g., \*48, \*52, \*62, \*71, \*105 EQU) that we might expect would maintain their prototypical shapes longer. Now we have the fuller picture provided by the *GORILA* palaeographical analysis. We can observe (figs. 21-22) that AB 69 is found in its "cursive" Linear B form on ZA 4a.4 and

<sup>59</sup> Hooker, *Origin* (supra n. 9) 16, citing A. J. Evans, "Knossos Excavations, 1903," *BSA* 9 (1902-03) 53.

<sup>60</sup> *PofM* IV, 684.

<sup>61</sup> Evans (supra n. 59).

<sup>62</sup> Since the earliest demotic texts date to the 7th century B.C. (D. Diringer, *Writing* [New York 1962] 51), it is not implied here that Evans thought that the Egyptian tripartite scheme of writing systems was a *contemporary* model for the Minoan system, only that Minoan writing might have had similar culturally motivated divisions.

<sup>63</sup> *PofM* IV, 683. See the similar opinion in *SM* I, 39.

ARKH 6.1 (LM I B), in an equally complex version on KH 91.3 (LM I B), in less simplified style on KN Zb 5 (MM III B) and LA Zb 1 (—), and in most elaborate form on IO Za 2b.1 (—) and KO Za 1b (—). AB 81 (fig. 25) is found in very elaborate forms on the following LM I B tablets, nodules and vases: HT 1.3, Wa 1600, Wa 1614; ZA 15a.1, Zb 3.2; ARKH 3a.6. The following signs are found commonly in complex or cursive forms on tablets, sealings or vases at several sites in LM I B: AB 13, AB 16, AB 21, AB 24, AB 28, AB 44, AB 45, AB 50, AB 51, AB 55, AB 61, AB 67, AB 73, AB 74, AB 77, AB 79. In addition we might point out that in this period certain forms of sign A 100/102 have a much greater complexity than their Linear B counterparts \*100 and \*102 ever have.

I do not think then that we have a firm enough palaeographical foundation to push the origin of Linear B back into the MM III period. I do agree that the forms of some —and only some— of the Linear A signs painted on the clay cups and inscribed on some of the libation tables and other non-archival objects are slightly more elaborate than the forms found generally on the archival documents. But the reasons for this are not in essence chronological. It is virtually impossible, given the variety of factors involved in producing inscriptions of these types, to draw chronological conclusions from their character shapes. Nor must one imagine a separate script in existence, whether Linear B or proto-Linear B, to explain the slightly fancier forms found in such texts. There are two alternatives: (1) the inscribers or painters of the non-archival objects are simply being more careful and more faithful to the sign archetypes in producing inscriptions that have a decorative element to them than the tablet scribes generally are in the repetitious labor that causes them to simplify their signs normally through habit; (2) the very decorative function of these kinds of inscriptions induce the inscribers to produce embellishments unknown to the pinacological tradition.<sup>64</sup>

We must imagine that the ephemeral Linear A documents on papyrus or parchment, even in the LM I B period, would have exhibited a considerable number of the forms which we now observe on these non-archival documents and occasionally, but commonly enough, in the styles of the tablet scribes. The Linear B scribes, making much fuller and more meticulous use of clay documents, would have had greater

<sup>64</sup> For an example from Linear B palaeography, see Bennett's discussion of the odd "thumb-in-the-palm" *no* on certain painted stirrup jars. Bennett (*supra* n. 44) 139.

incentive to preserve carefully the prototypical sign forms on the only archival writing material that has survived. Nonetheless one observes a tendency toward simplification of elaborate shapes when moving from the Knossos tablets (where some sign shapes are very close to LM I B Linear A) to the mainland tablets. I have always suspected these differences to have resulted from simplification through time, though this is beyond proof. Still scribes were always able to recapture an elaborate (archetypal) form when the importance of the record(s) at hand required (e.g., Pylos H2 in the Ta series, H43 in the Ea series), and the painters of the LH III B stirrup jar inscriptions were also able to employ florid, idealized forms that were far different from those normally used on contemporary tablets.<sup>65</sup> I suppose that Mycenaean school texts, even from the late LH III B mainland, would have exhibited many an elaborate feature, as would any writing system derived directly from the Linear B script at this stage. Although everyday writing had become palaeographically simpler, the archetypal forms presumably would have been used as the copy patterns, particularly if the script developed, as Linear B did from Linear A, within the context of the palatial scribal bureaucracies.

Phonological and structural questions are also linked to the origin and development of the Linear B script in problematical ways. I do not intend to repeat here the clear discussion of phonological details so well summarized recently by Duhoux.<sup>66</sup> Our understanding, of course, is one-sided. Linear A is gotten at only through transference of values from Linear B and by noting which characters have been lost, which newly invented, in moving from the Minoan to the Mycenaean script. Here we encounter difficulties because of an exaggeration of the degree of structural difference between the two scripts and because of the misapplication of a keen chronological insight about phonological development.

M. Lejeune in "Pré-mycénien et proto-mycénien," *Bulletin de la Société de Linguistique* 71 (1976) 193-206, focused his attention on the

<sup>65</sup> For the Pylos examples, see T.G. Palaima, "Secondary Criteria for Identifying Scribal Hands: Interdisciplinary Considerations," *Text: Transactions of the Society for Textual Scholarship* 2 (1985) 59-60, fig. 2. For an example of the elaboration of signs on the painted stirrup jars, see A. Sacconi's illustrated discussion of the forms of sign \*52 (*no*) in Sacconi (supra n. 9) 60-62, fig. 1. Compare also \*14 (*do*) on TI Z 24, Z 25 and TH Z 842 with the presumably earlier form on KN Fh 340 of Hand 141.

<sup>66</sup> Duhoux (supra n. 9) 41-54.

so-called *doublet* or *complex* signs in Linear B, signs which do not form part of the organic repertory of core signs by which any Greek word can be expressed according to Linear B orthographic principles. Some of these (AB 29, AB 66, AB 76) have Linear A predecessors; others still do not and may be freely invented additions to the Linear B script or adaptations of still undocumented, rare Linear A signs (more on this below). Lejeune argues reasonably that they must have been introduced at a single time since most are attested at more than one Linear B site.<sup>67</sup> It is most economical to believe that such surplus signs were introduced at the point of origin under the influence of the Minoan phonological system. Lejeune calls this point of creation  $B_1$  and then traces phonological changes that must have occurred in the values of two of these signs (LB \*62 [*pte*] and AB 76 [*ra<sub>2</sub>*]) between the point of origin ( $B_1$ ) and the date of the surviving Linear B texts ( $B_2$ ). One should note that nowhere does Lejeune ever estimate the length of time it would have taken for this process to be completed. He expressly states that it is not measurable.<sup>68</sup> In fact nothing precludes the possibility that the phonological changes (\**pye* > *pte*; *ra<sub>2</sub>* = *ri-ja* and *-rra-/-lla-*) were already beginning to take place at the time when the Linear B script was introduced, so that the final results seen in our surviving Linear B texts could have required no vast length of time to be reached. Yet Lejeune's insight is cited as support for placing the origin of Linear B in MM III.<sup>69</sup> It offers no such support.

The degree to which the phonetic and ideographic (logographic) repertories of the two systems differ also has been hard to assess. Some who wish to see no relationship between LM I B Linear A and later Linear B have tended to exaggerate the differences. For example, concentrating on phonetic characters, Hooker has estimated that only 40 signs are common to both scripts and that over 40 Linear B characters

<sup>67</sup> M. Lejeune, "Pré-mycénien et proto-mycénien," *BSL* 71 (1976) 196.

<sup>68</sup> Lejeune (supra n. 67) 194-195.

<sup>69</sup> Godart (supra n. 9) *SMEA* 20 (1979) 35, uses Lejeune's insight as justification to push the origin of Linear B back three or four centuries before the surviving mainland texts. See also Chadwick (supra n. 21). Hooker, *Origin* (supra n. 9) 54, also goes back so far by suggesting that the diachronic phonological stages traced by Lejeune could apply as well to the proto-script that lay behind Linear B. Duhoux (supra n. 9) is properly reserved with his application of Lejeune's thesis only to the two-century span between the actual creation of Linear B, according to his version of the "gradual evolution" theory, and the mainland texts. The real point, however, is that Lejeune's insight cannot be used to support any specific date unless one can pinpoint the amount of time necessary for the changes which he isolates to have occurred.

were invented.<sup>70</sup> This is later toned down to: "each script contains many signs peculiar to itself."<sup>71</sup> Again the effect is harmful in the context of discussion about the origin of Linear B, for it makes the change from Minoan to Mycenaean writing seem more drastic than is warranted by the evidence. We can come nearer the truth with Duhoux's estimate, based on *ITLA*, that 19 out of 88 Linear B phonograms have no parallels in Linear A.<sup>72</sup> But even this list contains three signs (AB 74 [ze], AB 22 and AB 79) that are now attested as Linear A simple signs in *GORILA*. AB 22 in definite readings occurs only ideographically in Linear A; but, if we examine in Linear B the class of signs used both as phonograms and as livestock ideograms (AB 85 [au] = \*108 SUS; AB 21 [qi] = \*106 OVIS; AB 23 [mu] = \*109 BOS; and AB 22 [mi?]<sup>73</sup> = \*107 CAP) and note that all the other corresponding Linear A signs (AB 85, AB 21, AB 23) are attested both ideographically and phonetically in Linear A texts, there is good reason to believe that AB 22 also had a phonetic value in Linear A. The other unparalleled Linear B signs are, with the exception of \*12 (*so*), \*14 (*do*) \*15 (*mo*), \*32 (*qo*) and \*72 (*pe*) of the presumably weakly represented Linear A *e*- and *o*- series, either doublet and complex signs, as we have seen, or rare signs to which no values have been assigned and which are often used on the Knossos tablets in transcribing apparent Minoan personal and place names, e.g., \*18, \*19, \*63, \*64, \*83, \*84. Duhoux has calculated that, according to mathematical probability, the Linear A phonetic repertory may have included another 20 signs.<sup>74</sup> We might eventually find the antecedents for these 16 unparalleled Linear B phonograms in new Linear A texts, particularly signs like \*62 (*pte*) for which we have posited a Minoan phonological basis. In any case, in terms of percentages, if these signs were totally new creations, say the surviving results of experimentation during the early formation of Linear B, they would stand in nearly the same proportion (roughly 1:5.5) to the whole Linear B phonetic repertory as the supplemental signs are to the Semitic core of the later Greek alphabet (4:24 or 1:6).

<sup>70</sup> Hooker, *Origin* (supra n. 9) 20 and 75, fig. 1.

<sup>71</sup> Hooker, *Linear B, An Introduction* (supra n. 9) 19.

<sup>72</sup> Duhoux (supra n. 9) 61, n. 38.

<sup>73</sup> M. Janda, "Zur Lesung des Zeichens \*22 von Linear B," *Kadmos* 25 (1986) 44-48, offers a persuasive analysis of the evidence for assigning a value close to *mi* to sign \*22.

<sup>74</sup> Y. Duhoux, "Une analyse linguistique du linéaire A," in Y. Duhoux ed., *Études Minoennes I* (*BCILL* 14, Louvain 1978) 119.

Working in the other direction there are also difficulties. Duhoux, again using *ITLA*, reckoned that 40 of ca. 110 Linear A non-ideographic signs were eliminated in Linear B.<sup>75</sup> This number can be reduced by more than half. 23 of these 40 signs are now seen to be mere variants of Linear A signs, mostly of signs with Linear B equivalents (e.g., *ITLA* 48a, 79, 83b, 109, 111, 162? = AB 21<sup>f</sup>; *ITLA* 20 = AB 37 or 38; *ITLA* 68? = AB 65; *ITLA* 75b = AB 54; *ITLA* 135 = AB 38; *ITLA* 151 = AB 09; *ITLA* 154 = AB 47; *ITLA* 201 = AB 80; *ITLA* 33 = *ITLA* 123 = A 329; *ITLA* 83a = *ITLA* 155 = A 306), or to correspond in Linear B strictly to ideograms despite having both ideographic and phonetic uses in Linear A (e.g., *ITLA* 42 = AB 120 GRA; *ITLA* 65 = AB 123 AROM;<sup>76</sup> *ITLA* 82a and 82b = AB 131a and 131b VIN; *ITLA* 85 = AB 118 L; *ITLA* 87 = AB 188). One other sign (*ITLA* 202) occurs on the hieroglyphic text PH 32.1 that we discussed above and accordingly is not documented in Linear A. The 16 signs without Linear B parallels are generally of rare and occasionally isolated occurrence. 9 occur six times or less, of which 4 (A 319, A 323, A 325, A 327) occur only at Hagia Triada, 1 only at Phaistos (A 320), and 1 (A 361) only at Tylissos. Several are seen to function as monograms or logograms in the texts where they are found: A 301, A 304, A 306, A 312, A 318, A 319, A 323, A 327.

If the adjustment in the phonetic repertory moving from Linear A to Linear B is not so extreme, what can we say about the ideographic character sets? Duhoux estimates that only 42 of the 172 Linear B ideograms have Linear A antecedents, while 4/5 of the Linear A ideograms, including almost all of the signs of the Minoan aliquot fractional system, were eliminated.<sup>77</sup> There is no getting around the observation made by J.-P. Olivier that the ideograms, including the numerical and fractional signs, are "la clé de voûte de tout système archivistique crétois."<sup>78</sup> We must carefully examine how Linear B modified this essential repertory.

<sup>75</sup> Duhoux (supra n. 9) 61, n. 37.

<sup>76</sup> Only on ZA 20.3 might AB 123 occur as an ideogram. This would involve interpreting the preceding AB 04 as a "transaction sign," a function it performs on 21 HT texts, always in headings or sub-headings (HT 67, 96) and relating to agricultural commodities: AB 30, AB 120, AB 122, AB 131, A 302. Since ZA 20.3 is not a sub-heading and nothing on the rest of this fragmentary tablet suggests an agricultural context, this interpretation has little appeal.

<sup>77</sup> Duhoux (supra n. 9) 20, 22.

<sup>78</sup> Olivier (supra n. 9) 49.

First, the ideograms form the keystone of Linear A accounting documents—in contrast to their minor, nearly non-existent role in the other classes of documents—because of the brevity of the Linear A tablets. Of all the 318 surviving tablets, there are only **5** wherein an entry (as distinguished from an opening heading) might consist of more than:

- 1) one sign-group followed by numerical-fractional signs;
- 2) one ideogram, ligatured or non-ligatured, followed by numerical-fractional signs; or
- 3) one sign-group and one ideogram followed by numerical-fractional signs.

Of these five exceptions, HT 93a.3-.4 and .4-.5 are sectional sub-headings composed of a single sign group followed by an isolated sign AB 28 and then by the ligatured ideogram A 574 (AB 120 + AB 03); HT 120.3-.4 has exactly the same structure, but appears not to be a sub-heading; KH 7a.3 is a sub-heading consisting of two sign groups which precede a third sign group that is followed by ideograms (A 571 [A 100/102 + 313b] and A 624 [A 303 'D']) and numerical signs; HT 27a.4-.5 may also be a sub-heading consisting of two sign-groups; PH 6 is singular among all texts, being composed of five sign-groups listed on four lines with a single word-divider and no ideograms or fractional signs. It should be stressed that no heading on the extant tablets consists of more than three sign-groups and even headings of this length are exceptional (HT 96a and 117a). Two sign-groups or one sign-group and a single sign (AB 04, AB 28, A 307 [=?] AB 39) are the rule (e.g., ZA 11a, b; HT 9a, 14, 17, 19, 21, 27a, etc.). We have to turn to other classes of documents for lengthier syntactical units. ZA Zb 3 (a pithos inscription) has at least five sign-groups following an ideographic and numerical entry; KN Zf 31 (a silver pin) has a sequence of at least ten sign-groups without any ideograms.

The Minoan record-keepers, to judge from the existing data, used clay tablets to record very basic and condensed kinds of information, resorting to full phonetic writing only to the most minimal degree. It is small wonder then that they employed the space-saving mechanism of ligaturing to a far greater extent than the Linear B record-keepers. There

are 137 of these composite "signes complexes" identified in the *GORILA* corpus (1427 documents, 7147 total signs), but a mere 36 composite signs (counting all ligatured ideograms and composite phonetic monograms together) in the Linear B corpus (over 4600 documents and over 72000 signs). The difference in relative frequencies of occurrence of these signs in the two scripts is obvious. A few of these combined signs, as pointed out by Bennett, Melena and others, may be common to both systems ( e.g., AB 54 + AB 81 [ = TELA? + KU ] and perhaps AB 54 + A 312 [ = TELA? + ZO?]).<sup>79</sup> As we should expect with phonetic abbreviations in different languages, the overwhelming majority are not. Here therefore is one obvious reason for the great discrepancy between the Linear A and Linear B ideographic repertoires: over 100 Linear A ligatured ideograms are not reproduced in Linear B.<sup>80</sup>

A second reason is simply the clear difference in the epigraphically documented interests of the clay-tablet record-keepers. In Linear A the greatest number of texts deal with agricultural commodities and products (AB 30 [NI], AB 120 [GRA], AB 122 [OLIV], AB 131 [VIN], A 302 [ = \*130 OLE?]<sup>81</sup>), persons (A 100/102 [ = \*100 VIR and ? \*102 MUL]), and, to a much lesser extent, livestock (AB 21 - AB 23, AB 85 [OVIS, CAP, BOS, SUS]) and vessels (A 400<sup>VAS</sup> - A 418<sup>VAS</sup>). There are otherwise a limited number of inscriptions dealing with probable ideograms of extremely rare occurrence (among signs A 308 - A 371, only A 308 occurs more than ten times and many occur only once or twice, e.g., all of the signs A 329 - A 371). AB 191 (GAL) appears only

<sup>79</sup> E. L. Bennett, Jr., "Linear B Sematographic Signs," *Acta Mycenaea* I, 61, cites the correspondences as a possibility; J. L. Melena, *Studies on Some Mycenaean Inscriptions from Knossos Dealing with Textiles (Minos Supplement 5, Salamanca 1975)* 108-110, cites the correspondences as certain. One should point out that AB 54 occurs ideographically in Linear A only on three occasions, and that these versions, which are ligatured, occur only once each, though on the same tablet (HT 38.3) and in context with the ideogram for sheep (AB 21).

<sup>80</sup> Nor are new discoveries likely to change the picture to any great extent, judging by Bennett's unfulfilled prediction of 1970: "Nevertheless there is no other instance in which a Linear A compound sign corresponds to a Linear B compound ideogram. *In time we will find more.*" Bennett (supra n. 79) 61 [italics mine].

<sup>81</sup> The association of A 302 with Linear B \*130 OLE is not made in the *GORILA* signary. This may have to do with the strict procedure followed by the editors of making identifications purely on the basis of forms. Otherwise it is hard to account for this omission, given the persuasive arguments in *Documents*, 35, and Olivier's own acceptance of this identification in Olivier (supra n. 8) 49: "le BLÉ et l'HUILE n'ont varié qu'assez peu."

once; AB 180 much more in Linear A (17 times, all on MM II and MM III tablets from Mallia and Phaistos) than in Linear B (at most 4 times); and the unparalleled A 301, A 303-306 with reasonable frequency. In the Linear A records, we may notice the near total absence of ideograms for military equipment (the one possible exception being AB 191), for spices (AB 123 = \*123 AROM is found in the Linear A texts only as a phonogram in sign-groups), and, so far as we can tell, for cloth (A 54 =? \*159 is found ideographically only five times) and for metals (unless A 327, which occurs on HT 97a and HT 119, is the Linear A version of \*140 AES). Wool may be recorded on a good number of texts, if the phonetic monogram (A 559 = AB 80 + AB 26) and its ligatured variations are the prototypes for Linear B \*145 LANA.<sup>82</sup> These are all subjects which are extremely well represented ideographically in the Linear B texts, and we must suspect that their absence, at least the absence of spices, cloth and metals, from Linear A clay accounting documents may be a matter of chance or of the different archival status of the Linear A records. The bulk of our Linear A economic inscriptions comes from centers (Hagia Triada [1032 texts], Khania [197 texts], Zakro [32 texts], Arkhanes [7 texts], Tyliossos [2 texts], Pyrgos [2 texts], Keos [2 texts], Melos [1 text], Gournia [1 text]) that may be of a completely different administrative rank than the Linear B major palace centers. The economic records from the Mycenaean centers may have been expected to match up with the few Linear A accounting documents from the major Minoan neopalatial (post-MM II) centers: Knossos (6-10 texts, 5 tablets), Mallia (7-8 texts, 6 tablets), Phaistos (2-7 texts, 5 tablets). Centers of different ranks would certainly have had different record-keeping interests and concerns:

<sup>82</sup> Bennett (supra n. 79) 59, pointed out that, in neither text (HT 12 or HT 24) where the ligatured monogram A 559 (Lc 46) was then securely attested, did it precede numerals or function in any other way that would suggest an ideographic use. He therefore thought that the resemblance was fortuitous. Sacconi (supra n. 9) 64, likewise stresses the uncertainty of the identification of A 559 as LANA. One should note, however, that on HT 12.4 the sign appears in front of AB 118 (= M), the Linear B weight sign that occurs with LANA on KN Lc(2) 483 + *fr.*, Lc(2) 532 + 554, etc. On HT 24 the same "weight ideogram" AB 118 is found on the verso after a ligature of AB 13, which itself occurs next to A 559 in three entries on the recto. This lends some support to an identification of the Linear A and Linear B signs.

hence possibly the differences in the documented Linear A and Linear B ideographic repertoires.<sup>83</sup>

Even when subjects are common to the surviving Linear A and Linear B documents, the relationship between the writing systems may be difficult to establish with certainty. For example, both scripts represent vases by means of ideograms which appear to be fairly careful schematic drawings of the distinctive types of vessels. Consequently, as Vandenabeele has cautioned, it is not possible to conclude that Linear B vase ideograms are derived from Linear A forms, since, in fact, such signs in both scripts could be modeled independently on the actual forms of contemporary vases.<sup>84</sup> Indeed lifelike drawing is characteristic

<sup>83</sup> J.-P. Olivier, in a paper I received after completing the penultimate draft of this paper including the observations in the text above, "Structure des archives palatiales en linéaire A et en linéaire B," in E. Lévy ed., *Le Système palatial en Orient, en Grèce et à Rome. Actes du Colloque de Strasbourg 19-22 juin 1985 (Travaux du Centre de Recherche sur le Proche-Orient et la Grèce antiques 9, Leiden 1986)* 230-234, describes the subjects and concerns of the extant Linear A accounts and archives as "domainal" in contrast to the "palatial" or "state" accounts of the late Mycenaean period. As Olivier explains, the records of the Minoan second-order centers relate to local interests, to regional agricultural production, to relatively small-scale artisanal activities and, with rare exceptions (e.g., HT 31.5-.6), relatively small quantities of items or products. Given the fact that we have, from the major neo-palatial centers, at maximum 16 tablets, of which 14 are partially or extremely fragmentary, which altogether contain only 75 lines of text, some with only *vestigia*, and of which 2 (MA 4 and MA 6) do record quantities suitable for a palatial level of economic transactions, it is extremely hazardous to agree with Olivier's hypothesis that the post-MM II palatial centers kept their "palatial-level" archives on materials other than clay. Imagine the false impression one would have of record-keeping bureaucracy at Mycenaean Knossos and Pylos, if one were to judge the potential administrative applications of Linear B clay tablet archives on the basis of the quantities and subjects of a comparable number of selected Ae, An (e.g., An 5), Aq, Ea, Es, Fp, Fr, Fs, Gn, Qa, Ta tablets. Our understanding of Mycenaean palatial administration would be even more skewed than our present understanding of the Minoan, if we only possessed the 43 tablets from Thebes, all of which would have to be classified as "domainal." Of the 24 often very fragmentary tablets from Tiryns, only TI Al 7 gives any hint, by numbers of personnel listed, of a higher level of administration. The tablets from Mycenae also have quite localized interests. We would be completely mistaken to deduce from the Tiryns, Thebes, Mycenae, and selected Knossos and Pylos tablets that the Mycenaeans in LH III B did not use clay records for "palatial-level" administration. It therefore seems advisable to refrain from such speculation as regards Linear A record-keeping of the highest-order neo-palatial centers.

<sup>84</sup> F. Vandenabeele, "Les idéogrammes de vases sur les tablettes en linéaire A de Haghia Triada et Phaistos," *BCH* 98 (1974) 7. Hiller (supra n. 14) 192-193, deals with the chronological aspects of the same question.

of many of the "generic" ideograms that seem to have been created in the Linear B period (see below).

In my opinion then, keeping in mind the above provisos, Linear A and Linear B are much closer in their phonetic and ideographic repertoires than previous straightforward comparisons of the sign lists have suggested. It is also necessary to emphasize how close the two writing systems are seen to be in their working principles, once we take into account the different emphases of the surviving clay records in terms of subject matter and record-keeping aims. The clearest difference ideographically is the replacement of the Linear A signs for aliquot fractions (A 701 - A 743) by the Linear B signs for units of measure (\*110 - \*118 and, we must not forget, the basic commodity ideograms). This difference results from an adaptation of script to a different system of measurement. Consequently even so radical a change cannot be dated with certainty to the origin of the Linear B script, since it may have been a product of increased Mycenaean trade contacts with the Near East at a date subsequent to the invention of the script.<sup>85</sup> Unless the present data deceive us, the other ideographic changes are the invention of what I would like to call new "generic"

<sup>85</sup> We may note, for example, that the Nuzi texts share with the Knossos Linear B texts a special unit of measure for wool approximating 1/10 of a talent. K. Petruso, "Wool Evaluation at Knossos and Nuzi," *Kadmos* 25 (1986) 29, expressly and correctly resists the temptation to draw any direct economic connection between these two regions and systems, preferring to view this unusual similarity as the result of independent practical developments in these separate geographical areas. It is worth remarking that the meager documentation in Linear A gives no indication that the Minoans had this special unit as part of their ideographic metrical repertory. The special increment 3M is well established in the Mycenaean system of weighing wool. To my knowledge, there is only a single Linear B text (KN Od 7312) which possibly contains quantities in excess of M of LANA that fails to make the conversion  $M \ 3 = LANA \ 1$ . This covers a wide variety and large number of tablets, series, texts, contexts and scribal hands, even at Pylos (Un 853 [+]  
869). It is remotely possible that this failure in the Knossos records has something to do with the possible absence of this special wool increment in the Minoan system of weights. Somehow, in order to calculate shearings of Cretan wool, the Mycenaean might have come up with a special LANA measure that the Minoans had not themselves devised earlier from identical practical considerations. This extremely tentative line of reasoning would leave open the possibility of a Mycenaean borrowing from another culture, not necessarily Nuzi, say in the great period of expansion of Mycenaean trade into Anatolia and the Near East, LH III A (see below, n. 106). On the Nuzi-Mycenaean parallels, see also now J. L. Melena, "On the Linear B Ideogrammatic Syllabogram ZE," *Studies Chadwick*, 397-401, who stresses that the adoption of exclusive standards of weight for wool is a phenomenon seen in many cultures.

ideograms (e.g., \*104 CERV, \*105 EQU, and those for weaponry and armor: \*162 TUN, \*230 - \*234 [arms], \*240 - \*243 [chariots and parts thereof]) as well as the creation of new phonetic monograms (e.g., \*133 AREPA, \*135 MERI, \*156 TURO<sub>2</sub>). This is quite in keeping with the working principles of Linear A whose scribes would have responded in the same way to the need to record new kinds of goods and objects. Some of the rarely occurring Linear A ideograms mentioned above may in fact be local scribal inventions of this sort.

Moreover, the perspective we have now gained can be used to lay to rest any difficulties that scholars have had about the peculiarity of so-called Mycenaean "double writing."<sup>86</sup> It should not surprise us at all that the Linear A corpus, so far as we can conjecture from our limited and extremely hypothetical knowledge of the Minoan phonetic system, contains only one likely instance wherein an ideogram, either generic or monogram, occurs together with its full phonetic spelling on a text.<sup>87</sup> The extreme compactness and phonetic brevity of the surviving Linear A documents afford little occasion for such concurrences. The single words listed with ideograms must refer to the parties and places and economic conditions (taxation, distribution, collection, delivery, storage, repair, offering, etc.) related to the items listed on these extremely shorthand texts. It is only when we have the increased capacities of the Linear B tablets that we have an expansion of the lexical element sufficient to produce a more frequent, although by no means regular, concurrence of synonymous sign-groups and ideograms. Linear B scribes are quite content in many cases to achieve the same condensed brevity, even in long lists, as their Linear A clay-tablet predecessors. See, for example, the spare livestock and agricultural lists (PY Cn 285, Cn 436, Fn 50, Fn 79; KN E 749 + 5532 + *fr.*, Og 833 + 959) or certain personnel and commodity records (PY series Aa; KN series Fh, Fp, Fs) which do not contain any synonymous lexical identification of the livestock, commodity, woman, or phonetic (*TA*, *DA*) ideograms. Even in records that have fuller lexical components, e.g., Cn 40, An 654-724, we find no lexical

<sup>86</sup> Hooker, *Origin* (supra n. 9) 20-32, 71, makes a very complicated business of the juxtaposition of ideograms and phonetic word-units or abbreviations in Linear B in order to support the idea of a Cretan, hybrid origin for the script. See also W. Nahm, "Die Pleonasmen in Linear B und anderswo," *Kadmos* 9 (1970) 1-21 and n. 1 for earlier references.

<sup>87</sup> Duhoux (supra n. 9) 20-21, 59, n. 27; HT 88.2: AB 30 (= *NI*) preceding AB 67-AB 67-AB 06 (*ki-ki-na?*).

definition of the generic ideogram. Rather a particular description of the generic ideogram may be provided, e.g., *pa-ra-jo* of OVIS<sup>m</sup> and *e-re-ta* of VIR. Other instances of "double writing" occur when the lexical synonym for a generic ideogram or a lexical definition for an invented ligatured ideogram appears in a tablet heading, but not in any of the individual entries, e.g., *qo-o* and BOS in Cn 3, *ta-to-mo* and OVIS + TA in Cn 4, *si-a<sub>2</sub>-ro* and SUS + SI in Cn 608. Still others arise from direct attempts to coin new ideograms, for example:

(1) *tu-ro<sub>2</sub>* immediately preceding *TURO<sub>2</sub>* on Un 718.4, but not thereafter on lines .8 and .12;

(2) *ko-wo* immediately preceding the rare<sup>88</sup> phonetically ligatured \*153 on Un 718.4, but not on line.8;

(3) *a-re-ro* for *a-re-<pa>* before *AREPA* on Un 718.8.

We should also not lose sight of the fact that, in the new Linear B measurement system, the basic generic ideograms for certain commodities stand for the highest units of measure and sometimes for peculiar units of measure, e.g., LANA. So, for example, even if the line-by-line repetition of the ideogram GRA after *to-so-de pe-mo* in the Pylos En tablets were not easily explained as a convenient and advanced reference device, it would be worthwhile to point out that the entries on En 74.1, .11, .20, En 467.1, .3, .5, etc. require the presence of GRA as a unit of measure and that these occurrences set the format for this series of tablets.

"Double writing" requires no elaborate theoretical explanation. It is an outgrowth of the natural development of the Linear B clay records toward fuller information storage, fuller lexical description, and greater ease of information retrieval which led to line-by-line ruling, the repetition of standard formulae within set spatial formats, the careful spatial separation of individual entries, the stoichedon formatting of lexical and ideographic items within successive entries, and so on. The single Linear A example, which exists despite features of the Linear A clay records that severely limit the very possibility of "double writing,"

<sup>88</sup> This ligatured ideogram, seemingly a modification of the basic generic ideogram \*154 in the manner of the ligatured ideogram \*152, occurs only on this tablet at Pylos.

leads me to expect that we would find "double writing" on the presumably fuller texts of ephemeral records of the Linear A period.

I have argued thus far that:

1) there are no compelling reasons (palaeographical, phonological or structural) for dating the origin of the Linear B script to MM III or for viewing Linear B as anything other than a transformation of the Linear A writing system in its most advanced stage (LM I B);

2) there is a discernible development of Linear A character shapes from MM II to LM I B, and many of the later Linear B shapes have close Linear A parallels in the LM I B period;

3) the degree to which any of the Linear B forms are more elaborate may be explained by the creation of the script from archetypal forms and by conservatism due to the apparently greater emphasis placed on clay-tablet recording in the Mycenaean period; newly invented signs, particularly ideograms, also are more pictorial and elaborate since they have not been subjected to as much simplification through regular and widespread use;

4) there is a noticeable development of what we may call the information recording and retrieval techniques and capabilities on clay records moving from MM II (hieroglyphic and Linear A) to LM I B (Linear A) and then on into the Mycenaean III B period (Linear B);

5) the Linear A and Linear B phonetic repertoires are reasonably close to one another, much more so than previous purely statistical comparisons have suggested;

6) the differences in ideographic repertoires can be explained by: (a) the greater use of ligaturing on the extremely abbreviated Linear A clay texts, (b) differences in the kinds of subjects recorded on the surviving documents, and (c) the invention of generic ideograms in the Mycenaean period in response to the need to record new subjects [the Linear A vase ideograms and some of the rarely occurring ideograms (A 329 - A 371) may provide a parallel for this procedure in the Minoan period];

7) "double writing," which has been viewed as a special peculiarity of Linear B, results from: (a) the significant expansion of the lexical component in Linear B texts [though Linear A was undoubtedly capable of an equally full use of phonetic writing and may have exhibited "double writing" on fuller accounting documents], (b) the use of certain commodity ideograms as units of measure, and (c) the systematic use of ideograms as an information reference and retrieval tool in the carefully formatted Linear B texts.

The term development occurs explicitly or implicitly in all these arguments. I would stress that it is also essential to our understanding of the final three general points: the nature of the recovered documents, chronology, and historical considerations. Since these three points are related to one another at the most general level, I now take them up together in offering additional educated guesswork about the origin of the Linear B script.

First, it is not without purpose to stress that all stages of Minoan-Mycenaean writing are scripts used to record the operation of palatial systems. This fact has been recognized for Cretan hieroglyphic, which makes its first significant appearance in MM II Mallia at a stage when the site is in full expansion together with the other proto-palatial centers, and which is rightly termed by Godart and Olivier "l'écriture des premiers palais."<sup>89</sup> This is also true for Linear A, the earliest occurrences of which come from a similar early palatial environment (MM II Phaistos). Its *raison de naître* seems to have been decidedly economic: the script was needed to control the increasingly complicated transactions that were essential to the daily existence of the Minoan centers. The Minoans quickly merged the older and more basic controlling and recording procedures relating to seals with the increased capabilities of the full phonetic and ideographic script. We have inscribed roundels, scellés and nodules all in evidence by the MM III period. As we have seen, the scribes developed increasingly sophisticated formatting procedures into the LM I B period. Knowledge or at least the appreciation of writing also spread through the élite of Minoan society, if we are to judge by the use of script on

<sup>89</sup> J.-P. Olivier and L. Godart in J.-C. Poursat et al., *Le Quartier Mu* (ÉtCrét 23, Paris 1978) 25. Godart (supra n. 9) *SMEA* 20 (1979) 30, stresses the connection between the social, economic and political conditions associated with the development of the first Minoan palaces and the origin of Cretan writing.

religious and decorative artefacts.<sup>90</sup> Most importantly, the Minoan administrators seem to have used the script systematically throughout those regions that fell within their strict economic orbit: hence the *administrative* documents found at sites other than palaces, presumably sites at lower levels in the hierarchy of settlements, and at non-Cretan sites where a strong Minoan influence may be observed (MM III - LM I Melos and Keos).<sup>91</sup> The inscriptions on storage vases indicate the degree to which the writing system permeated other levels of economic activity. One should not be so incautious, however, as to conclude that literacy was widespread. It is more reasonable to propose that writing was fully exploited as a tool by a Minoan or Minoanized bureaucracy that was equally present at Pyrgos and Phaistos, Keos and Knossos, Melos and Mallia. The effects of so general and conspicuous a presence of bureaucratic administration are clearly observed in the imitation of linear characters, or at least of the concept of Minoan linear writing, by potters in MM II Quartier Mu (correspondence to hieroglyphic characters),<sup>92</sup> and in MM III - LM I B Keos,<sup>93</sup> Mallia,<sup>94</sup> Melos and Knossos.<sup>95</sup> Thus Minoan writing was known widely enough for potters to be aware not only of its existence, but also of its form.

How does this picture change when we look at the Mycenaean use of writing? How are we to place the origin and development of Linear B into a chronological framework? First, we must remember that we are dealing with palatial scripts and palatially focused regional economic

<sup>90</sup> John Bennet points out (written communication 6-24-87) that the use of Linear A on religious artefacts may not be totally separate from administration, since some of these objects may be associated with palatial (or state) cult. Still the find-spots of some inscribed tables of libation (e.g., PR Za 1, AP Za 1) in minor regional habitation sites indicates the extent to which even this application of writing made its presence felt outside of the strict limits of state cult at peak sanctuaries.

<sup>91</sup> This view holds whether one imagines that the Minoans in the neo-palatial period used clay or another medium for the higher order administrative records of the major palaces (supra n. 83). It is not, however, to imply that in MM III-LM I all records are controlled by the main palaces. The lower-order and island centers certainly would have used record-keeping for their own, strictly local concerns.

<sup>92</sup> Olivier and Godart (supra n. 89) 35, with reference to similar material from the SW excavations.

<sup>93</sup> A. H. Bikaki, *Ayia Irini: The Potters' Marks* (Keos IV, Mainz 1984) 22, plate 10.

<sup>94</sup> Marks similar in form to AB 08 and A 318 on MM III pottery from Mallia, Chapouthier (supra n. 54) 85-87, figs. 29 and 31.

<sup>95</sup> MELIAN: T. D. Atkinson et al., *Excavations at Phylakopi in Melos* (BSA Supplement 1, London 1904) 179; and A. J. Evans, *PofM* I, 561, fig. 408. KNOSSIAN: A. J. Evans, *PofM* I, 561, 643, fig. 477.

systems.<sup>96</sup> To judge by the extant data, which may be skewed by the non-preservation of ephemeral documents, the Mycenaean used Linear B primarily for recording the economic activities and concerns of the palaces. In the Mycenaean period, there exists none of the wider uses of writing that were typical of the Minoan: no religious or dedicatory inscriptions, no inscribed (graffiti) storage vessels, no trace of Linear B employed in areas where the Mycenaean by LH III B had a strong cultural or trade presence (e.g., Cyprus, Rhodes, the Cyclades, etc.), and, most significantly, no noticeable impact of the Linear B writing system upon actual potters' marks (as distinguished from the painted stirrup jar inscriptions) in the LH II - III B periods. Döhl's Tiryns catalogue and the collected Mycenaean pottery from Cyprus demonstrate the dominant use of Cypro-Minoan, rather than Linear B inspired, pot marks in LH III B.<sup>97</sup> The only marks known to me that we have good reason to believe *may* have used Linear B characters as models in the Mycenaean period occur as inscriptions after firing (Tiryns, Döhl nos. 88-93 [all III B], of which only no. 90 is without good Cypro-Minoan parallel) and painted (Tiryns, Döhl nos. 103 [LH I/II] and 107 [III B], of which no. 107 may be a decorative motif).<sup>98</sup> Moreover, we should keep in mind that the only examples of a broader effect of writing on the mainland from the Shaft Grave period onward are faint traces of the indirect influence of the Minoan tradition of writing: the LH II A masons' marks from the tholos at Peristeria; the III A/B masons' marks beneath Room 7 at Pylos and on the *krepis* of the Treasury of Atreus; the undated Linear A inscription from Hagios Stephanos (HS Zg 1); the inscribed sign on the bronze cauldron from Grave Circle A at

<sup>96</sup> A mere 0.19% of extant Linear B inscriptions may not have economic or administrative purposes. In contrast, at least 2.8% of Minoan inscriptions fall outside this sphere. See Palaima (*supra* n. 11) 500, 507.

<sup>97</sup> H. Döhl, "Bronzezeitliche Graffiti aus Tiryns I: vor dem Brand eingeritzte Zeichen," *Kadmos* 17 (1978) 115-149; "Bronzezeitliche Graffiti und Dipinti aus Tiryns II: nach dem Brand eingeritzte und gemalte Zeichen," *Kadmos* 18 (1979) 47-70. Most recently it has been suggested that a sherd from western Macedonia has incised signs in Cypro-Minoan, rather than in either of the Minoan-Mycenaean linear scripts. A. Panayotou, "An Inscribed Pithos Fragment from Aiiane (W. Macedonia)," *Kadmos* 25 (1986) 97-101.

<sup>98</sup> Perhaps we should consider, too, the characters that are incised on the base of the coarse pot PY Za 1392, and the graffiti *wa* on the false spout of a stirrup jar from Khania (KH Z 16). The latter, however, may be an actual phonetic abbreviation rather than a potters' mark.

Mycenae.<sup>99</sup> The much more restricted impact of Linear B suggests that we should limit our hypothetical explanations for the origin of the script as well. We cannot argue that trade contacts with the Minoans or even Mycenaean trade colonies in Minoan lands provided sufficient motive for the adoption of a complicated script that, so far as we can tell, was never employed, even at its most advanced stage, to monitor trade activities directly.<sup>100</sup> Yet the evidence of trade may be a crucial indirect indicator of the kinds of economic activities that would have brought Linear B into existence. We are looking for the point of economic take-off, as described by A. Gaur:

Societies which depend on coordinated labor efforts...which produce enough surplus to support a growing number of non-producing specialists, which assemble permanently in large and increasingly more densely populated areas (cities) need, sooner or later, some centralized form of organization; and centralized organization depends on an effectively functioning administration.<sup>101</sup>

<sup>99</sup> See E. Vermeule, *Greece in the Bronze Age* (Chicago 1964) 41, fig. 6, for illustrations of most of the above. For the Pylos masons' mark, see *PofN* I, 44, 94, fig. 16. H. Matthäus, *Die Bronzgefäße der kretisch-mykenischen Kultur* (Munich 1980) 89, discusses the Cretan provenience of the inscribed Shaft Grave cauldron. It should be noted that neither *GORILA* nor *CTLA* accepts this mark as a Linear A inscription. These marks provide no proof of the existence of an active writing tradition, Minoan or Mycenaean, on the mainland during the period MM III-LH I.

<sup>100</sup> J. T. Killen, "The Linear B Tablets and the Mycenaean Economy," in *Linear B* (supra n. 9) 262-270, emphasizes the almost complete absence of direct references to trade in the Mycenaean texts. Yet this, too, is a difficult area of interpretation since, for example, even in the far fuller and more diverse palatial and private archives of the Near East, information about trade is often extracted only indirectly from texts, such as inventories, registrations, records of "tribute" and of other specific categories of donation, that may supply the original or secondary provenience of items by way of description. See A. Archi, "Anatolia in the Second Millenium B.C.," in A. Archi ed., *Circulation of Goods in Non-Palatial Context in the Ancient Near East* (Rome 1984) 200. Still the Minoan-Mycenaean clay archives are so primitive and so extremely limited in subjects and types in comparison to Near Eastern texts that it is hardly unwarranted to assume that trade *per se* was never a major text subject and certainly not a direct motive for adopting and using writing. Contrast the Mycenaean-Minoan texts with the typological range of economic documents from Nuzi listed in C. Zaccagnini, "Transfers of Movable Property in Nuzi," *Circulation*, 141, n. 7, and with the range of texts from South Mesopotamia classified by J.N. Postgate, "Cuneiform Catalysis: The First Information Revolution," *ArchRevCam* 3:2 (1984) 8, fig. 2.

<sup>101</sup> A. Gaur, *A History of Writing* (London 1984) 16-17.

We must, I think, focus on the mainland centers and try to determine when their activities would have reached the point when their administrations could no longer function or function effectively without the assistance of written records. We shall then have an historical *terminus ante quem* for the use of writing by the Mycenaeans.

My own answer is LH II (late and post-LM I B), wherein we observe the economic and social organization and the concentration of power and resources necessary:

1) to begin to construct the large tholoi in Messenia, Laconia, the Argolid, Attica and Thessaly;<sup>102</sup>

2) to lay the groundwork for the trend toward the full-scale palatial architecture of the III B period: House 1 of the Menelaion (LH II);<sup>103</sup> Mycenae (earliest palace in LH I-II, radical remodelling in LH III A

<sup>102</sup> The evidence is neatly summarized and interpreted by P. Carlier, *La Royauté en Grèce avant Alexandre* (Strasbourg 1984) 22-25, 30-37. The change to building larger tholoi in LH II and following seems to indicate the emergence of specific centers of power within sub-regions of the Greek mainland, e.g., around Englianos, Peristeria and Kákovatos in Messenia; the Vapheio tholos and House 1 of the Menelaion 10 km. to the south; Mycenae, the Argive Heraion, Kazarma and, in LH III A or LH III, Berbati, Dendra and Tiryns. See O. Pelon, *Tholoi, tumuli et cercles funéraires* (Paris 1976) 176-194; O. Dickinson, *The Origins of Mycenaean Civilization* (SIMA 49, Göteborg 1977) 62-63. J. Wright, "Umpiring the Mycenaean Empire," *TUAS* 9 (1984) 62-63, calculates that advances in social, economic and political conditions and institutions during this period resulted in an increase from "a possible ten sites with wealth displayed in shaft graves or tumuli...to at least forty sites in LH II with tholos tombs." See also C. B. Mee and W. Cavanagh, "Mycenaean Tombs as Evidence for Social and Political Organization," *Oxford Journal of Archaeology* 3 (1984) 45-64, especially pp. 50-52, figs. 1-3, 5-6, for the dramatic increase in number of tholoi in LH II linked by the authors at least to an aristocratic élite, if not in all cases to individual rulers and their immediate families.

<sup>103</sup> H. W. Catling, "Excavations at the Menelaion, Sparta, 1973-76," *AR* 23 (1977) 29-31, interprets the evidence of later reused blocks and Palace Style jars from the House 1 area as proof of the existence of a "completely vanished monumental building of the late sixteenth or early fifteenth century B.C." The first phase of House 1 itself seems to be dated no earlier than the first half of LH II by the discovery of LM I B sherds in its foundation trenches. It went out of use before the construction of House 2 late in the fifteenth century B.C. Catling, *AR* 22 (1976) 14, thinks that the ceramic evidence "may suggest a date in LH II B for its [House 1's] building." Mycenaean pottery from the area of extensive occupation of the slope beneath and south of the Menelaion is continuous from LH II A, and well preserved LH III building remains were also identified in this area, *AR* 32 (1986) 29-30.

2);<sup>104</sup> Tiryns, Pylos, Argos (?), Midea, Phylakopi, Volos (Kastro = Iolkos) (all in LH III A);<sup>105</sup>

3) to produce the goods and materials necessary for the outburst of Mycenaean trade which begins in LH II.<sup>106</sup>

<sup>104</sup> S. Iakovidis, *Late Helladic Citadels on Mainland Greece* (Leiden 1983) 71, accepts the view of an LH I-II palace on top of the hill at Mycenae. In this he follows G. E. Mylonas, *Mycenae and the Mycenaean Age*, 58-60 and fig. 14, who in turn agrees with the observations of A. J. B. Wace, "Excavations at Mycenae," *BSA* 25 (1921-23) 147-282. Wace, *Mycenae: An Archaeological History and Guide* (Princeton 1949) 71-75, cites the evidence of an earlier wall in support of an LH I-II palace, almost all traces of which would have been obliterated by the reterracing and extensive remodeling done in preparation for the LH III A palace. The LH III A date is secure for the first phase of this later palace because of extensive pottery remains in the area of the court, megaron and its throne room. O. Dickinson, in J. Bintliff ed., *Mycenaean Geography* (British Association for Mycenaean Studies, Cambridge 1977) 72, cites the fresco material from the LH II A East Lobby Deposit at Mycenae as evidence of a proto-palatial structure on the site.

<sup>105</sup> TIRYNS: Iakovidis (supra n. 104) 5. The first megaron and ultimate overall architectural design of the acropolis apparently both had their beginnings in LH III A 1, AR 31 (1985) 21, AR 32 (1986) 26-27. PYLOS: *PofN* I, 94, and *PofN* III, 35-37, for the evidence, beneath Rooms 7 and 65, of a considerable LH III A structure. ARGOS: a megaron structure with frescoes and a secure LH III A 2 *terminus ante quem* reported by G. Touchais, "Chroniques des fouilles et découvertes en Grèce en 1977," *BCH* 102 (1978) 664. MIDEA: Iakovidis (supra n. 99) 22. PHYLAKOPI: C. Renfrew, "Phylakopi and the Late Bronze I Period in the Cyclades," in C. Doumas ed., *Thera and the Aegean World I* (London 1978) 411, 409 fig. 2, 405 table II. C. Renfrew and M. Wagstaff eds., *An Island Polity: The Archaeology of Exploitation in Melos* (Cambridge 1982) 41. Even ORCHOMENOS has a palatial structure by LH III A 2, AR 31 (1985) 31; and VOLOS has two successive large Mycenaean buildings in LH III A-B which are thought to be palaces, R. Hope Simpson, *Mycenaean Greece* (Park Ridge, New Jersey 1981) 161. In general, I think that the epigraphical and material evidence concur in supporting Dickinson's (supra n. 104) 22, cautious remarks about the earliest evidence for mainland palatial organization: "the fifteenth century may perhaps have been the seminal phase, particularly the later part [leading to] the foundation of the great palaces in Late Helladic 3A2, 14th century." Dickinson (supra n. 104) 72, would add the LH III A 1 structure at NICHORIA to the list of proto-palatial buildings.

<sup>106</sup> O. T. P. K. Dickinson, *The Origins of Mycenaean Civilization* (SIMA 49, Göteborg 1977) 102-103, links the increase in Mycenaean trade in LH II A-B with three factors: (1) the rise of many independent principalities on the mainland creating demand for raw materials and luxury goods; (2) the improved quality of Mycenaean pottery which made it competitive with Minoan wares; (3) the ability of at least some of the separate Mycenaean communities to organize their own trading fleets. Changes in social, political and economic organization and administration clearly underlie each of these trends and were no doubt required for and affected by the Mycenaean expansion, in terms of trade or settlement, into the

The restricted wealth of the Shaft Grave period at Mycenae and elsewhere, the evidence of increasing sophistication in the production and importation of luxury goods on and to the mainland in this same period, strike me as relatively limited developments in the sense that they could still be managed by traditional systems of control. The quantum leap of the succeeding period is clear proof of the need for writing and of the powerful boost in terms of improved organization and control of economic activity that the acquisition of writing in that period would have provided.<sup>107</sup> Here I would appeal indirectly to an

Cyclades, Rhodes, the Anatolian coast and the area of Troy, the eastern coast of Cyprus, Syria and Egypt which culminates in LH III A 2 - III B. See generally F. H. Stubbings, "The Expansion of the Mycenaean Civilization," *CAH* II, 2, 181-182. It is interesting, in this context, that J. F. Cherry and J. L. Davis, "The Cyclades and the Greek Mainland in LC I," *AJA* 86 (1982) 340-341, question whether the mainland polities in LH I "were sufficiently well organized to have exerted great political or economic power abroad." It is in LH II that we find the first well-documented evidence for Mycenaean wares in Anatolia, particularly at Troy (18% of Troy VI Mycenaean ware, 24% of all Mycenaean ware, is LH II), Clazomenae, Iasos and perhaps Mylasa. See C. B. Mee, "Aegean Trade and Settlement in Anatolia," *Anatolian Studies* 28 (1978) 125, 129, 142, 146-147, who also conjectures (pp. 134-135) that the transition from Minoan to Mycenaean at Miletus must have taken place in LH II B, judging by the total dominance of LH III A 1-2 pottery at the site after the preponderance of LM I A beforehand. In Cyprus, Mycenaean pottery makes a quantum leap in LH III A 1 / LC II A 1 (ca. 1425-1400 B.C.) according to the clear analysis of P. Åström, "Comments on the Corpus of Mycenaean Pottery in Cyprus," *Acts of the International Archaeological Symposium "The Mycenaean in the Eastern Mediterranean,"* (Nicosia 1973) 122-125 and fig. on p. 123. See also the more recent analysis by Y. Portugali and A. Bernard Knapp, "Cyprus and the Aegean: A Spatial Analysis of Interaction in the Seventeenth to Fourteenth Centuries B.C.," in A. Bernard Knapp and T. Stech eds., *Prehistoric Production and Exchange (UCLA Institute of Archaeology Monograph XXV; Los Angeles 1985)* 44-78, esp. 45, 48-49 and table 4-1. John Bennet kindly provided me with a reference to the paper of C. B. Mee, "A Mycenaean Thalassocracy in the Eastern Aegean?" in E. French and K. Wardle eds., *Problems in Greek Prehistory* (Bristol 1987) 301-306 which takes up some of these points.

<sup>107</sup> It is difficult to measure for a given society the effects of the use of writing upon its economic systems. A. Morpurgo Davies, "Forms of Writing in the Ancient Mediterranean World," in G. Baumann ed., *The Written Word: Literacy in Transition* (Oxford 1986) 55 and n. 9, expresses proper reservations about the application of quantitative formulae (certain percentage rates of literacy among the population under study) to determine the effects of literacy upon economic and social development. The Minoan and Mycenaean uses of writing offer good examples of how, in terms of real impact, "the 'quality' and uses of literacy are as important as its spread." In fact, pervasive geographical spread of a specialized literacy may be more significant than the spread of literacy for mundane purposes throughout a somewhat larger percentage of the population. Despite rather restricted percentages and applications of literacy in Minoan and Mycenaean

argument, albeit an *argumentum ex silentio*, put forward by Oliver Dickinson concerning the parallel system of economic control, seals and sealings. It is his sense from the distribution of seal finds and the absence of sealings in the Shaft Grave period, that the Mycenaeans were not yet putting seals to administrative use in this early period.<sup>108</sup> Although Pini objects to this as *ex silentio* reasoning, he himself argues that in LM I-II A the Mycenaeans attracted Cretan seal craftsmen to the mainland and eventually acquired the skill of manufacturing seals themselves, so that we see a larger Mycenaean component in motives from LM II onward.<sup>109</sup> I would suggest that it is no coincidence that the Mycenaeans attained such skills in LH II, that in fact what had begun as a luxury production had been converted, together with the advent of written administration at this time, into a production essential to an interlinked administrative system.

I would then see the Mycenaeans adapting the Linear A script and borrowing Minoan administrative techniques in LH II. There is no need to assume, as has J.-P. Olivier,<sup>110</sup> that the advanced techniques of tablet formatting that we observe in the LH III B documents must have been developed prior to the introduction of Linear B to the mainland. The fledgling Mycenaean palace bureaucracy would have adopted both the script and the principles for using the script at their current stages of development. We can then propose a process of development within the Mycenaean sphere. As we have seen, this process would have led to fuller and fuller use of clay tablet documents and gradually less reliance on complicated seal and sealing practices, both developments perhaps being responses to increased centralization, at least of recording, within the Mycenaean economy.<sup>111</sup> I cannot see any way of choosing, or even of favoring, Crete or the mainland as the place of origin of Linear B. Even if, merely for the sake of example, the

societies, writing was obviously vital for the management of certain economic and administrative affairs.

<sup>108</sup> O. T. P. K. Dickinson in discussion of I. Pini, "Minoische Siegel ausserhalb Kretas," in R. Hägg and N. Marinatos eds., *The Minoan Thalassocracy (Acta Instituti Atheniensis Regni Sueciae, Series in 4°, XXVIII, Göteborg 1983)* 131.

<sup>109</sup> Pini (supra n. 108) 126-127, who, however, would see the Mycenaeans making administrative use of seals from the beginning of LH I onward (pp. 170-131).

<sup>110</sup> Olivier (supra n. 9) 51.

<sup>111</sup> See T. G. Palaima, "Mycenaean Seals and Sealings in Their Economic and Administrative Contexts," *Tractata Mycenaea*, 249-266. This increased centralization is reflected in the subjects treated in the late LH III B Mycenaean tablets in contrast to the concerns of the majority of the surviving Linear A texts.

Mycenaeans became aware of writing through early contacts with the Cyclades or even through Minoan influence in Laconia and Messenia, the real impetus for the invention and implementation of a Greek system of writing and recording must have come from the complex activities of an expanding economic and political center. For this reason, Knossos and Mycenae must always remain the strongest candidates as the focal points of their respective regions. Each offers a compelling need for a Greek script by the end of LH II. At Knossos, the Mycenaeans would have encountered and been forced to assume control of a long-established economic system of considerable size, of which writing was only one, albeit the major, recording mechanism.<sup>112</sup> At Mycenae, one can imagine the dominant class tailoring the new script quickly to the

<sup>112</sup> This holds true whether Knossos was in control of all of Minoan Crete or simply its own territory, estimated at 1000-1500 square kilometers. See J. F. Cherry, "Politics and Palaces: Some Problems in Minoan State Formation," in C. Renfrew and J. F. Cherry eds., *Peer Polity Interaction and Socio-Political Change* (Cambridge 1986) 23-24. On the mere process of administrative transition on Crete in this period, whatever the historical explanation, see John Bennet, "The Structure of the Linear B Administration at Knossos," *AJA* 89 (1985) 244-245, and Bennet's contribution to this volume. For the differences in the administrative systems *per se* and a somewhat different view of the historical implications of these differences, see T. G. Palaima, "Preliminary Comparative Textual Evidence for Palatial Control of Economic Activity in Minoan and Mycenaean Crete," in R. Hägg ed., *The Function of the Minoan Palaces (Acta Instituti Atheniensis Regni Sueciae, Series in 4°, XXXV, Stockholm 1987)* 301-305. Here I must remark that Bennet's view (*AJA* 89 [1985] 231 and n. 4) of Knossos as the sole site in LM II Crete "centrally processing information on clay tablets" and the concomitant suggestion that information may have been recorded elsewhere, i.e., at smaller settlements, on perishable materials, are particularly dangerous arguments from silence, especially given our growing sense of the importance of *ku-do-ni-ja* (Khania) in western Crete and the presumed costliness of papyrus or parchment as recording media. It is also, we should note, exactly opposite to Olivier's proposal for the Minoan period, according to which the lower order centers used clay extensively, while the central palatial centers relied on ephemeral materials. While I do not think that the limited evidence allows us to support this interpretation of use of writing materials at Minoan administrative centers of the highest order (*supra* n. 83), I do believe that practical considerations would make it more likely that, in both the Minoan and Mycenaean periods, the basic kinds of information essential to the economic lives of lower-order centers and to their relationships with higher-order centers would have been recorded on a convenient, readily available, inexpensive and versatile material such as clay. Since this paper was completed, there has appeared the article by E. Hallager, "The Inscribed Stirrup Jars: Implications for Late Minoan III B Crete," *AJA* 91 (1987) 171-190, which should be consulted for further discussion of the transition to and organization of *Mycenaean* Crete in LM III B and for the topic of stirrup jar inscriptions (*supra* n. 50).

specific requirements of its regional economy and growing trade production.

I do think that the script itself was created by a single, but by no means drastic, transformation of the Minoan phonetic repertory, and by a straightforward borrowing of the non-ligatured, and perhaps non-metrical, ideographic repertory. Given the complete absence of any wider primary or secondary manifestation of Linear B writing at any period, the transformation probably took place either: (1) "from above," i.e., as a conscious directive by authorities of high status to devise a functional administrative tool; or (2) at least within the close confines of palatially oriented bureaucracies which then sanctioned the invention and continued to apply it to narrow record-keeping tasks. In either case, the Mycenaeans would have adopted the Minoan recording techniques as then developed, e.g., uniform dextroverse writing, simple tablet shapes and textual layouts. The metrical ideograms would have been changed at this same time, if the Mycenaeans were already using a system of weights and measures different from the Minoan. Subsequent developments, after these initial modifications of the Minoan script, would have been internal to the Mycenaean script and bureaucratic system: changes in phonetic values of signs, expansion of the ideographic repertory, changes in the types of texts and in formatting and general recording procedures. I, therefore, place after the invention of Linear B most of the changes that have previously been used to emphasize the radical nature of the transformation from Minoan to Mycenaean writing or to argue for a gradual evolution through separate stages to Mycenaean writing.

Such is my own educated guesswork. Like all the theoretical packages we surveyed at the outset, it undoubtedly has some flaws in its wrapping. I hope that these are detected and corrected, or at least disputed. For, if the highly tentative nature of theorizing is the problem with prehistory, it is also a major source of the intellectual interest we all share. Evidence, old and new alike, must be constantly reexamined. Theories must be scrutinized with equal regularity so that we may avoid the illusion of thinking we know what we do not know and so that we may construct new theories within the strict limits of knowledge, real

and most probable. This is not a formula for despair, but a recognition of the exciting challenge that awaits the *epigoni* of Mycenaean studies, if we follow the precepts of the wisest of our predecessors.

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