American Journal of Archaeology
Vol. 58, No. 2 (April, 1954)

MINOAN WRITING

STERLING DOW

PLATES 15-17

Inscribed to the memory of John Franklin Daniel

CONTENTS

See also: Obituary of A. E. Kober, under NECROLOGY.
Review of M. P. Nilsson, *Minoan-Mycenaean Religion*^{2}, under BOOK REVIEWS.

UNTIL lately no great amount of Minoan writing was available. Only about 200 inscriptions in the most developed script, which is "Linear Script B," had been published. "Linear Script A" was even less known. In 1945 all of Linear A was published, and in 1951-53 the texts have been printed of about 3400 Linear B tablets. During 1952, Pylos yielded an additional 350 Linear B tablets, and others, 39 in number, were found at Mykenai itself.

After a half-century of dearth, the specialists have an abundance of material, and there is much activity. Since the present article was first drafted, Linear B has been proved, by actual translation of at least four words, to be Greek. Linear A remains almost totally unread, but doubtless it is "Minoan."

The present article has three parts: bibliographical, textual, and an essay on literacy. The bibliography is intended first of all for non-specialists, but I have tried through it to make everything on Minoan writing accessible. One section, in the form of annals, provides a skeleton history of these studies from their beginning. The remainder of this part consists of reviews; these too are introductory.

The textual part is special. Continuing the reviews, it examines certain texts and provides a basis for some sections of the essay.

The essay on literacy is historical rather than linguistic. I hope that it can be read without study of the preceding parts. Literacy itself is a subject hardly tapped as yet; perhaps I should be pleased enough if in this part the right questions have been raised. One section gives the reasoning which persuaded me, before the linguistic evidence was known, that Linear B was Greek. As an example of historical and archaeological argument which has actually been proved correct, the reasoning may be of interest in itself; but more because, in giving the setting for Linear B (i.e. Greek) literacy, the reasoning necessarily goes beyond mere literacy, and proves that Greeks controlled the very Palace of Minos for at least a generation before they destroyed it.

Fonts. From *infra,* p. 88, it will be clear that the Linear B inscriptions from *Knossos* are now to be cited in *italics,* for instance *Ag01;* and those from Pylos in Roman, for instance Aa01.

Abbreviations, etc. A half-dozen important abbreviations of works bearing on Minoan writing will be found *infra,* pages 80-83. All other abbreviations of scholarly works are those of the standard list, *American Journal of Archaeology* 56 (1952) 1-7. Periods of the Bronze Age: E(arly) M(inoan); M(iddle) M(inoan); L(ate) M(inoan), L(ate) H(elladic), L(ate) C(ycladic), and, applied to the whole area, L(ate) B(ronze).

Transliterations from Greek, both ancient and modern, follow the principles adopted in the *Journal of Hellenic Studies* 67 (1947) xix-xxi, so that Knossos is preferred to Cnossus, Mykenai to Mycenae, and, with less pleasure, Ayia Triadha to Hagia or Haghia or Agia or H.Triada. For Arkhanais, instead of Arkanes (Trullos), I follow Pendlebury. As to the Hittite capital, the former spelling, adopted in e.g. *CAH,* viz. Boghaz Keui, antedates the Turkish adoption of Latin letters with standard spellings, in this instance Boğazköy. This rendition of the weak guttural *g* makes difficulties both for printers and for readers who are not linguists, so that it seems best to follow the advice of H. G. Güterbock (*per litt.*), which is to encourage Boghazköy.

"Minoan." Pedantic accuracy, and some good current usage, would compel the use of the full term "Minoan-Mykenaian" (or "Minoan-Mycenaean") when the whole is spoken of; but it seems better to use the simple term, as in "the Minoan civilization," unless there is need to emphasize that specifically Mainland contributions are to be kept prominently in mind. The reasons are: simplicity; uncertainty as to whether Mykenai really was the center of everything on the Mainland before the Mykenaian Age (LH III = LM III = LC III = L[ate] B[ronze] III); the fact that, since Pylos has provided ca. 920 tablets and Mykenai 39, students of script must speak not of Mykenai as the center, but of "the Mainland" as a whole; and especially the desirability of *not* having to say "Minoan-Mykenaian [or "Mainland-Minoan] Script B," or "A′" ("A prime").

MODERN STUDIES

Introductions and Bibliographies

Introductions. Any interested layman and every scholar who wishes an introduction could well read the following brief, well-illustrated articles:

(1) G. E. Mylonas, "Prehistoric Greek Scripts," *Archaeology* 1 (1948) 210-220. No previous knowledge is assumed in the reader. "Popular" in a good sense; covers the background for all the scripts. (The title should not mislead: it means, presumably, "prehistoric scripts in lands which eventually became, but were not all then, in any full sense, Greek.")

(2) E. L. Bennett, Jr., "The Undeciphered Minoan Script," *Yale Scientific Magazine* 25, no. 5 (Feb. 1951) 11-13, 24, 28, 34, 36, shows non-specialists what the best leads are for the decipherment of Linear B: the ideal beginner's article, with actual examples. Specialists will note the possibility that the nine towns of Pylos are listed (p. 24 and fig. 5). (Caption to fig. 9: *for* fire *read* five).

(3) A. E. Kober, "The Minoan Scripts: Facts and Theory," *AJA* 52 (1948) 82-103. A dispassionate survey of all the scripts just before the recent publications of Linear B.

Other brief and intelligent summaries are those of J. Sundwall, *FuF* 14 (1938) 25; and of G. Klaffenbach, *FuF* 24 (1948) 193-196, with bibliography and an interesting synthesis centered about Cyprus; and of L. Deroy, cited *infra*.

Scholars will note that all the early Near Eastern systems of writing — the setting for Minoan — are introduced by F. v. Bissing in the Müller-Otto *Handbuch,* I (1939) *Archaeologie* 147-181. Among the other languages of the area, E. Benveniste treats Minoan briefly in A. Meillet and M. Cohen, *Les Langues du Monde* (1952) 211-212; bibliography 223-224.

Bibliographies. The then principal works were listed by A. E. Kober in *AJA* 52 (1948) 82, n.2. *HT*(Carratelli, *MonAnt* 40 [1945] 422-610) mentions more special articles. *SM* II (Evans, *Scripta Minoa* . . . II) contains much. M. N. Tod's epigraphical surveys included this whole field: *JHS,* Vols. 34 (1914), 35, 39, 41 and biennially through 59, then 62, 65, 67, and 72 (1952). A useful 100-title list for the period down to 1950, i.e. the pre-Bennett period, is Appendix 5 of M. G. F. Ventris' *Mid-Century Report,* pages xxxi-xxxvi, cited fully *infra* under 1950. Most recent, and generous in its inclusion of archaeological and other peripheral matter, is the list in J. E. Henle, *Word Structure* (cited *infra* under 1953, fall) pp. 174-185. From this list a few titles can be added to the two inclusive bibliographies reported in the next paragraphs; but the book does not mention either Anstock-Darga or Deroy.

The field is a particularly difficult one for the bibliographer, because the material is scattered and some of it is fugitive. With extraordinary diligence, two inclusive bibliographies have been compiled. Louis Deroy, "Bibliographie critique des recherches relatives à l'écriture

---

Acknowledgments. I am grateful, for generous and expert scholarly help in this field, to E. L. Bennett, Jr., C. W. Blegen, H. G. Güterbock, J. Sundwall, and M. G. F. Ventris; to Mrs. J. B. Conant, for the first report, in July 1952, of Ventris' new studies; and to W. F. Albright, W. E. Caldwell, Miss H. M. Cam, J. H. Day, E. J. Doyle, J. P. Elder, G. H. Gifford, Miss C. Griffin, H. M. Hoenigswald, Miss L. B. Lawler, M. Reinhold, and A. J. B. Wace. The assistance of my wife and of my father, S. T. Dow, has been indispensable. The Editors have given me the pleasure of seeing this article appear in a journal which has long been generous to Minoan studies, beginning with accounts of the Archaeological Institute's own expedition and other articles on Crete in many early numbers, down through the excavation reports by C. W. Blegen, the Editorship of J. F. Daniel, the articles of A. E. Kober, the monograph by H. J. Kantor, the Symposium on Homer in 1948-1950, and Bennett's superlative article on fractions. The author thanks Harvard University also, which through the Provost, P. H. Buck, and the Administrative Committee of the Harvard Foundation for Advanced Study and Research, assisted with grants.

crétoise," *RHA* 8 (1947/8) 1-39, with additions in 11 (1951) 35-60, has 179 (the numbers run to 176, but three are double) titles listed under the year of publication and numbered; important ones are starred; there is an index of authors' names at the end (pp. 59-60). The terminus is early in 1951, but Mme. Anstock-Darga's bibliography (*infra*) had appeared and Deroy was able to utilize it. Compiled just on the eve of the recent publications of texts, these two bibliographies record opportunely the whole of the first period of the study of Minoan writing. Deroy's comments are often lengthy enough to be brief reviews. Most of them are agreeably acid; he believes in rigorous proof. His pages 55-59 are a good brief summary of progress. From Marouzeau's *AnnPhil* 21 (1952, covering 1950) some additions can be made, e.g. T. B. Jones, "Notes on the Eteocypriote Inscriptions," *AJP* 71 (1950) 401-407.

M. Anstock-Darga, "Bibliographie zur kretisch-minoischen Schrift und Sprache," *Orientalia (Pontificium Institutum Biblicum,* Rome) *NS* 20 (1951) 171-181, has a two-page introduction to recent attempts at decipherment, and a list of 177 books and articles, arranged alphabetically by authors' names, and including also some but not all important reviews; no commentary by the compiler. General works, linguistic and historical, even Nilsson *MMRel*^{2} (*Minoan-Mycenaean Religion,* ed. 2) and Pendlebury *AoC* (*Archaeology of Crete*) are expressly omitted, too inflexibly; Glotz' chapter on "L'Ecriture et la langue" in *La Civilisation Egéenne* (1924 [1923]; there is a new edition, not yet accessible to me), pp. 421-443 (*infra,* p. 108) should also be in, and the Index volume (V; 1935) to *PM*. Add also Klaffenbach, *FuF* 24 (1948) 193-196; A. Xenaki, article on the Linear B tablets [from Knossos] in the Giamalake Collection, *Kretika Chronika,* Tome A′, II (1947) 390-399; V. Georgiev, *Vorgriechische Sprachwissensschaft* I-II (*Annuaire de l'Université de Sofia,* Fac. Hist.-Philol., vol. 38 [1941/5] no. 6); and H. L. Lorimer, *Homer and the Monuments* (London, 1950) 122-131.

For A. E. Kober all older bibliographies are supplanted *infra,* pp. 83-84; for J. Sundwall there is a supplement *infra,* p. 85.

Annals of Discoveries, Scholars, and Publications

The object of the present section is to provide a useful kind of annals, putting bibliography (limited, but with full references for the works cited) into its setting, and relating discoveries directly to authors and publications.

The italicized abbreviations *SM, Py,* etc., printed in square brackets after the dates at the left margin are the abbreviations used herein for works bearing on Minoan writing.

1871-1876 The Cypriot syllabary of Classical times, the script of which was a direct descendant of the Cypro-Minoan script, was largely deciphered in these years by George Smith, and by Birch, Brandis, Deecke, Siegismund, Moriz Schmidt, and Ahrens. Their work was based on inscriptions which were Greek in language and in script, equated with other texts in the Classical Cypriot syllabary. See further *infra,* p. 101.

1894 A. J. (from 1911 Sir Arthur) Evans first visited Crete, and determined to excavate the site Knossos, primarily to find Cretan Bronze Age writing, which hitherto had hardly been recognized by anyone except himself. (For an account of Evans and Knossos, with some of his diary, see Joan Evans' biography *Time and Chance* 299-300, 308 ff.)

1894 Evans, "Cretan Pictographs and Prae-Phoenician Script," *JHS* 14, pp. 270-372. Reprinted 1895 (London, Quaritch). Further, *JHS* 17 (1897) 327-395.

1900-1904 Evans began the excavation of Knossos and within a month discovered great masses of Linear B tablets, some 2791 eventually. Early excavation reports in *BSA:* listed in Henle (*infra* 1953) 176; on the writing, see *infra* Evans *PM* (*Palace of Minos*); *SM* II (1952): and *Bennett, Ind* (*A Minoan Linear B Index*).

1902-1912 F. Halbherr and R. Paribeni discovered the Linear A tablets at Ayia Triadha.

1908 Pernier discovered the Phaistos Disk.

1909 Pernier published the Phaistos Disk, *Ausonia* 3 ('1908') 255-302. Bibliography and notes *infra,* p. 99.

1909 [*SM* I] Arthur J. Evans, *Scripta Minoa I: The Hieroglyphic and Primitive Linear Classes* (Oxford, Clarendon Press). The Pictographic texts: a *corpus,* still fundamental, but needing now to be extensively supplemented.

1913-(continuing) Articles and monographs by J. Sundwall; references *infra,* p. 85.

1921-1936 [*PM*] A. J. Evans, *Palace of Minos,* I-IV, and Joan Evans, V, *Index.* The various scripts are treated, especially in IV, pp. 591-769, 785-871; see also the *Index,* s.v. Script (an article composed by A. J. Evans).

1930 F. Chapouthier, *Les Ecritures Minoennes au Palais de Mallia* (Ecole Française d'Athènes: *Etudes Crétoises,* II). 36 inscriptions, mostly pictographic. Well published with photographs.

1933 Rhys Carpenter, *AJA* 37 (1933) 8-29, claimed that the absence of any Greek written in Phoenician letters datable earlier than ca. 725 B.C. proved that the Phoenician alphabet was introduced about then, and not (as had been universally supposed) much earlier. He showed further that the gradual extension of writing to record literature, law codes, and the like, accorded with this, or even with a slightly later date. Although much is still uncertain, since 1933 fewer and fewer scholars would put the beginning of the second period of Greek literacy (i.e. the borrowing of the Phoenician alphabet) earlier than 850 or 800 B.C., and there is still no conclusive proof that it antedated ca. 725. Accordingly if any Minoan script survived (outside Cyprus), then it must have survived over a far longer interval than used to be thought. *Infra,* p. 127.

1935 Publication of the Ayia Triadha tablets entrusted to G. Pugliese Carratelli. In 1941 he visited Crete and Greece, and studied the tablets; and later, in 1941, submitted his MS.

1936 G. E. Mylonas in *AJA* 40 (1936) 426-431, and also in *ArchEph* (1936) 61-100, published an inscription on an amphora found at Eleusis, which became the best-known Minoan inscription from the Mainland. The most recent note on it is T. B. Jones, *AJA* 55 (1951) 67.

1939 [*AoC*] J. D. S. Pendlebury, *The Archaeology of Crete* (London, Methuen). A model summary. The setting for the scripts.

1939 C. W. Blegen discovered 621 (inventoried) Linear B tablets at Epano Englianos (Pylos) in Messenia: "Excavations at Pylos, 1939," *AJA* 43 (1939) 557-576, especially 563-570. Full bibliography of announcements of the news, *FuF* 24 (1948) 195, n. 6. Publication of the tablets was later entrusted to E. L. Bennett, Jr.

1941 J. D. S. Pendlebury died, *aet.* 37. Obituaries: three, with portrait, *BSA* 41 (1940-1945 [1946]) 5-8; a fourth, *JEA* 28 (1942) 61-63. Partial biography: N. G. L. Hammond and T. J. Dunbabin, *John Pendlebury in Crete* (Cambridge, Eng., 1948). Last article, posthumous: "Egypt and the Aegean," in *Essays for David M. Robinson,* I, pp. 184-187.

1941 Sir Arthur Evans died, *aet.* 90. Biography: Joan Evans, *Time and Chance: the Story of Arthur Evans and His Forebears* (London, 1943). Summary: Joan Evans, "Sir Arthur Evans and Knossos," *Archaeology* 3 (1950) 134-139. Publication of *SM* II-III entrusted to J. L. (later Sir John) Myres.

1941 John Franklin Daniel, "Prolegomena to the Cypro-Minoan Script," *AJA* 45 (1941) 249-282. See the references for Cyprus, *infra,* p. 101.

1945 [*HT*] G. Pugliese Carratelli, "Le Iscrizioni preelleniche di Haghia Triada in Creta et della Grecia peninsulare," *MonAnt* 40 (1945) 422-610. A *corpus,* of the texts of Linear A, mostly from Ayia Triadha; and also the published Mainland texts, mostly on vases, of Linear B; Carratelli had not seen the Pylos tablets. For reviews, corrigenda, etc., and readings of the Arkhanais (Trullos) text, see *infra,* p. 101. The texts will be reprinted in letterpress in *SM* III (Myres, *Scripta Minoa* III).

1947 Helene J. Kantor, "The Aegean and the Orient in the Second Millennium B.C.," *AJA* 51 (1947) 1-103, pls. 1-26 (re-issued later, with five additional pages of appendixes [two] and index, as Monograph I by the Archaeological Institute of America; Principia Press, Bloomington, Indiana). The first full presentation of the case for extensive Mainland trade and power, at the expense of Crete, before 1400 B.C. Cf. Furumark 1950.

1948, Dec. J. F. Daniel died, *aet.* 38. Obituary: *AJA* 52 (1948) unnumbered pages before 485. His only published writing in the present field was his dissertation; see under 1941.

1949 M. G. F. Ventris produced and distributed privately a "Minoan A Syllabary Transcript Index" (address 19 North End, London, NW 3, England).

1950, Mar. [*Mid-Century Report*] Ventris edited *The Languages of the Minoan and Mycenaean Civilizations: Mid-Century Report,* London 1950. Published privately in mimeographed form with covers and distributed gratis. Pages text 56, appendixes xxxvi and 3 diagrams. Text: answers, in English or Englished, to an elaborate questionnaire, by E. L. Bennett, Jr., H. T. Bossert, G. P. Carratelli (a summary of parts of *HT,* not a new paper), V. Georgiev, E. Grumach, (A. E. Kober was asked but doubted its

value, p. 37), C. D. Ktistopoulos, J. L. Myres, E. G. Peruzzi, F. Schachermeyr, J. Sundwall. Appendixes: (1) Ventris' own answers; (2-4) other material; (5) bibliography of ca. 100 titles. *Infra,* pp. 98-99, with notice of Ventris' other writings, and p. 115.

1950, May Miss A. E. Kober died, *aet.* 43. Bibliography, *infra,* p. 84.

1950 Bennett, "Fractional Quantities in Minoan Bookkeeping," *AJA* 54 (1950) 204-222. Established the symbols for most of the fractions in both Linear A and Linear B. The article also contains Bennett's only expression of opinions thus far on several larger related questions. Written before he had seen the Knossos tablets. — See also J. Sundwall, Soc. Sci. Fenn., *Com. Hum. Litt.* 19, no. 2 (1953) 1-8.

1950, summer An inscribed tablet was discovered at Mykenai, the first to be found there.

1950, July-Aug. Bennett visited Herakleion, checked inventory numbers of the Knossos tablets, made joins; reported these to Sir John Myres, who included them in *SM* II. Bennett also reported that much else needed to be done, but it was decided, wisely, not to delay *SM* II longer. He copied a thousand small bits of tablets which Evans had not included (these are covered by *Ind* and will be published). He visited Athens and Oxford, testing and correcting readings of most of the known tablets.

1950 A. Furumark, "The Settlement at Ialysos and Aegean History c. 1550-1400 B.C.," *OpusArch* 6, pp. 150-271. Proves that the settlement is Minoan: a major historical contribution.

1950 [*MMRel*²] M. P. Nilsson, *Minoan-Mycenaean Religion,* ed. 2 (ed. 1 was published in 1927). Indispensable for the background, all that has to do with cult, and much else. Full title and review *infra,* under BOOK REVIEWS.

1951 [*Py,* or *Py 1951*] E. L. Bennett, Jr., *The Pylos Tablets: a Preliminary Transcription,* with a Foreword by Carl W. Blegen. Princeton University Press, Princeton, N. J., for the University of Cincinnati. Signs in texts and indexes drawn, then photographed; rest in typewriter font, except introductory matter in print. Pages xvi, 120. Paper covers. 8vo. $2.00. All the tablets found in 1939: texts as prepared from photographs, then corrected by inspection of the originals in summer of 1950. Index of *Py* now supplanted by *Ind.* Corrigenda: Bennett, *Minos* I (1951) 100-101. Review: E. Peruzzi, *Minos* I (1951) 150-152. Further notes *infra,* pp. 87-96.

1951 [*Minos*] Antonio Tovar and Emilio Peruzzi established *Minos: Investigaciones y Materiales para el Estudio de los Textos Paleocretenses* (Consejo Superior de Investigaciones Cientificas, Colegio Trilingüe de la Universidad, Salamanca). Articles, obituaries, reviews. At this writing the two (excellent) fascicules of Vol. 1 (1951) have appeared.

1951 E. L. Bennett, Jr., "Statistical Notes on the Sign-Groups from Pylos," *Minos* I, pp. 100-137. Systematic and elaborate computations of frequencies, with tables, of all important aspects. No conclusions expressed.

1952, Jan. [*SM* II] A(rthur) J. Evans, *Scripta Minoa: the Written Documents of Minoan Crete, with Special Reference to the Archives of Knossos:* Vol. II, *The Archives of Knossos: Clay Tablets Inscribed in Linear Script B, Edited from Notes, and Supplemented,* by J(ohn) L. (Sir John) Myres. Oxford, at the Clarendon Press. Pages of letterpress, viii, 114; then numerous unnumbered pages of: Index; Vocabulary; Tables 1-5; Line Drawings of Tablets B1-B1574; and Collotype Plates (numeration continued from *Scripta Minoa* I) XIV-XCI (XCII omitted), XCIII-XCVII. 4vo. £10/10/-: $42.00. A. E. Kober's Inventory according to contents of tablets was included, and E. L. Bennett's report from Knossos; but the text does not seem to have benefited from any but general knowledge of the Pylos tablets. Reviews: J. Sundwall, *Gnomon* 25 (1953) 176-180, dealing largely with interpretation; and *infra,* p. 85-87.

1952, spring Ventris turned from Etruscan to explore the possibilities of Greek as the language of Linear B. This was announced in his "Work Note 20" of June; and in the British Broadcasting Company's *The Listener* of 10 July, pp. 57-58. *Infra,* under 1952, fall, and pp. 98-99.

1952, May Bennett, "Corrections of *Scripta Minoa* II," dealing with the identifications of the tablets; with a list of additional references to the plates, to A. E. Kober's classification, and to the junctions made by Bennett in 1950. 14 quarto pages, stapled, with covering letter, privately distributed by the author (address: Box 1967. Yale Station, New Haven, Conn.).

1952, June C. D. Ktistopoulos, *Recherches,* proposed a number of equivalents of Linear B proper nouns in Greek (*infra,* p. 97).

1952, summer C. W. Blegen discovered 484 more Linear B tablets at Pylos (the figure is the number inventoried; joins have reduced it to ca. 350): *AJA* 57 (1953) 63 and pl. 36, fig. 14; Blegen *per litt.*

1952, summer A. J. B. Wace found 39 Linear B inscriptions, on tablets and one on a large vase, at Mykenai, in the House of the Oil Merchant. Photographs of three tablets and a preliminary account, *Illustrated London News* 221 (1952: 25 Oct.) 681-683; also A. C. Sedgwick, *New York Sunday Times Magazine,* 1952. (Wace's own accounts, *infra* under 1953). Publication entrusted to Bennett: see under 1953, Sept. Another unpublished [Linear B] tablet was reported in the Ashmolean Museum at Oxford.

1952, Sept. Bennett produced and distributed privately a card bearing on its two faces tables of all the Linear B signs, with variant forms and transcriptions of each. This card is reprinted in *Ind,* pp. 1 and 107.

1952, fall Ventris and J. Chadwick wrote the article which has been proved to offer the first successful translations of Linear B into Greek. *Infra,* 1953 spring.

1953, spring [*Ind*] E. L. Bennett, Jr., *A Minoan Linear B Index.* Yale University Press, New Haven 7, Conn.: published for the Department of Classics. Pages xxiv, 120. Paper covers. 8vo. $2.00. Indexes of other signs-in-groups, ideograms, and a reverse index. Scope: all Linear B texts known before Summer 1952, including all the (otherwise unpublished) new tablets and new readings made by Bennett in Summer 1950. These indexes supplant those in *Py* and in *SM* II. Lesser but vital features: Synopsis of the Classification (xii-xiii); List of Knossian Inscriptions (xiv-xxiv), all classified according to the system on pp. xii-xiii; a List (107), and Summary of the Uses, of Ideographic Signs (118-119). Review, *infra,* pp. 87-96.

1953, spring Ventris' and Chadwick's phonetic values, applied by Blegen in April to the tablet Pylos Inv. No. 641, unpublished and unseen by them, yielded several Greek words. Various lectures by Ventris and Chadwick, including one in London by Ventris on 24 June. On 25 June, an account and a notable editorial in the London *Times.* A subsequent good account of the decipherment is R. D. Barnett's, in *The Manchester Guardian Weekly,* 15 Oct. 1953, p. 7.

1953, summer Two or three more tablets found at Pylos: Blegen *AJA* 58 (1954) 29, 30, and pl. 7, fig. 8.

1953 T. B. Mitford in *Congrès* (cited *infra,* p. 101) on Cyprus.

1953 A. J. B. Wace, "The Discovery of Inscribed Clay Tablets at Mycenae," *Antiquity* 27 (1953) 84-86, with photograph of one tablet; "New Light on Homer — Excavations at Mycenae, 1952," *Archaeology* 6 (1953) 75-81, with photographs of two; *JHS* 73 (1953) 131-132. *Infra* p. 121; and next item.

1953, Sept. E. L. Bennett, Jr., "The Mycenae Tablets," *Proceedings of the American Philosophical Society* 97, no. 4 (28 Sept.) 422-470, including photographs of all; introduction by A. J. B. Wace.

1953, fall A. J. B. Wace, "The History of Crete in the Third and Second Millenniums B.C.," *Historia* 2, pp. 74-94. The most recent historical synthesis, critique, and bibliography.

1953, fall Jane E. Henle, *A Study in Word Structure in Minoan Linear B.* A Columbia University dissertation written under W. B. Dinsmoor. Address: Miss J. E. Henle, 299 West 12th St., New York 14, N. Y. Based on all the texts except the corrections published in *Ind.*

1953, Sept. M. Ventris and J. Chadwick, "Evidence for Greek Dialect in the Mycenaean Archives," *JHS* 73 (1953) 84-103. The crucial article. Reprints: address, Society for the Promotion of Hellenic Studies, 50 Bedford Sq., London, W.C.1; price, 5s. *Infra,* p. 98.

1953, late Carl W. Blegen, article on Pylos Tablet 641 (*supra,* 1953 spring), in a volume of essays honoring the late G. P. Oikonomos (Athens). The first objective linguistic proof that Linear B is Greek, in that some of Ventris' phonetic equivalents enable words to be translated. *Infra,* p. 99.

1954, spring Ventris, article in *Archaeology:* discussion of Pylos 641.

1954? [*SM* III] Sir John Myres, *Scripta Minoa* III. London, Society of Antiquaries, forthcoming. Linear A; also Cypro-Minoan and Mainland vase inscriptions. Texts to be printed in letterpress. No (?) drawings or photographs; will not supersede Carratelli's *HT* (*supra,* under 1945).

Bibliography of Alice Elizabeth Kober

An obituary appears in *Minos* I (1951) 138-139, and another (by J. Sundwall) in the *Jahrbuch für Kleinasiatische Forschung* 1 (1951), also E. A. Hahn in *Language* 27 (1951).

Add that she was a member of the Board of Advisory Editors of the *AJA.* To her memory are dedicated J. Sundwall's *Kleinasiatische Nachträge* and C. D. Ktistopoulos' *Premières*

Remarques sur les Inscriptions de Pylos. There is also a note *infra,* p. 97.

The following bibliography is complete down into 1947. I may have missed a few more recent reviews.

1932

1. *The Use of Color Terms in the Greek Poets, Including All the Poets from Homer to 146 B.C. except the Epigrammatists* (W. H. Humphrey Press, Geneva, N. Y.). 8vo. Pp. viii, 124. Columbia Ph.D. dissertation. Note on it, under Necrology, A. E. Kober.

1933

2. Review of F. E. Wallace, *Color in Homer and Ancient Art,* in *CW* 26, pp. 166-167.

1934

3. "Some Remarks on Color in Greek Poetry," *CW* 27, pp. 189-191.

1937

4. Review of W. B. Stanford, *Greek Metaphor,* in *CW* 30, pp. 146-147.
5. Review of J. Sundwall, *Altkretische Urkundenstudien,* in *CW* 30, pp. 206-207.
6. Notice (unsigned) of H. Bauer, *Die Alphabetische Keilinschrifttexte von Ras Schamra,* in *CW* 30, p. 217.

1942

7. "The Gender of Greek Nouns Ending in -inthos," *AJP* 63, pp. 320-327.

1943

8. "The Scripts of Pre-Hellenic Greece," *CO* 21, pp. 72-74.

1944

9. "The 'Adze' Tablets from Knossos," *AJA* 48 (not 43 as in *Orientalia* NS 20 [1951] 177), pp. 64-75.

1945

10. "Evidence of Inflection in the 'Chariot' Tablets from Knossos," *AJA* 49, pp. 143-151.
11. "Tiberius — Master Detective," *CO* 22, p. 37.
12. "The Cryptograms of Crete," *CO* 22, pp. 77-78.
13. "The 'Thracian Pig Dance'," *CP* 40, pp. 98-107 (in collaboration with Lillian B. Lawler).
14. Review of C. D. Ktistopoulos, *A Contribution to the Problem of the Minoan Script,* in *AJA* 49, pp. 605-606.

1946

15. "Inflection in Linear Class B: I — Declension," *AJA* 50, pp. 268-276.

1948

16. Review (written, or at least begun, earlier) of B. Hrozný, *Die älteste Geschichte Vorderasiens und Indiens*[2] and *Kretas und Vorgriechenlands Inschriften, Geschichte und Kultur — I, Ein Entzifferungsversuch,* in *AJA* 50, pp. 493-495.
17. "The Minoan Scripts: Fact and Theory," *AJA* 52, pp. 82-103.
18. Review of J. Sundwall, *Minoische Kultverzeichnisse aus Hagia Triada; Ueber Schilf- und Baumkult in den Hagia Triada Urkunden; Weitere Bemerkungen zu den Hagia Triada Täfelchen* I, II, III; in AJA 52, p. 303.
19. Review of G. Pugliese Carratelli, *Le Iscrizione preelleniche di Haghia Triada in Creta e della Grecia peninsulare* [*HT*], in *AJA* 52, pp. 302-303.
20. Review of H. T. Bossert, *Asia,* in *Artibus Asiae* 11, pp. 320-322.

1949

21. Review of D. Diringer, *The Alphabet, a Key to the History of Mankind,* in *AJA* 53, pp. 212-213.
22. " 'Total' in Minoan (Linear Class B)," *AO* 17 (1949 = *Symbolae . . . B. Hrozný,* I), pp. 386-398.

1950

23. "A Note on Some 'Cattle' Tablets from Knossos," *JKF* 1, pp. 142-150.
24. Review of B. Hrozný, *Les Inscriptions crétoises: Essai de déchiffrement;* and of V. Georgiev, *Le déchiffrement des inscriptions minoennes,* in *Language* 26, pp. 286-298. (For an important review of the continuation of the Hrozný item, see E. L. Bennett, Jr., in *AJA* 54, pp. 81-82.)

UNPUBLISHED

25. An article on the Minoan scripts and languages written at the request of the editor of the section on Mediterranean languages, H. M. Hoenigswald, for the *Dictionary of Languages* (general editors, U. T. Holmes and G. S. Lane). Submitted in 1947 or earlier. The need for this volume having been largely met by *Les Langues du Monde* (*supra,* p. 79), it is not being pushed at this writing. The article is said not to contain any novelties.
26. *The Element* -inth- *in Greek and Its Relation to the Pre-Hellenic Linguistic Stratum.* Unpublished typescript, 272 pages plus extensive bibliography at end. Now, with her other literary remains, in the University Museum (33rd and Spruce Streets, Philadelphia 4, Pa.). Developed, doubtless, from her paper of 1942 (*supra*); substantially complete by 1947. Publication was discussed at various times. I have not seen it. A detailed and reliable work on the Prehellenic component of Greek is one of the great needs.

Bibliographical Note on J. Sundwall's Studies of Minoan Writing and Related Matters, Down into 1953.

Johannes Sundwall's first series of studies accustomed him to the (by then) fairly exact methods of modern classical investigations. Drawing largely on epigraphical sources, he had produced two monographs, *Epigraphische Beiträge zur sozial-politischen Geschichte Athens im Zeitalter des Demosthenes* (Leipzig; *Klio:* Beiträge zur Alten Geschichte, IV [1906]); and *Nachträge zur Prosopographia Attica* (Helsingfors; Öfversigt af Finska Vetenskaps-Societetens Forhandlingar, 52 [1909/10], Humanistiska Vetenskaper). He had also produced an extensive monograph in the latter series (1906/7-1907/8), on the New Style Attic coins. Thus by 1913, the year of his first Minoan article, he had made expert contributions in epigraphy, prosopography, and numismatics: solid blocks for the foundations of taller structures. Sundwall was among the five scholars of whom W. S. Ferguson (*Hellenistic Athens,* x) said that he had neglected nothing they had written. This is not the place to dwell on Sundwall's other studies in the Classical field, in the *New Testament,* in the late Roman period; on *Weströmische Studien* (1915) or *Zur Vorgeschichte Etruriens* (1932). In the field of Minoan writing his numerous articles constitute a unique and splendid series. The list for the past forty years can be had from Anstock-Darga, *Orientalia* NS 20 (1951) 179-181, nos. 143-170, with the addition of the following titles:

Answer to Ventris' questionnaire, *Mid-Century Report* 55-56.

"Ueber einige Sachzeichen in den pylischen Täfelchen," Soc. Sci. Fenn., *Com. Hum. Litt.,* 17, no. 3 (1951).

"Sachzeichen und Symbole in Knossischen Rinderinventaren," *Minos* I (1951) 31-38.

"Die Knossischen Wageninventare," *Studies Presented to David Moore Robinson* I (1951) 16-20.

"Zu den Knossisch-pylischen Hohlmassen für Trockenes und Flüssiges," Soc. Sci. Fennica, *Com. Hum. Litt.,* 19, no. 2 (1953).

Review of *SM* II, in *Gnomon* 25 (1953) 176-180.

Another list of Sundwall's writings, through 1950, with convenient summaries and comments, is that of L. Deroy (*supra,* p. 79), who in *RHA* 53 (1951) 60 lists 29 items.

Though strictly it falls outside the limits of the present study, mention may be made of his important *Kleinasiatische Nachträge* (*Studia Orientalia,* ed. Soc. Or. Fennica, XVI, 1, pages 1-50; Helsinki 1950), which is largely a list of pre-Greek and non-Greek names of various kinds.

Review of A. J. Evans - J. L. Myres, *Scripta Minoa* II (1952)

This volume is abbreviated *SM* II. Bibliographical details, *supra,* p. 82, 1952, January and 1952, May. Though published after *Py,* it was not affected by *Py* and can be reviewed first, so that *Py* and *Ind* can be considered together.

Authorship and Condition of Material. Evans' own interest in Crete developed originally through his interest in its writing, and he had taken some steps toward the publication of Linear B. At different times he had arranged the tablets in different orders, e.g. by date of discovery, by subject matter, by some "alphabetic" system; and in a modified form of his final result — i.e. in no one order — they are now published. He had caused drawings of practically all of them to be made; over a hundred collotype plates to be prepared, with photographs of a good many but not most of the tablets; and a font of Minoan type to be cut. He had not completed any systematic and final attempt to join pieces together; to check all the numbers; to check the transcribed and drawn texts; or to record every smallest bit having as much as one sign on it. Nor had he arrived at a scheme of classification.

When in 1941 Myres began the heroic task of publishing objects then inaccessible, which offered scores of opportunities for error on every page, he faced a task which would strain the powers and patience of even a young specialist. He had only the drawings, photographs, and his predecessor's notes to go by. Naturally he retained the order, the drawings, the plates, and the font; and he built on what Evans had written in *SM* I and *PM* IV. The title page of *SM* II modestly gives Evans as the author, and names Myres only as having "edited and sup-

plemented." It is clear, however, that Evans had written little if any final, synthetic matter; what he thought about Linear B had gone into *PM* IV (Joan Evans, *Time and Chance,* 391). Apart from the documents themselves, this is Myres' book. Evans is frequently spoken of in the third person (often as 'AE').

There is reason to think that all has turned out fortunately. Evans had made his contribution. What Myres could give was wide-ranging theories — bold, but stopping well short of wholesale attempts at translation. It is good to have this: no student will neglect the lively pages (4-36) discussing sign by sign, nor those (37-74) on the Palace Archives. This introductory matter is the distinctively valuable part of the book.

Handling and Editing. Without imputing blame to anyone — things had to be as they had to be — one must say that the story of the tablets is on the whole a mixed one. Though the finding-places of most were recorded, still there are some without (pp. 107, 108, 111). Many joins were made, but Bennett, aided by a scheme of classification, was able to make many more; his transcripts are given after the Evans drawings; also a list, p. 101. A thousand small pieces, some with signs not seen elsewhere, were left unread; one page of them is published just before the plates. The collection ought to have been housed with care and kept united; instead, some few pieces have strayed to at least five other collections outside the Herakleion Museum (pp. 93, 108, 109). In the actual editing, the drawings are probably excellent work, considering that they were not executed by an expert. As to readings, not even an Evans could be right without repeated checkings from the tablets themselves. Myres has done a painstaking job of checking as best he could, and his pages of Critical Notes, 102-106, deserve high praise. I have examined many of the texts with the aid of the plates, and it is pleasant to report the finding of only two errors; of these Myres had caught one, and Bennett now has the other (*Ind*). The order which was adopted by Evans as the order of publication was rational only to a limited extent and more or less by accident. A. E. Kober convinced Myres that a rational Inventory should be inserted (pp. 75-89), with listing of all the tablets under Categories and Groups; but unhappily the scheme adopted is not that of Bennett, and the Knossos tablets were fated to appear, thirteen years after the Pylos discovery, without benefit of the Pylos texts. Bennett's 1950 summer visit to Crete resulted in remedying a few only of all these misfortunes, but he contributed a Concordance of Museum numbers (93-101), and other notes by him were included in *SM* II. His subsequent list of errata (*supra,* p. 82) found in *SM* II rectifies over 600 errors, largely "clerical," solely in matters affecting the identification of the tablets, without mentioning such vital aspects as readings, and without touching at all the introductory matter in pages 1-64.

The photographs vary considerably in quality. Some, like plate 68, could hardly be improved: its clarity is such that from study of the plate it is possible to see that no. 903 still needs cleaning, and that, when it is cleaned, line 2 will be wholly legible. No. 1088 is a scrap from a palm-leaf tablet preserving numerals for the next-to-largest number given in any known tablet, apparently 19,000(+?). No. 1088 happened to get photographed twice: poorly for pl. 84, so that the ideogram preceding the total, a sign mostly broken away and not drawn clearly, is invisible; but on pl. 76 the marks are well shown, and are clear enough so that close study may eventually change Bennett's restoration of it (*Ind,* p. 111, under *Dn*), which I think fits the traces, into a (dotted) reading. This fragment illustrates also the desirability of a thorough search for joins. Nineteen thousand is a considerable number of cattle.

Bennett has seen (*Ind,* p. 117) that six tablets, four Knossian and two Pylian, are records of tallying, among them *SM* II, no. 162. The photograph, again, is dim (pl. 27).

It may be added that having the plates in the same volume necessitates endless turning back and forth. If the volume had to cost ten guineas (a price not unreasonable considering all the factors) then another binding for the plates, with the proportionately slight additional cost, would be a vast improvement. Moreover the many different tables and lists —

too complicated to explain here — make the use of *SM* II no joy. The paging stops at 114, leaving the Vocabulary, Tables, and the Drawings without page numbers.

But when all the foregoing is realized, closer acquaintance leads to a better opinion; the mountain of clerical errors and other troubles is less formidable when the texts are studied one by one, and the student appreciates the amount of work which the volume represents. In details it will continue to be corrected, as here and there *infra* in the present article — the worst findings are on pp. 105-107, but this section deals with the very end of the whole *SM* II series, and to judge the whole book by it would be quite unfair. For at least a generation *SM* II will be indispensable for all scholars and institutions concerned in any way with Minoan writing. For beginners and laymen its drawings and photographs offer the most immediate and vivid approach to Linear B and to Minoan writing in general. Those persons interested in Cretan civilization as a whole will realize that *SM* II, a strictly Knossian volume (unlike *SM* I and *SM* III), is virtually a part of *The Palace of Minos* itself.

Review of E. L. Bennett, Jr., *The Pylos Tablets* (1951) and *A Minoan Linear B Index* (1953)

The first volume is abbreviated *Py;* some day it will have to be *Py* 1951. The second volume here under review, *Ind,* covers *Py* and *SM* II. Bibliographical details, *supra,* pp. 82-83.

In almost every detail of format the two volumes are alike. They are light, thin, and cheap. It is the ideal format for such contents — with the one grand exception, that photographs are lacking. Both volumes are scientific in tone, avoiding all unnecessary hypotheses. They invite, and they can withstand, drastically critical examination.

Number of Tablets. At the 1939 excavation, 621 tablets were inventoried as they came out of the ground. They were handled by B. H. Hill, C. W. Blegen, W. A. McDonald, M. MacVeagh (Mrs. S. Thorne), and others with extraordinary care. Later, G. Swift assisted the editor and Blegen in transcribing. The total number of tablets published in *Py,* counting the sealing Wr01 on p. 71 (mentioned in *AJA* 43 [1939] 569), and including one inserted number (Cn08a), would have been 601 if all the numbers in each series had been used. For instance, the series Ab runs from Ab01 to Ab45; but there is no Ab24, 33, or 36. In all, 36 numbers are omitted. *Ind,* p. ix adds one more Pylos tablet, Cn28. The whole total of texts in *Py* is 566. The shrinkage from 621 is due to the discovery of a great number of joins, first in the course of very elaborate cleaning and mending, then in the course of study. Thus category X, defined as pieces too incomplete for classification, shrank from 149 numbers to 125 actual pieces. The ultimate total figures are therefore highly creditable.

SM II had 1722 texts as numbered. About 1000 short texts from Knossos, unpublished except by Bennett in *Ind,* cause the Knossian list, presumably complete, in *Ind,* pp. xiv-xxiv, to run to a total of 2791. (Eventually joins will reduce this total.) These, with the 566 from Pylos, found in 1939, and the other then-published texts from the Greek mainland, make up a total for *Ind* of about 3400 texts. Since far less than 400 of these are "page" tablets (i.e., since few are lengthy), ca. 350 tablets found in the summer of 1952, not yet published, including doubtless many page tablets, are much more welcome than their proportionate number would indicate.

Contents of Volumes. Py consists of an introduction with the important statement of the main (capital-lettered) "Categories" into which the texts are divided; then the 565 texts with numbers but no other apparatus except notations of erasures; lists of signs, ideograms, etc.; and 35 pages of index, giving every occurrence of every sign-group. The two latter parts — the lists of signs, and the index — are superseded by *Ind,* except of course for the student who wishes an index of nothing but the Pylos tablets; but *Ind* makes advances here too, so that *Ind* must also be consulted even for Pylos texts.

The scope of *Ind* is very much broader. The

texts indexed include all those in *Py;* all the Linear B texts in *HT* (i.e. the Mainland ones outside Pylos: viz. Thebes, Tiryns, Eleusis, Mykenai [1950: pp. 4 and 56]; Asine is omitted [*infra,* p. 109]); all the texts of *SM* II except the final seven numbers (1716-1722; omitted with some reason: *infra,* pp. 105-108); all the readings which Bennett has corrected in *SM* II; and the thousand hitherto unpublished texts, mostly brief, from Knossos, read by Bennett. In short, *Ind* is complete for Linear B to the spring of 1952.

Moreover the volume contains an extension of Bennett's former system of classification (*Py*) to include the Knossian material, and also a synopsis (the first; pp. xii-xiii) of that classification. Another section (pp. xiv-xxiv) lists *all* the Knossian tablets according to this classification, thus giving the first such united list. There are lists also of all the signs (pp. 1 and 107). The indexes are based on these lists.

There are three indexes: of sign-groups (pp. 3-78), of sign-groups in reverse (pp. 79-106), and of ideographic signs (pp. 109-117), with a Summary of Ideographic Uses of Signs Used in Sign-Groups (pp. 118-119). There is no need to underline the immensity of these tasks, the interest of contents so rich, and the importance of the data.

Scheme of Reference to Contents of Py *and* Ind. With hesitation born of a sense of the great difficulty of constructing these lists of signs correctly, and knowing that decipherment may alter the order, Bennett gives no method of reference to any sign. For those who cannot sprinkle printed pages with reproductions of signs, some method of reference is necessary, and for present purposes I propose:

I. *Signs used in sign groups.* Number the signs in *Ind,* p. 1 in vertical columns, with 24 numbers to a column. Thus e.g. "Sign 72" will mean "a sign, used in a sign group, having the shape of one of the signs in *Ind,* page 1, third column, last row."

II. *Signs appearing as ideographic.* Number the signs in *Ind,* p. 107 in vertical columns, beginning with 101, with 25 numbers to a column (which involves assigning numbers 107, 170, 189, and 197 to spaces left blank by Bennett). Thus e.g. "Sign 201" will mean "a sign, used ideographically, having the shape of one of the signs in *Ind,* page 107, fifth column, first row."

To refer to texts, and to signs in texts, I follow Bennett in using italics for Knossos, Roman for Pylos, thus:

"Da1614" means *"Scripta Minoa* II, no. 1614, now classified in Category D, Group a, in Bennett's list, *Ind,* pp. xiv-xxiv." (In *SM* II it is on p. 107.)

"Gn01" means *"Pylos Tablets* (1951), the first tablet in Category G, Group n." (In *Py* it is on p. 47.)

"Gn01.3.1" means this same text, line 3, first sign in that line.

The basis for the classification into Categories and Groups will be discussed presently.

Principal Kinds of Characters. Apart from numerals, etc., there are just two principal kinds of characters in the Linear B script:

I. Signs-Used-in-Sign-Groups, i.e. signs appearing in groups of two or more such signs, as if to make up words.

II. Ideographic Signs, i.e. signs appearing before numerals, as if to indicate the kind of object, or unit, which is being measured or numbered, e.g. humans, cattle, measures. Ideographic signs can stand alone and have meaning, just as in modern currency £ means "pound" or "pounds"; and ideographic signs are modified, apparently, just as £E means "Egyptian pound(s)."

Numerals, etc. In addition, there are, in *Ind,* p. 107, at bottom:

Numerals, for 1, 10, 100, 1000, and 10,000 (but no sign for 0).

Interpunct, viz. a short low vertical stroke, regularly inserted, as in cuneiform, between words.

Checkmark (×) often entered against numerals *after* the tablet was baked or dried. Bennett is surely correct in taking this to be a checkmark and not, as hitherto, a zero.

I. Signs-Used-in-Sign-Groups. The list is *Ind,* p. 1, available also on a card. *SM* II also has a list, Tables I and II (introduction on p. 36; this list differs from, and should be used in preference to, the earlier version of the same, published in *AJA* 52 [1948] 94-95, and in *JHS* 46 [1946, pub. 1948] 1-4), which includes the ideographic signs; and also, carefully distinguished, the signs of Linear A.

There is nowhere, as yet, a thorough and reliable discussion of the origins of each sign, nor of the precise normal form of each (the best discussion yet is the valuable pages of *SM* II, pp. 6-36). *Ind* shows several variants for most of the signs, with column-headings to distinguish Knossian, Pylian, and other Mainland forms. The drawing is fairly free, the scale is small, and the impression conveyed is not always sharp, but familiarity improves one's opinion. Thus the signs in *Py* and *Ind* could be said to be conventionalized, as in handwriting. *SM* II, using letterpress, has "normalized" the forms: there are few variants, and the draughtsmanship is clear and handsome.

The essential differences between the two lists are considerable. Obviously only lengthy study, based on the originals or on photographs, could enable a source-based judgment between the two. It must suffice here to note that the Evans-Myres list was available to Bennett when he saw the Knossos tablets. The presumption is that the *Ind* list is always to be preferred unless there is evidence to the contrary; and in such instances as I am able to test, the presumption is correct. — For Linear A, Bennett has no list, but here the *HT* photographs afford a control.

Ind has 89 signs in its list of Signs-Used-In-Sign-Groups, and this figure may stand at present as the maximum total for Linear B. Some few signs, such as the last three, are uncommon: the Knossian sign, 87, is a newly identified shape (?) not fully recognized in *SM* II; 88 occurs only once, in *Py* Aa15; and 89 is unique, *not Knossian,* and possibly a variant of 41 (?; *infra,* p. 105). A few others in the list look like two signs in ligature; and, of course, several may be determinatives for case, gender, etc. But then Bennett would be the last to claim finality for the list; he emphasizes its primarily Pylian basis, as if ultimately many more Knossian variants ought to be admitted; and his other statements in *Ind,* p. vii, are also important.

In fact the *Ind* list is based immediately on that in *Py,* p. 82, with the addition of only ten signs in all, most of them peculiar to Knossos. One sign, 79, is not in the list *Py,* p. 82 at all, although it occurs twice at Pylos, being read and indexed in *Py* (En03.8.2 and Eo03.7.2): it and 88 were omitted from the list in *Py* through oversight.

II. Ideographic Signs. Ind, p. 107 probably supplants *SM* II, Tables I-II again for ideographic signs. Certainly *Ind* makes some slight advance on *Py*. Thus sign 210 was omitted from *Py,* p. 82, though clearly given by Mn03.7; it is an instance in which Knossos confirmed a reading and added a sign. The list of ideographic signs is naturally more difficult to fix and less stable than the list of group-signs, and it is not apparent why 122 appears again as 206 (indexed as if always used with 201, and thus distinguished ?), and 147 as 174. Others also look somewhat alike: Bennett has preferred to make a maximum list, and even, for instance, with nine vase-shapes grouped under three numbers (190-192) the whole list runs to 121 numbers.

Some of the Ideographic Signs (II) have the same shapes exactly as Signs-Used-in-Sign-Groups (I). In *Py* Bennett formerly admitted sixteen such identities as between the two groups, but the lists in *Ind* show that the three signs now numbered *Ind* 1, 15, and 59 have been withdrawn, and appear only in the list of Signs-Used-in-Sign-Groups. The thirteen identical pairs which remain are: 2 = 153, 13 = 147 and 174, 23 = 123, 30 = 133, 42 = 105.2, 44 = 163, 53 = 162, 54 = 104.2, 61 = 164, 65 = 134, 70 = 104.1 and 105.1, 74 = 201, 75 = 114.

For various reasons, the total number of different shapes of signs in the Linear B "signary," excluding numerals, etc. (*supra*), can only be given approximately. If it is useful to have *some* figure, ca. 199 appears to be the closest present approximation.

Signs-Used-in-Sign-Groups Used Ideographically. Some of the first kind (I) of signs can be used alone, or with an Ideographic Sign (II), like an ideogram. Such uses, summarized in *Ind,* pp. 118-119, involve many different signs, from 1 to 85, in tablets from Aa02 on through *U5653.* The uses vary. Sometimes the sign stands alone (alone, that is, with numerals), and may be thought of, loosely and partially, as being like our abbreviations. Sometimes the sign is in ligature. Sometimes, finally, the sign is used as an Adjunct.

Adjuncts. Ind appears to mark a considerable advance in recognizing, "within the class of ideographic signs, a new sub-class here identified as *Adjuncts.* These are signs (all but one normally in sign-groups) written usually before, but sometimes in ligature with, another ideographic sign, and sometimes standing alone where the ideographic sign may be readily understood. They seem to have the function of modifying the value of the sign, perhaps adding an attribute, e.g. of color, or size, or the like.... A careful study... will frequently give an inkling of their value" (p. xi). A promising field of work is here opened up. Inspection shows that the Adjuncts are the familiar signs of *Ind,* p. 1, the Signs-Used-in-Sign-Groups, and numbered herein *Ind* 1-89. They are used, as Adjuncts, most often singly (as in Ak610.1, where we find the sequence Sign 45 — Sign 103 — numeral; Sign 45 being the Adjunct). The Adjuncts are indexed under the Ideographic Sign to which they are attached; thus Sign 45 is given on p. 109 under Sign 103.

Principal Shapes of Tablets. There are two principal shapes:

First, the long, thin, narrow tablets with text running parallel to the length. This shape of tablet has been called, from what it possibly imitates, the "palm-leaf" shape; but the object is said to resemble a small billet of wood flattened on one side. There are usually only one or two lines of text, never more than four.

To palm-leaf tablets from Pylos Bennett has assigned, in *Py* and *Ind,* the 13 lowercase letters drawn from the first half of the alphabet, i.e. "a" through "m." (The classification for Knossos and for Mykenai takes no account of shape.)

Second, the tablets, taller than broad, with text running, as on a page of a modern book, at right angles to the longer dimension. Whatever their origin beyond Linear A, these tablets may be called "page" tablets. They may have as many as 29 lines (Kn01).

To page tablets from Pylos Bennett has assigned the small letters from "n" through "z." (Intermediate between these two, Blegen informs me [*per litt.*] is a distinct third category.)

There is no difference in content between palm-leaf and page tablets (Bennett, *per litt.,* comparing Eb26 and Eo04). All of the major categories of tablets contain both shapes. Palm-leaf tablets often have some of the first signs written much larger than the rest, and there are other devices to indicate relative prominence and subordination of items. These devices await, and obviously deserve, study; they cannot easily be specified in an index, which reduces rubrics and items to one size. Especially at Knossos, but also at Pylos, palm-leaf tablets are in an overwhelming majority.

It may be noted here, in sum, that Minoan epigraphy has begun with advantages over Greek and Latin epigraphy. Thus whereas *IG* II² 1028 (or, in the style now largely abandoned, *I.G.,* II², 1028) necessitates many symbols without denoting what kind or shape of inscription is involved, the "Cn" of e.g. "Cn28" denotes "found at Pylos, published in *Py;* subject, cattle; shape, page."

Basis and Quality of the Transcriptions. Py is sub-titled *A Preliminary Transcription.* Complications caused by the War prevented the reading of the texts from the tablets themselves; only photographs could be used. The photographs were by Miss Alison Frantz; none has been published, but their quality may be guessed at from their reported superiority to such printed reproductions as that of Gilliéron's photograph in *Archaeology* 1 (1948) 218. The editor is fully aware, however, that the best photographs in the world, such as these probably are, supplement but do not replace direct personal inspection. His procedure has been cautious; he has preferred to omit rather

than to guess. There is good hope that corrections of readings will not have to be numerous.

Many of the Linear B signs were still close to their pictographic origin. Repetition had made them regular, and even careless, in shape, but not yet simple. Their development, moreover, was left free by use of a point in writing — not a brush as in Chinese, or a wedge-shaped tool-corner as in cuneiform, or a straight chisel-edge as in most strokes in Greek inscriptions. The Minoan's point could apparently be moved in any direction with almost equal ease, to produce any shape. Some of the resulting shapes are as simple as our letters, but many are complex enough to be comparable, in degree of complexity, but not otherwise, to Chinese characters. Many of the Minoan shapes are dainty and delicate, with flower and bird shapes; the "signary" as a whole seems a true and a valuable reflection of the civilization which produced it. On the other hand, many signs are made up of numerous little lines and are fussy.

To record such characters is a problem. We have as yet no systematic study on the basis of which normal forms can be determined for each sign. Ideally such a study should precede the cutting of a new font of type, because letterpress involves "normalized" signs. *SM* II, as we have seen, gives only a few complete texts in letterpress, and its own index must be used sometimes to determine its editors' view of the true reading. This illustrates the disadvantage of drawings, which otherwise have value, because they are clearer than photographs, and not normalized like letterpress. The final edition should evidently give (a) a photograph, (b) a drawing, (c) a text in letterpress.

This final edition will be expensive, and as a temporary solution Bennett and others have taken advantage of the flexibility afforded by printing in forms other than letterpress. This enables the signs to be drawn by hand.

Bennett has developed a "hand" for Minoan rather conventionalized than normalized. No one who has tried to copy these signs, unless he has draughting talent himself, will criticize severely the transcriptions as they appear in *Py*. On the whole they are neat and legible, and it is perhaps of small moment that any student unfamiliar with the signs will have trouble at first. Such a student, attempting to make sure that the jumbled Un07.4.3 is really sign 167 (also Un09.2.4) must do much turning back and forth, with scanning of both lists to eliminate possible rivals. The signs Ea09.1.12 and 13 are only to be identified positively as sign 6 by reference to the index, p. 108. Defaced areas are not always carefully indicated: the slanting lines are drawn in haste, so that e.g. in Er01.5 hardly any space is allowed; whereas the same sign-group, indexed on p. 85, top of column II, allows a full space. Other small flaws could be cited, such as may hinder briefly the progress of a beginner. After that, i.e. when the shapes are familiar, the difficulties largely disappear, and the excellence of Bennett's hand becomes evident.

Accuracy of the Readings. Photographs of just eight of the Pylos tablets have been published (list, *Py*, p. ix), only four of them in places easily accessible (*AJA* 43 [1939] 565-568; one is repeated in *Archaeology* 1 [1948] 218 and also, though Bennett has not listed it, all four are repeated in *HT*, pls. 27-29; the other four are much less clear, three being in *ILN* of 3 June 1939, p. 980, and one, barely legible, in a pamphlet published by the American School), and incidentally without scales or any specific indication of size (cf. *ibid.* 566): presumably the four are shown at about actual size. (We have not been told the precise dimensions of any one of the Pylos tablets.) The present volume is inexpensive: everyone is grateful, but surely everyone really interested would pay four times as much to obtain a photograph of a representative of each sub-group.

To check readings, I have collated the eight published photographs with the transcriptions. Some of the photographs as printed are not clear enough to enable many of the signs to be positively identified, but so far as I could determine, seven of the texts seemed flawless, and I give here the only notes which seemed worth making on the other, Cn04.

Line 4. By error presumably, the eighth sign is made like the ninth, one cross-bar of the eighth being omitted. The transcription has two cross-bars.

Line 11. First numerals: the transcription

omits four (vertical) unit signs, amply clear on the photograph, after the four (horizontal) signs for 40.

Line 14. The first sign, half broken away, should be shown as indented one space — to allow for the rounded corner.

It will be seen at once that very few lines are affected, and that all the defects but one are trivial, viz. the omission by which the first numerals in line 11 are made to read 40 instead of 44. This is not perfection; checking should have caught this error. On the other hand, it is one omission among many hundreds of correct readings in the four texts tested: the degree of accuracy is impressive. In any comparable body of printed Greek epigraphical texts, many more errors in readings would be expected. Moreover, works dealing with an unknown language like the present are particularly liable to error: see *AJA* 52 (1948) 104-106 and *SM* II (*supra*). As to Cn04 it may be worth remarking that Bennett's photograph is evidently superior to the one in *AJA,* which in printing has lost many of the × check-marks read by him; and he has been able not only to discover erasures here and elsewhere, but also to read what was "erased."

Restorations. The texts are given entirely without restoration. For the index in *Py,* and doubtless for *Ind,* a policy is announced (*Py,* pp. xii, 81) of including in the index such restorations as will "show where other examples of known sign-groups *may* have been written," in contrast with the texts, which attempt "to present only what is reasonably certain." I italicize the dangerous word, and note an example to show to what lengths the principle is carried. The sign-group On01.5 superscript contains four signs and is preserved in only this one instance. The fourth of these signs, but not the other (preceding) three signs, occurs in On01.3 (twice) and in On02. Bennett restores all four signs in each of these three places, space permitting. Nothing would seem, to a Greek epigraphist, at first glance, to be more hazardous. Study will show, however, that the editor has some reason. All the instances just cited, as best one can gather from the texts, are superscript (or interlinear). The fourth sign, itself, which is 53, appears as the final sign of a Pylos sign-group only four other times in the entire book (Na70, Ep02.5, Xb06.1, An18.r8; note also An39.3, Xn22.3, Jn02.12, all incomplete?); and none of these is in the O category. Moreover, most of the longer inscriptions, of which On01 is one, exhibit a high degree of scribal regularity (cf. p. xii). For these reasons, restorations which in Greek epigraphy would be regarded as extremely dubious may well be justified in a Minoan *index,* to which Bennett has thus far confined them; the commentaries eventually will explain, and restorations can be included in, the texts themselves. Bennett has, moreover, not printed many even in the index.

The restorations thus far considered are given solely within square brackets, and are made only to fill out words when one or more signs are preserved. Other restorations are indicated by pointed brackets, where the letters are "restored, or expanded from apparent abbreviations." Evidently here also a commentary is needed to explain. Even fewer restorations within pointed brackets are suggested, and we must wait for the commentary to understand the basis for many of them. I do not doubt that a basis exists.

Cautious students will note that incomplete sign-groups are given twice in the index of *Py* if restoration seems possible. Thus for instance the two signs Kn01.11.4 and 5 appear in the second line of the index in *Py,* p. 112, but to find the (well-supported) restoration, one must search back seven entries. In practice this is usually not hard; but now that *Ind* is much bigger, it seems more necessary to indicate possibilities of restoration under the entry proper, as well as under the full restored form. Even as it is, one could easily overlook the fact that On02.1 superscript, a single sign, indexed in *Py,* p. 105, second line from end, is restored on p. 112, first line. For *Ind* the Reverse Index gives help.

Clerical Accuracy of the Books. For *Py* Bennett has himself corrected several errors (*Minos* 1 [1951] 100-101), has incorporated these corrections in *Ind,* and he has three others to note (*Ind,* p. ix). He now adds *per litt.* (3 Aug. 1953) the following:

p.18 delete An40 entirely.

p.21 Cn04.11 for == read ==

p.33 Eb30.2 for read .

p.35 delete Eb44 entirely.

p.80 delete Xn89 entirely.

p.90 s.v.  omit Xn89.1.2.

p.96 s.v.  omit Eb44.1.

p.115 svvv.  omit Eb44.1.

In studying *Ind,* allowance should be made for new readings by Bennett; and for the general rule that the indexing of an adjunct does not imply the presence of the matrix — which, if present, will be specifically indexed.

Again with extraordinary generosity, when I had failed to find in *Ind* any error among the hundreds of opportunities for error on every page, Bennett has sent *per litt.* (3 Aug. 1953) the following list, on which he received help primarily from Ktistopoulos, Ventris, Peruzzi, and Chadwick (columns are lettered A-F from left to right; in Vocabulary, items are numbered in the column; in Reverse Index, the lines are numbered):

p.xixC for L 1621 read Dw1621.

p.xxiA s.v. Da5038 add 658, omit Dw5039 658.

p.xxiD s.v. Sc5170 for 730 read 1206.

p.xxiiF insert Fh5497.

p.xxiiiF for U 5780 read Ga5780.

p.xxivA omit Ga5806.

p.7B22 for read .

p.9B2 s.v.  add Fh5497.

p.19A23 s.v.  add (cf. Py ).

p.20A1 s.v. omit Xn89.1.2.

p.32B26 s.v.  omit Eb44.1

p.36A20 s.v. for L 1621 read Dw1621.

p.69B16 s.v. for L 1621 read Dw1621.

p.74B21 s.v.  omit Eb44.1.

p.77B9 for  read .

p.78A9 omit second occurrence of  etc.

p.78A14 for read  .

p.79A16,17,18 omit  .

p.79B22 for read  .

p.81B34 for  read .

p.82C20.5 insert  .

p.83A0.5 insert  .

p.87A14,15 for  read  .

p.87C7 for read  .

p.88A18 for read  .

p.88C26 for read  .

p.91B10 for read  .

p.92C30 for read  .

p.93A4.5 insert .

p.95B34 for  read .

p.97B10 omit  .

p.97D8 omit .

p.98B22 for  read  .

p.98D35 for read  .

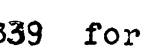
p.99C21 for read  .

p.99D21 for read  .

p.99D23.5 insert .

p.100C9 omit  .

p.104A5.5 insert .

p.104B39 for  read .

p.110B1 s.v.  , Da for <5038> read 5038.

p.111A s.v. Dw add 1621, omit 5039.

p.113A2 s.v.  , Eb omit -44.

p.113B3 s.v.  , Ga add 5780, omit 5806.

p.114A2 s.v. , Fh add 5497.

p.115A2 s.v.  , M for 557 read 559.

p.115A3 s.v. ADJUNCT  , Od transpose 5731 before 5733.

p.118B19 delete  U 5780.

To clear the record, the present paragraph deals with other omissions in *Py* which G. E. Mylonas has ably detected in his review of *Py* (*CJ* 48 [1952/3] 146). The sign missing in *Py*, and missing also, due to a printer's error, in the *CJ* review, is now present as 79 in *Ind*, p. 1. Of the three words alleged to be omitted in *Py*, Bennett himself had caught all three, and a few others, in *Minos* 1 (1951) 100. The first is misprinted in *CJ* as En01.1 (first word), but this word is in its place in *Py* on p. 97; *CJ* evidently should read Fn01.1 (first word). The second omitted word is cited correctly in *CJ*, but the third, given in *CJ* as from Eg01, involves another misprint, since there is no Eg class at all. The reading should presumably be Eq01.6 (second word). In short, there are no omissions detected in the *CJ* review which have not been made good in *Ind*.

Classes of Tablets According to Content. As in the case of the shapes of the signs, Bennett has imposed his scheme derived from Pylos upon the Knossian material. Categories had already been made up for Knossos by A. E. Kober (*SM* II, pp. 75-89), and as Bennett says (*Ind*, p. x), her scheme should not be neglected; but Bennett's is simpler and neater and avoids more than a bare minimum of assumptions. He has outlined it for Pylos in *Py*, pp. xi-xii, and has given a synopsis of the whole in *Ind*, pp. xii-xiii.

The principle of division is the occurrence of one (or if related, of more than one) dominant Ideographic Sign(s). In point of fact, no one sign constitutes a Class except the small and exclusively Knossian Class B. All the other Classes are constituted by a multiple number of related signs, except Class V, which is the Class of tablets with no dominant Ideographic Sign at all.

The Classes are denoted by the capital letters "A"-"Z" for Pylos, *"A"-"Z"* for Knossos; with five letters left unused for future additions. All of the Classes except B and Z are divided into sub-groups, denoted by lower-case letters added to the capital letter which designates the Class. Thus Aa, Ab, Ad, Ae, and An are the sub-groups of Class A from Pylos. The Pylian origin is denoted by the Roman letters. Sub-groups *Ag, Ai, Ak, Am, Ap,* and *As* are the ones from Knossos, as the *italics* denote. At Pylos, Aa, Ab, Ad, and Ae are the palm-leaf tablets of Class A; the others, from An on, are page tablets. The distinction e.g. between Aa and Ab has not been set forth by Bennett, but is in all such cases a distinction of apparent content.

The Classes and the Numbers of Tablets in Each. It may be useful to attempt here, since it appears nowhere else, a brief account of the Classes, giving their (capital-)letter designations, their general subject matter, and a count of the number of tablets assigned to each Class

from Pylos 1939, published in *Py 1951;* and from Knossos, published in *SM* II and assigned to classes in *Ind,* pp. xiv-xxiv. Omitting Class Z as irrelevant here (*infra,* pp. 105-108), the total number of tablets considered is 566 + 2791 = 3357 (*supra,* p. 87), which is taken as 100% in the reckoning of percentages.

Class A. Humans: signs for men, women, boys, and girls. Knossos, 156; Pylos, 129: the largest of the Classes at Pylos. Total, 285 tablets (8.5% of the total 3357).

Class B. Sign showing a seated person. Knossos only, 43 tablets (1.3% of the 3357).

Class C. Animals of various sorts, domesticated and (as they appear) wild. Knossos, 57; Pylos, 32, all page tablets, classified Cn. Total, 89 tablets (2.7%).

Class D. Also animals, various. Knossos only, 772 tablets (23.0%); the largest of the classes at Knossos, except for unidentified fragments (Class X, 776).

Class E. Commodities, all measured by the same standards. The E tablets are all alike and all Pylos (Ea, Eb, Ec, etc.) except the Class *E* (no sub-group) of Knossos. Knossos, 26; Pylos, 107. Total, 133 tablets (4.0%).

Class F. Commodities, various, measured by the same standards as E. Knossos, 157; Pylos, 10. Total, 167 tablets (5.0%).

Class G. Commodities, various, measured by a similar and related, but different, set of measures. Knossos, 73; Pylos, only 1 (Gn01). Total, 74 tablets (2.2%).

Class J. Commodities measured by yet another set of measures, not related to those of E-F or G. Knossos, Class *J* (no sub-group), 3; Pylos, all Jn, 9. Total, 12 tablets (0.4%).

Class K. Ditto. Knossos, Class *K* (no sub-group), 13; Pylos, all Kn, 2. Total, 15 tablets (0.5%).

Class L. Ditto. All Knossos, *Lc, Ld, Le, L,* 162 tablets (4.8%).

Class M. Ditto. Knossos, *Mc, M,* 33; Pylos, Ma, Mn, 22. Total, 55 tablets (1.6%).

Classes N-O-P. Meanings yet to be determined. Knossos, 119; Pylos, 91. Total, 210 tablets (6.3%).

Class R. Weapons. The "sword" tablets: *SM* II, pp. 23, 57-58, 85 (in the index to *SM* II, p. 113, s.v. sword signs, for 93 read 85). *Ra,* 22 tablets. Also "javelin" and "arrow" tablets, *SM* II, pp. 58, 85 (in the index to *SM* II, p. 113, add 85 s.v. Javelin): *R,* 2 tablets. Total, 24 tablets (0.7%). All this class are from Knossos.

Class S. "Chariot" and related tablets. Knossos, 189; Pylos, 6. Total, 195 tablets (5.8%).

Class U. Tablets containing a mixture of signs. Knossos, 46; Pylos, 15. Total, 61 tablets (1.8%).

Class V. No Ideographic Sign; but numerals are present. Knossos, 100; Pylos, 9. Total, 109 tablets (3.3%).

Class W. Labels and sealings, mostly on basketry. Knossos, 42; Pylos, 8. Total, 50 inscriptions (1.5%).

Class X. Too fragmentary to classify. Knossos, 776; Pylos, 125. Total, 901 tablets (26.8%).

Class Z. Painted on pottery; late; some dubious, only one certain. Various sites. See *infra,* pp. 105-108.

The significance of the relative totals is potentially considerable, but at the present stage it is limited by the prospect of future discoveries, and by the reflection that chance has played some part. The sword tablets, for instance, happened to be preserved together, and happened to be discovered. Again, the large numbers in Classes N, O, P, U, V, and X, none of which has yielded positive meanings, will upset the present proportionate figures if meanings are ever established.

Some Recent Essays

No attempt is made here to review all the studies in the field since 1950, but only to notice briefly, without drastic testing, a few samples. The work of Georgiev illustrates one type of attack, which relies on context, philological associations, and sheer inspiration. Following a different method, the more valuable works of Ktistopoulos (*infra*) rely primarily on full and accurate study of the individual signs as they occur in the whole body of data. He has also written "A Minoan Name" in *Studies . . . David M. Robinson* I (1951) 21-22. Ventris

earlier found that Etruscan seemed to offer the best hope of phonetic equivalents; but after *Py* appeared he changed to Greek, with success.

Vladimir Georgiev, *Inscriptions Minoennes Quasi-Bilingues (Annuaire de l'Université de Sofia,* Faculté Hist.-Philol., Tome 46 [1949/50], Livre 4). Pages 86, with figures 32 in text. 8vo. Letterpress.

This study proceeds directly to suggest phonetic equivalents and words in known languages, mostly Greek. *HT* was available, but not of course *Py, SM* II, and *Ind;* the inscriptions treated are listed on pp. 62-63. The words are studied in context, beginning with horse- and sword-tablets where the meaning of the principal sign is clear. The rest appears to be a combination of learning and ingenuity; as to the results, others may be able to find more certainty than I can make out.

Pages 38-57, "Problèmes du Vocabulaire Préhellénique" is a list, in alphabetic order, of Greek words explored to find antecedents, cognates, etc. in a variety of languages; no attempt is made to involve Minoan signs.

There is a bibliography, resumé in Russian, index of words (25 languages!), and addenda.

V. Georgiev, *Problèmes de la Langue Minoenne* (in Russian; resumé, pp. 139-164, in French; Sofia, Publications of the Bulgarian Academy of Science, 1953). Pages 196. 8vo.

All of Georgiev's previous publications on this subject are listed in the bibliography, pp. 165-167; a systematic study of "the Minoan language" is announced. The present volume again assumes that the language in question is Indo-European, a "substratum," or virtually an archaic Archaic variety (p. 143), of Greek. Linear A and B are included apparently as one, and many of the tablets are declared to be lists of dedications. There is an increased effort, however, to provide a rational basis for translations, but the fundamental statements are few and, compared to what Ventris and Chadwick have amassed (*infra*), ineffective. Beyond this, necessarily, the guesswork begins again, and the strength of the book is doubtless, again, in its range of learning and in the number of its suggestions which may turn out to be plausible. These can be dug out of the Russian text.

Constantinos D. Ktistopoulos, Πρῶται Παρατηρήσεις ἐπὶ τῶν Ἐπιγραφῶν τῆς Πύλου (*Premières Remarques sur les Inscriptions de Pylos)* (Athens; submitted to the Academy, 19 May 1951; published by the author at 4 Mauili Street, Psychiko). Mimeographed. Pages I-IV, summary in French; 1-10, Greek text; plus 6 tables. 4vo.

This study falls into two parts. The first is an elaborate systematic tabulation of the numbers of occurrences of the individual signs in the 1172 complete sign-groups in *Py,* and of the pairs of signs occurring at the beginnings and ends of complete sign-groups. If, after prolonged testing, these tasks prove to have been executed with care (as doubtless they have), then this part will be of the highest usefulness. The second part consists of suggestions as to the phonetic value of a large number of the commoner signs. Beyond noting that frequency is carefully regarded, and that some of the results *look* plausible, I can make no pretense of judging this part.

C. D. Ktistopoulos, *Mots Composés de la Langue Minoenne* (Athens, same address, September 1951). Mimeographed. Pages 7. 4vo.

This is an attempt to analyze 146 sign-groups, taken to represent separate words, into their principal components, the occurrences of which as separate words, in Crete as well as in Pylos, are duly noted. Only a few phonetic equivalents are attempted. Most of the 146 have four signs each, and are mostly analyzed into two groups of two each.

C. D. Ktistopoulos, *Recherches sur les Mots Minoens* (Athens, same address, 1952). Mimeographed. Pages 21, plus 4 of tables. 4 vo.

SM II (but not, of course, *Ind*) was available for this study: it deals first with 1221 complete sign-groups from Knossos. The procedure is the same as in the *Premières Remarques.* The data from Pylos are then added. Numbers of signs in sign-groups are tabulated, then individual signs are systematically examined, and pairs of signs, compound words, words common to Knossos and Pylos, words (a few, p. 18) common to Linear A and B. It appears again that

an immense amount of careful work has gone into the making of useful pages. Finally there is an expanded list of suggested phonetic equivalents yielding proper nouns recognized as occurring in Greek, etc.

Michael Ventris has shown himself willing to consider the opinions of others and to modify his own conjectures. His 21-item questionnaire of Jan. 1950 produced 70 pages of replies from eleven scholars: the *Mid-Century Report* (*supra,* p. 81) is of great interest for the history of these studies, showing how, on the basis of such evidence as was then available, contrary and erroneous views could be asserted flatly (see further *infra,* pp. 115-116); also for incidental mentions of scores of details which all careful scholars will wish to take into account. The volume is of much greater value than its modest method of publication would suggest.

Ventris himself, having contributed 20 pages (which altered and superseded much of what he had written in a 1940 *AJA* article), began a year later to publish his own *Work Notes on Minoan Language Research,* also mimeographed on legal-size paper. Issued at irregular intervals for private circulation only, but paged continuously, they varied in length. There were twenty notes: Note 1 was of Jan. 1951, Note 20 was of June 1952; also Note 14B of 2 Sept. 1951, and Addenda of 20 Dec. 1951. In all they filled 176 pages, with 11 figures. There is a valuable note on arithmetic (Note 18: *infra,* p. 124), and Note 20 is partly historical; but most of the rest are linguistic. The frequent reliance on Etruscan could be fully justified, surely, only by results; but I have the impression that, wholly within the sphere of Linear B, he offers a host of suggestions worth testing.

Finally, in Note 20, he abandoned Etruscan, i.e. all the previous Notes, and the contents of his own part of the 1950 *Report,* in order to test more thoroughly the possibilities of Greek. Theretofore progress had been slow or nonexistent; always there was a strain. Now — this was in Spring 1952 — success was almost immediate.

During the Fall he collaborated with John Chadwick, and in about three months they produced the detailed and elaborate article which has just appeared in *JHS* 73 (1953) 84-103 (*supra,* p. 83; Ventris kindly sent me proofs). The first page only is historical. The rest is linguistic, and I attempt here only a crude statement of what appear to be the essentials. The "syllabary" is given first (p. 85), i.e. Bennett's Signs-Used-in-Sign-Groups, in Bennett's order, but in four columns, the new one being for Wace's tablets from Mykenai in 1952, of which 12 were available to the authors in photographs. They find that Linear B is homogeneous: no account has to be taken of where a sign, a word, or a tablet comes from; Pylos is like Knossos, and so on (p. 85); *infra,* p. 122.

The next step was to collect evidence of changes in the forms of words due either to varying orthography or to inflection, and to tabulate the results in relation to the signs (p. 88). Following this, the crucial step is to take the signs involved in the changes and to assign them to positions on a grid which provides for the five vowels and for each of the consonants in combination with the vowels. Theoretically, this might take care of as many as 88 signs, but the present article assigns phonetic values to 65, the remainder being infrequent. The resulting system of assigned sound values, i.e. of transliteration, is fully set forth (p. 86) and also some of the general bases for it (pp. 88-90); it might be helpful to have some examples given to show in more detail how the investigators actually proceeded in particular instances. Though to a less extent than might be imagined, it is clear that the procedure was mostly conjecture. *Any* effort at present to translate Linear B must be largely conjectural, as were the attempts by Georgiev, Hempl, Hrozný, Ktistopoulos, Persson, Stawell, and Ventris himself. The Ventris-Chadwick effort differs advantageously from the others in several respects. It makes use of Kober's attempts to find evidences of inflection, and of Bennett's work on fractions, etc. It is more solidly based in relation to Greek, without enslavement to the Cypriot syllabary—of which only the conventions are accepted. This latter advantage is considerable, since Cypriot and Linear B *ought* to differ in details, as will be seen. Most of all, the new article has the enormous advantage of being able to use the great

number of Linear B texts now published, *Py* and *SM* II being available (but not *Ind*), and the only known texts not published being those discovered since 1951.

Even so, the task is one of forbidding difficulty: conjectures are still conjectures, and they can be successful only by a combination of luck and brilliance. The article is an intelligent, bold, inspiring attack: no fewer than 223 words (p. 87) are transliterated and most are translated. Many aspects are taken up, lists are given, findings are summarized.

Pylos tablet 641, discovered in 1952 and completely unknown to Ventris and Chadwick when they wrote their article, has provided an objective test since the preceding paragraphs were drafted. I have not seen Blegen's article, which will be available only in a Festschrift (*supra,* p. 83, under 1953), and for a summary must refer the reader to Ventris' article forthcoming in *Archaeology;* but I understand that "many" of the word-groups, some of them actually illustrated by drawings on this tablet, when transliterated according to the Ventris-Chadwick system, become unmistakable Greek words, strikingly apt for the objects shown.

Bennett, furthermore, "has discovered some further and very striking confirmation on other related tablets" (Blegen, *per litt.*). No possible alternative explanation, so far as I can judge, will avert the conclusion that Linear B is Greek. Complete translation, if it is ever attained, will be a matter of discovering correct phonetic equivalents for signs which at present certainly have erroneous equivalents, since numerous sign-groups cannot yet be read.

Ventris' achievement is no less tremendous because the historical circumstances, as he and Chadwick perceived, made it overwhelmingly probably that the language is Greek (*infra,* pp. 115-120).

TEXTUAL NOTES

The Phaistos Disk

Discovered 1908; first published, and well, by L. Pernier, *Ausonia* 3 ("1908," pub. 1909) 271-302, with pls. 9-13. First study of it by a specialist, A. J. Evans, *SM* I (1909) pp. 22-28, 273-293. Some bibliography to 1935, in a summary republication of the Disk, L. Pernier, *Il Palazzo Minoico di Festòs,* I (1935) 424-425 (in the notes, page 455, line 3, *for* Erbert *read* Ebert). In L. Deroy's bibliography *RHA* 8 (1947/8) 1-34, the following 39 items: 10-24, 27, 29, 31, 32, 34-36, 38, 42, 44, 48, 54, 55, 62, 63, 65, 79, 85, 86, 101, and his own p. 37; in *RHA* 11 (1951) 35-60, items 116, 151, 152, 153 *bis.* For bibliography since 1935, see also *AoC* 170; *HT,* pp. 539-540; A. E. Kober, *AJA* 52 (1948) 87-88; *SM* II, bibliography, p. 69, and other references in index, p. 113; H. T. Bossert, *Mid-Century Report* 11; E. Grumach, *ibid.* 31; F. Schachermeyr, *ibid.* 46; P. Kretschmer, *Minos,* 1 (1951) 7-25, for bibliography, especially p. 15; and J. E. Henle, *Word Structure* (*supra,* p. 83) 174-175.

The date is fixed by the context (on which see L. Pernier-L. Banti, *Festòs* II [1951] 392, 402) in which it was discovered: at the end of MM III, in the 17th-16th centuries (Kretschmer, *op. cit.* 23).

In other respects, study of the Disk is still beset by fundamental uncertainties. Pendlebury, Evans-Myres, and others, doubted whether it was Cretan at all. On the evidence of the Arkalokhori Axe and the Mallia Block, Carratelli was positive that the Disk is Cretan. Kober did not discuss the origin explicitly: she stressed the differences from both Axe and Block, but included the script of the Disk as one kind of Cretan writing. One of the best-qualified recent opinions, that of H. T. Bossert, is that the Disk is "West-Anatolian," thus agreeing with Pendlebury. E. Grumach and F. Schachermeyr regard a Cretan origin as proved, apparently on the authority of Carratelli.

Since there is really no exactly similar writing, or rather printing, anywhere, the problem is largely "archaeological," and on this aspect the authority of such archaeologists as Pendlebury and Bossert would seem to hold the field at present, if anyone feels compelled to choose sides on a question where the evidence does not warrant a positive verdict. Doubting whether even protracted study would settle the matter, I have made none.

It may not be amiss, however, to urge the

general improbability that such a fragile object would be imported from Asia Minor into Crete, and taken to a fairly distant and secondary center, such as Ayia Triadha. (The notion that it is a treaty is especially dubious.) The right course would seem to be that of Kober: viz. to include it for study along with Cretan scripts until it is proved not to be Cretan. The simultaneous existence in Crete of several scripts at once — Linear A, with plentiful local variants; for part of the time, Linear B; before then, the several varying "signaries" of the Disk, the Axe, and the Block; and possibly, in the early period, survivals of Pictographic writing — all these more or less together might seem unlikely. Crete is small, and only a little over half of it was in any sense inhabited. But then Phoenicia too is not large, and yet — whatever the statement may mean in terms of practicality — "it is now certain that the Canaanites of the Middle and Late Bronze Ages were in fact so literate that they could choose between any of half a dozen different scripts in which to express themselves" (W. F. Albright, *AJA* 54 [1950] 165).

Although it is as subjective as much else that has been said, I venture an impression about the terminus at the edge on each side. A line runs from the edge to the first concentric boundary. On each side, this line is either at the beginning or at the end of the text. On Face A the line is marked with four large dots, on Face B with five. Fanciful interpreters have sometimes taken these dots so seriously as to suggest that they indicate Nos. 4 and 5 in a series of texts. This notion neglects what anyone conscious of the visual requirements of such a design would not neglect, viz. the necessity of marking clearly the beginning (as it seems to me) or the end of the text. If so, the number of dots may well be arbitrary and meaningless.

The common opinion is that the text begins at the outer edge, not at the center. I have examined the fine plates 12 and 13 published in *Ausonia* 3, and conclude that this opinion is undoubtedly correct. There is no need to elaborate Pernier's reasoning on pp. 272-273.

The Linear A Inscription from Arkhanais, with a Note on *HT*

The rim of a sort of mortar, shaped like a ladle or spoon, is well published by Xanthoudides in *Ephem* 1909, col. 179-196, with a photograph on 181 (reproduced *infra,* pl. 15, figs. 1-3). A brief note about the shapes of some of the signs (but only a few) will illustrate the great difficulty of attaining accuracy in dealing with Linear A signs; the consequent frequency of errors; and the need for yet greater care. But as to the scholars and scholarly works touched upon in the present note, no general view should be formed from it alone.

Xanthoudides' text (his fig. 4, reproduced *infra,* pl. 15, fig. 4) did not assign numbers to some four missing, or largely missing, signs; I have done so, altering his numbers. *HT,* cols. 601-602 (T1 1) gives a text which, not being, apparently, based on inspection of the original, is only a partial improvement (reproduced *infra,* pl. 15, fig. 5). Finally, there is a text of signs 11-14 by Kober, apparently based on *HT,* in *AJA* 52 (1948) 89, fig. 3; discussed *ibid.* p. 88 in n. 25.

The following notes are based only on Xanthoudides' photograph. His text is referred to as *Ephem;* and the drawing, his fig. 2, is not without value.

Sign 2. Intended to be, and is approximately, symmetrical (cf. *HT*). — Sign 3. The legs are nearly equal, as in *Ephem,* not in *HT;* the tangs of the trident are equal, as in *HT,* but not in *Ephem.* — Sign 5. *Ephem* is nearly correct, not *HT.* — Sign 7. The upper left termination, certainly different from *Ephem* and *HT,* resembles a Greek lower-case letterpress *epsilon* but facing left. — Sign 11. Completed in *Ephem;* shown with too large an area of damage in *HT;* restored in *AJA,* agreeing with *HT,* to give L 32. L 32 may be the correct identification (a local variant, that is), but the photograph shows absolutely clearly that the surface is preserved, and that the right vertical does not continue upward beyond the second horizontal. — Sign 12. In *Ephem,* but not in *HT* and *AJA,* the be-

ginning of the left arm is correctly shown; this assures the identity with L 31, as has always been claimed, sign 13 being the same. — Sign 14. Much truer proportions in *Ephem* than in *HT* and *AJA*. — Sign 15. The photograph shows that the member to the left is quite different from what appears in *Ephem* or *HT*. — Sign 16. Best in *Ephem*, fig. 2; *HT* shows a damaged area, but the surface is apparently intact, and the *HT* shape is erroneous.

Note on HT

Vocabulary: a complete vocabulary of the inscriptions in *HT*, in regular order and also inverse, is said to comprise the second half of E. Peruzzi, *Aportaciones a la interpretación de los textos minoicos*, Madrid-Barcelona 1948 (Consejo Superior de Investigaciones científicas: Instituto Arias Montano, series C, no. 3). See also *supra*, p. 81 s.v. 1949 Ventris.

Summary of Conclusions: Mid-Century Report, pp. 12-25 (in English).

Reviews: A. E. Kober, *AJA* 48 (1952) 302-303; B. G. Nuño, *Minos*, 1 (1951) 150-152.

Corrigenda: Bennett has contributed nine of the following:

Col. 457, legend beneath second figure: *for* Fig. 53 *read* Fig. 43.

Col. 503: omit the last item, Cn 8 (*infra*, pp. 105-106).

Col. 558 s.v. 48: read v. fig. 81e.

Col. 591: *for* 164 (721) *read* 168 (721).

Col. 592 s.v. Ch 1: *for* (*PM* I) p. 639, fig. 747 *read* . . . 474a.

Col. 595 s.v. Cn 14: add (=Cn 11).
Cn 16: read *AJA* 43 (1939).

Col. 598 s.v. Pc 10: read p. 142, fig. 123. Omit entirely reference to *PM* I.

Col. 610 s.v. M: corrected in *PAPS* 97 (1953), "The Mycenae Tablets," by Bennett.

Tav. IX: *for* 53a *read* 54a.

Tav. XII: *for* 94a *read* 94b: *for* 94b *read* 94a.

Tav. XIV: 109 is upside down.

Addenda: HT 123 joined to *HT* 124, Bennett in *AJA* 48 (1953) 208, with studies of fractions. F. Chapouthier, *Mélanges Picard* I, pp. 166-169.

HT omits the two-line (Linear A?) inscription on a terracotta ram or horned sheep, now in the Ashmolean at Oxford, found at Eski Samsun (Amisos; on the coast of the Black Sea just east of the mouth of the river Halys): *PM* IV 2, p. 768 and figs. 749-750; H. T. Bossert, *Altanatolien* pl. 3, no. 6ab, and p. 18 with refs.

References for Cyprus

J. F. Daniel's "Prolegomena" (*supra*, under 1941) is summarized in *CW* 35, p. 59; and there is an estimate by A. E. Kober in *AJA* 52 (1948) 99, n. 51. In its detail (both archaeological and epigraphical), its scope, and its precision, Daniel's study is superior to all other publications of Minoan writing. It constitutes "the foundation for the scientific study of this signary": T. B. Mitford, in the latest report on Cypriot inscriptions, *Actes du Deuxième Congrès International d'Epigraphie* 1952 [Paris 1953] 166-171.

Mitford's article is the best introduction. It is accessible also, with illustrations, as "Cypriot Writing, Minoan to Byzantine," *Archaeology* 5 (1952) 151-156. On "Eteocypriot," T. B. Jones, *AJP* 71 (1950) 401-407. F. H. Stubbings, in his *Mycenaean Pottery from the Levant* (Cambridge, Eng., 1951) pp. 45-52, has published the latest *corpus* of signs, largely if not all Cypriot, on vases. This excellent chapter is now the first place of reference.

An inscribed Cypriot clay tablet, the first, has now been discovered: P. Dikaios in *Antiquity* 27 (1953) 103-105 and pl. V; *ILN* 223, no. 5968 (5 Sept. 1953) 342, with photographs; cf. A. H. S. Megaw, *JHS* 73 (1953) 134. At Ras Shamra in 1953, C. F. A. Schaeffer discovered a tablet, inscribed on both sides apparently with a continuous text (i.e. not accounts) in the Cypriot syllabary; the context dates it to the reign of Merneptah, *fin.s.* XIII (*Manchester Guardian Weekly*, 3 Dec. 1953).

On the derivation of the Cypriot syllabary, which some have thought came from Minoan Linear A, Bennett states, "[the theory that] it is descended from the Minoan script or influenced by it is not proved, and is not entirely probable, yet the possibility ought not be overlooked": *Yale Sci. Mag.* 25 (1951) 12.

On the importance of Cyprus for literacy, *infra*, p. 112.

The Alleged Hittite-Minoan Tablet from Boghazköy

This inscription bears the final number of all the documents listed in *SM* II: p. 65, no.

1722. A text is given, and is put down as an example of Knossian Linear B surviving in LM III. The whole is published otherwise only in a photograph, H. T. Bossert, *Altanatolien (Die Ältesten Kulturen des Mittelmeerkreises,* II), text p. 66, no. 725; pl. 163 (not p. 163 as in *SM* II). Both as an alleged piece of Minoan writing actually found (*infra*) in the Hittite archives, and as an inscription alleged to be in some sense a cuneiform-Minoan bilingual, this tablet is worthy of close scrutiny (pl. 16, figs. 6, 7).

H. G. Güterbock of the Oriental Institute of the University of Chicago, who was himself present when the tablet was discovered, has written me fully about such details. He has also brought forward what is, I think, undoubtedly the correct explanation of most of the alleged Linear B signs. With his help I give here, not a final publication of the whole, but a discussion which may suffice so far as Linear B is concerned.

The tablet was found at Boghazköy in 1933, as its Boghazköy inventory number, correctly written 2429/c, indicates; /c = 1933, following K. Bittel's system, with /a = 1931, his first campaign. It was found as part of the large archive uncovered by Bittel, and its New Empire date, i.e. ante ca. 1200 B.C., need not be doubted. It is now in the Archaeological Museum in Ankara (not in Berlin; *SM* II was misled by the provenience of the photograph). There is no publication other than the photograph by Bossert and the alleged Minoan part of the text in *SM* II.

The object is a clay tablet of regular form, baked in antiquity. The bottom (i.e. the bottom of the side shown in the photograph) is partly preserved, and also a bit of the left edge. Confirming this latter observation, Güterbock notes that the cuneiform text in its last three lines, which are the colophon, and normally are indented, require only a little more surface than is actually preserved at that level. On the right, Güterbock points out, we have not the original edge but the double line between two columns (as seen e.g. in Bossert *op. cit.*, no. 728); the tablet is broken away at the back and none of the text remains. He adds that our fragment undoubtedly contains the last column of an opisthographic tablet originally bearing, in all probability (there are an ample number of analogies), four columns, two on each side, in the order shown on pl. 17, fig. 8.

The importance of all this is that it definitely limits the area of the alleged Linear B inscription above, to the left, below, and to the right (Col. III would fill the entire right half). This finding eliminates any possibility that the lower text could have been lengthy enough to translate more than a few words of the upper text. The inscription as a whole cannot be called significantly bilingual.

There are, however, two texts, "the upper text" being cuneiform, the lower being "the present text" (as we shall call them). The upper text is preserved in parts of six lines followed, under a double line and a *vacat,* by a colophon in three lines. Thus the (regular) end of the upper (cuneiform) text is definitely preserved, and beneath it is a single incised line.

The much larger characters of the present text appear certainly to have been incised in a manner different from the cuneiform, which itself doubtless was done before baking. Bossert thought that the present text postdates the baking; he calls it a *nachträglich hinzugefügte Ritzinschrift.* More accurately, Güterbock notes that all one can say with absolute certainty is that the tablet was dry when the present text was added; it may or may not already have been baked; inspection of the original itself would probably not settle the matter.

In any case it seems clear that the present text was in fact *nachträglich hinzugefügt.* It involved the use of a different tool, and a widely different conception of how to write. Larger cuneiform characters — cuneiform in a proper sense — added before baking, are shown in Bossert *op. cit.* no. 728: they are quite different.

Moreover, it appears to me from the photograph that the present text includes not one kind, but three different kinds of incisions. The first two lines appear to be ragged, broad, shallow strokes, none too clear. The other two lines, except for the third sign, are cut comparatively sharp and deep (by the instrument with which the vertical grooves between panels were incised?). The third sign in line 3, however, is only a very thin scratching, and were it not placed, as it is, quite accurately for a sign,

it would be dismissed as accidental. I cannot see a clear case for accepting (as a tentative stroke, abandoned?) or for rejecting it. Evans-Myres in *SM* II omit it, and Güterbock would deny it the status of an (intentional) sign. Certainly it must be neglected in any reasoning about the inscription as a whole, at least until it can be given meaning; it is not exactly like any known sign in any relevant script.

The only text thus far published, that in *SM* II, is of the present inscription only, not the upper text. It can easily be shown to be faulty. Leaving out the three unclear and difficult characters of line three, until the definite signs have been settled, what we have is simply and clearly:

Line 1 𐄁 𐄂 } shallow, ragged incisions
2 𐄂 }
3 𐄁 𐄇 } deep, clear incisions
4 𐄇 }

The sign 𐄁 could by a stretch be Minoan, i.e. *Ind,* p. 107, no. 127, an ideogram for commodities of some sort. At Knossos, however, it faces either way, whereas it appears elsewhere, i.e. Pylos and Mykenai, only as 𐄁 normally, less regularly as 𐄀. The sign 𐄇 is like *Ind,* p. 107, no. 128, another sign for commodities; but the latter sign is never used, as apparently in the present text, as a numeral. Thus the case for Linear B rests on the apparent occurrence of two commodities ideograms in juxtaposition here, as in Bennett's sign list. The weakness of the case is that one sign is not quite similar, and the other should not appear as a numeral.

Güterbock has a quite different explanation. In the Hittite cuneiform, the numeral for "one" is a vertical stroke, the broad part of the wedge being at the top; for "four," four such strokes, three in one line and one below. The numeral for "ten" is a broad wedge, point to the left and deepest near the point, shallower to the right thus, 𒌋, the whole being known as a *Winkelhaken.* Güterbock proposes therefore to read lines 1-2 as the numerals for "fourteen" done in a large straight-line (sans-wedge) equivalent of cuneiform.

He points to close parallels. *Keilschrifturkunden aus Boghazköi,* Vol. 34, no. 68 has the cuneiform numerals for "eight," viz. three superposed rows respectively of 3+3+2 vertical strokes, which, like those of the present text, are straight, wedgeless, vertical lines. The piece, he notes, certainly comes from Bittel's great archive.

"Cuneiform, too," he continues, "could be 'scratched on' after the tablet was dry. Forrer, *Zeitschr. Dtsch. Morgenl. Ges.* 76 (N.F.1) p. 180 speaks about it. Of his three examples, the two numbered with 'U' numbers cannot be checked, because these were provisional numbers used by Forrer only (U = '*u*nnumeriert') and nobody knows what number they bear now. His third example, however, Bo 2400, is published: once in Forrer, *Die Boghazköi-Texte in Umschrift* II (*Wiss. Veröff. Dtsch. Or.-Ges.* vol. 42, Leipzig 1926) no. 1, and again in *KBo — Keilschrifttexte aus Boghazköi* (*WVDOG* 30) Heft 3, no. 9. This is instructive for the shape in which the 'wedges' of cuneiform are rendered: slender triangles for vertical and horizontal, somewhat 'fat' triangles for the so-called *Winkelhaken.* Forrer in *ZDMG* indicates how wedges were transformed in linear writing elsewhere. I would say that the simple lines of *KUB* XXXIV 68 and of the present first two lines, although not among Forrer's examples and although different from the triangular verticals of *KBo* III 9, might very well be simple renderings of vertical 'wedges,' since after all a 'wedge' of cuneiform is nothing but a 'line'."

Güterbock next turns to lines 3-4 with the suggestion that they (i.e. the present signs) are again numerals. The *Winkelhaken* is clear, and the T shapes could well be "another attempt at rendering 'wedges,' with an indication of their upper borderline." The force of the explanation is again obvious. "Bossert," he notes, "says 'perhaps hieroglyphic numerals,' I do not know on what grounds. Numerals they seem to be, but why hieroglyphic? For numerals in that script in general, i.e. mostly in the 'Late Hittite' inscriptions of the first millennium, I refer to Meriggi's sign list in *Revue Hittite and Asianique,* vol. IV. For examples from pithoi in Bogazköy, the one reproduced in Bossert as no. 718 is taken from Bittel, *Bogazköy: Die Kleinfunde . . .* (*WVDOG* 60) pl. 38 where more can be found. But, to me at least, the system there seems different from what we have on the present tablet. Cf. Bittel's text pp.

53ff. with drawing of another piece in Abd. 30."

To make the Hittite evidence doubly sure, we may pursue further what Güterbock has written me: "I think that Bittel, *Kleinfunde* pp. 53ff., has missed the point. Of his two possibilities, to read from left to right or from right to left, only the second alternative is possible; what he says against it (p. 54, lines 2-3), 'durch die Stellung des Gefässes, das immer links steht und doch wohl die Angabe einleitet,' is not cogent. The vessel can very well follow the numerals. In favor of a reading from right to left I should urge four considerations. (1) The 'direction' of the vessel, with the handle to the left so that it 'looks' toward the right. The rule is that pictorial signs in Hittite hieroglyphic always look toward the beginning of the line. (2) Inscriptions of one line only usually go from right to left (if there are more lines, they follow boustrophedon). (3) Where 'units' are grouped, a single stands to the left of pairs, and this is what one expects: an odd number like 5 and 9 written in pairs plus one single at the *end*. (4) The horizontal seems to be the normal expression for 'ten' in Hittite hieroglyphic, at least it is given so by Meriggi in his sign list (not expressly indicated, but it becomes clear by comparison with his 'Glossar': Piero Meriggi, 'Die längsten Bauinschriften in "hethitischen" Hieroglyphen nebst Glossar zu sämtlichen Texten' (*Mitteilungen der Vorderasiatisch-Aegyptischen Gesellschaft* 39, 1; Leipzig, 1934), p. 172, where he has — 'zehn,' —| 'elf' and ≡ '50.'

"It follows that the pithoi incisions are '35 + fraction,' '39,' etc. (Bossert 718). The fraction, where given, two slanting strokes, *perhaps* meaning 'two-thirds' (but what is one slanting plus one short vertical in Bittel, Abb. 30?).

"It then follows, that *if* our triangle is 'ten,' the system is quite obviously 'cuneiform' and not 'hieroglyphic'."

If anything were needed to clinch Güterbock's solution for the present text (I think nothing is), something could be offered from study of Linear B numerals (*infra,* pp. 123-125). This study is, I think, new. The upshot of it is that Linear B, especially the [later] Mainland Linear B, shows a high degree of regularity in the arrangement of its numerals. Four is regularly 𐄫 or by exception 𐄪 but never (unless rarely, earlier at Knossos) 𐄬, whereas a formation almost like this latter arrangement, the one found twice in the present text, is precisely the regular arrangement 𐄭 in cuneiform.

Accordingly there is an exclusive preference for taking the signs to be Hittite numerals, written in a large straight-line equivalent of cuneiform.

The text thus far yielded is "Fourteen | fourteen." The upper text deals with ritual, and the colophon can be read from the photograph. Güterbock, who has kindly sent a translation, concludes that nothing in it relates to the number 14. The colophon does assign a tablet-number to the upper text, as was usual, and the number is two or three. As a hypothesis for future study, I suggest that the tablet was baked before the 14's were inscribed, and that afterward a second number was assigned to it, perhaps for filing — as in the case of the one cited *supra* with its added "eight," which should be similarly explained. As to the repetition of the numeral 14, it appears to me that the first incisions, being shallow and ragged, may have been considered unclear; hence the numeral was simply repeated.

Whether or not these last hypotheses are correct, we encounter difficulties of a different order entirely in dealing with the other signs. In line 3, to judge from the space available, only one sign, or rather part of one sign, the first, is missing. What remains of this first sign is apparently parts of two loops — too little to permit certainty, but the loops definitely do not suggest any sign in Linear B. The third sign is the thin one already abandoned as valueless. The second sign, Güterbock informs me, resembles nothing in Hittite hieroglyphics or cuneiform. It does resemble, at least superficially, *Ind* p. 1, no. 59, being deficient only in one stroke, so that it is 𐄩 instead of 𐄨 as in Linear B. So slight a variation in itself should surprise no one.

In view of all the dispute about possible Greek names in Hittite records, nothing would be pleasanter than to find one sure Linear B sign at Boghazköy, and the present sign cannot be absolutely excluded from that distinction. The chances, to be sure, that one sign (or three) is Linear B in a text otherwise completely

Hittite, are small chances; and a few signs scratched on a ritual tablet along with numerals could hardly be of intrinsic importance. Moreover a close look at the sign in question makes it appear from the photograph that neither of the shapes given in the preceding paragraphs *may* have been intended at all. Instead (see figure *supra*), there seems to be a vertical stroke cutting the left side of a semicircle; and the upper parts are as if tacked on. This sign, whatever its intended shape, calls for identification; but there remains at Boghazköy no Linear B writing or other plausibly identified actual relic of Mykenai, not even a sherd.

The Folded Silver Bowl from Ras Shamra

After being bent and folded to make it useless and hence fit to be a dedication, the bowl was placed in a vase with several other objects, some of them gold, several of them also folded, and set against a foundation of a construction which abutted the (earlier and better built) Library at Ras Shamra. The bowl is given a preliminary publication by F.-A. Claude Schaeffer, *Syria* 13 (1932) 22-23, pls. XVI (and IX); the text, fig. 15, is the only published transcription; there is still no photograph of the inscription itself. Schaeffer's transcription is enlarged as *PM* IV, fig. 762, and Evans has a discussion on pp. 782-784. There is a mention in *AoC* 224-225. Oddly, all the more recent works on Cretan scripts omit any mention of this text, either because it has been proved to be irrelevant, or because it is puzzling and better avoided, or simply because it has been overlooked.

Evans read the transcription as two two-sign words separated by the usual vertical. The two signs of the first word are joined, or almost joined, by a horizontal stroke at the bottom. If read as one sign, then this sign is unexampled in Cretan. If the bottom stroke is disregarded, then two Linear A signs can be read; for the second see sign no. 22 in *HT*. They can also be read as two Linear B signs. The second word begins with the *phi* shape, which, in Linear A, only sign no. 61 at all resembles, whereas in Linear B there is a sign which is the same as the one on the bowl *if* the finials and the size of the circle be disregarded — features which are heavily emphasized on the bowl but lacking in ordinary Linear B. The last sign is close to *HT*, no. 75, but it too can be Linear B.

Although the forms of the signs permit the inscription to be Linear A — a possibility not mentioned heretofore — the shapes favor Linear B. Tentatively, then, we may regard it as a dedicatory (?) inscription, on a silver bowl presumably inscribed on the Mainland or in Crete, in Greek, during LM I-II, and exported to Syria.

The Last Minoan Inscriptions in Crete

A. J. Evans discussed survivals of Minoan writing generally in his brilliant *Scripta Minoa* I (1909), pp. 54-61 and 104-106, but he had little to go on. J. D. S. Pendlebury's excellent summary, *The Archaeology of Crete* (*AoC*), mentions no inscriptions in the periods after ca. 1400 B.C. In Evans' and J. L. Myres' *Scripta Minoa* II (1952) there is no discussion, but on p. 65 is published the list called "Miscellaneous Late Examples of Linear Script B." This list consists of eight items, numbered with the concluding numbers of the inscriptions published in that volume, viz. 1715-1722. *Ind* makes a separate Class, Z (*supra*, p. 96), of this group, but prudently names only one.

All references and illustrations in *SM* II are repeated here, so that this section, on *SM* II, p. 65, is, I think, superseded by what follows.

Notes are added on a few other inscriptions which have been claimed as of Cretan origin post-1400 B.C. Cretan literacy is discussed *infra*, p. 120, with a summary of the present section on pp. 126-127.

SM II, No. 1715. *SM* I, pp. 54-55 and photograph fig. 29; *PM* IV, p. 681, no. 3a, and p. 728; *SM* II, p. 65 and drawing on last page of drawings, also p. [121], second column, nineteenth row; *Ind*, p. 55, second column, sixth line. (In *SM* II, p. 108 a still uncorrected statement makes no. 1653 a duplicate of no. 1715, but it is a duplicate of 1714c.) *HT* includes it (col. 593, Cn 8; the second sign is given in col. 478

and fig. 49 as sign L 108) in Linear A, without knowing that *AoC* had given authoritative reason to dispose otherwise of this sherd, as we shall see at the end.

The sherd is broken away before the first of the three preserved signs, in such a way that I have not been sure that a sign or signs did not precede: all the texts are published as complete, but the sherd should be re-examined.

The first sign is given in *SM* II, p. 65 as sign AB 21 (*SM* II, Table I; same as *Ind,* sign 54, p. 1), but in *Ind* as sign 57 (*Ind,* p. 1). The photograph shows, and the drawing reproduces, a definite bar across the bottom. The resulting shape is shown nowhere else in *SM* II. Besides this third, bottom bar, the photograph shows traces of a fourth horizontal bar. *Ind* has all four horizontal bars, but neglects the clear middle vertical stroke. Thus the true shape, with a total of seven lines, appears only in *SM* II, p. 121. This shape has never been correctly transcribed except in the index of *SM* II, p. 121; but no list of signs, either in *SM* II itself or elsewhere, has a sign of exactly this form. To regard it as a variant of *Ind* 54, as do *HT* and *SM* II, or of *Ind* 57, as does *Ind,* is equally arbitrary. Until positive reason is shown to do otherwise, the sign should be put down as unique.

The second sign, *SM* II B 103 (Table II), better given as *Ind,* p. 1, sign 89, is stated on *SM* II, p. 34 to be unique, and to be a representation of a steering oar, such as appears on classical and later Greek and Roman monuments but not on Minoan-Mykenaian. As to the notion that this is a steering oar, the drawing in *SM* II is definitely closer to the photograph than the regularized version of *SM* II B 103 in Table II, which differs from both drawing *and* photograph in having the central vertical stroke prolonged downward (as in a classical steering oar). This being an error, and since actually the great petal-like points flare out far to the side, it seems necessary to query the oar notion, or else to regard the shape as highly stylized. But if so, then comparison could better be made, though hesitantly, with the common sign *SM* II B 36, which also has concave flaring sides.

It thus appears that *both* the first and second signs can be regarded either as being familiar signs which here vary considerably from the established forms of these familiar signs, or as being unique occurrences of signs otherwise unknown. The third sign is the regular form of *Ind* 8. Carratelli (*HT,* col. 593) asked if it were not unique. He includes a correct drawing among Linear A signs (cols. 475-476, fig. 49, sign L 108). Bennett has included the present sign in *Ind,* p. 1, as sign 89 — the last, and in the Knossos column. The shape is accurate, *SM* II being tacitly corrected, but as we shall see there is reason to believe that the sherd is of Mainland origin. The shape and the sign itself remain unique. Bennett makes it a special class, "Z: Knossos; Painted, etc.: 1715" (*Ind,* p. xiii), but *Ind* 41 might be mentioned, if not as a variant shape, then possibly as a sign from which the present one could easily develop.

The date, LM III, given in *SM* II is taken from *SM* I, and is doubtless correct. Meantime J. D. S. Pendlebury's *Archaeology of Crete* (*AoC*) had appeared; and on p. 256 (where *for PM* IV 738 *read* 728) he states that, since the good glaze is not characteristic of Crete, "the sherd may well be an import from the mainland." There is no reference in *SM* II to this statement, but presumably it is correct and 1715 should be excluded from a position among the positively established late examples of Linear B surviving in Crete itself.

SM II, No. 1716. PM IV 756-757.

A terracotta head, "found, many years since, near the Aqueduct, above the Villa Ariadne." No dimensions given; apparently small. Now in the Ashmolean Museum. Taken to be a woman, apparently on the evidence of the headgear. On the bridge of the nose, a mark which is the same as *SM* II AB 18 (Table I), but with a loop at top left. Low on the cheek near the end of the jaw, a diamond-shape enclosing a cross; it cannot be identified with any of the known signs, and Tables I-II do not contain it. Evans (*SM* II 65) takes the (two) signs to be "perhaps tatoo-marks, or the name of the votary."

The drawing shows, however, that both signs have the same essential character as "a geometrical pattern" (Evans) on the neck, where

tattooing is unlikely (!). Evans dates the head as "very late" or "Sub-Minoan" wholly from its looks, since it was found in no context. The life-size Minoan sculptured face, H. T. Bossert, *Alt Kreta*[3], fig. 87, has not-dissimilar beauty spots, but the present head is probably Protogeometric or Geometric, and the alleged signs are merely such space-filling geometric ornaments as became common on figurines. There is no reason to suspect that these ornaments had anything remotely to do with writing, and the head may be excluded from all future lists of Minoan, post-Minoan, or other inscriptions.

SM II, No. 1717. Evans, *SM* I, pp. 101-102.

Halbherr did not mention it in the preliminary (and last) report on the Erganos tombs (*AJA* 5 [1901] 270-280): a clay disk, size nowhere stated, with marks which appear to be intentional.

If it came from one of the Erganos tholoi, which need not be doubted despite Halbherr's silence (it was Hazzidakis who showed it to Evans), then the context is Sub-Minoan or Protogeometric. No photograph, but only a drawing is available. Evans read it as *SM* II AB 45 (Table I) occurring twice, then halved, then the sign usual for an interpunct — reading, however, from right to left, which is rare or unique in Linear B. The sign on the right, however, is by no means identical with the one in the middle, which is the same as *SM* II AB 45, except that it is crossed from the left by a hook-shape which, like the sign on the right, is not like any sign given in Tables I-II.

If the foregoing is a correct disentangling of the several crossing lines, then we have, as in 1715, three signs, of which one is of regular form whereas the other two are gross variants or "new" signs.

This being so, it seems preferable to regard the whole as merely a two-line hook-shape five times repeated. It may have been intended to have meaning, but the relation if any to Minoan writing is very dubious.

SM II, No. 1718. Taramelli (*AJA* 5 [1901 — correct *SM*'s 1801] 299) saw this, a "heart"-shaped piece of jasper, in the hands of a peasant near Kourtes; but as Evans (*SM* I, p. 102, n. 1) pointed out, there is no proof that it came from the nekropolis of Kourtes. Hence there is no positive external evidence for its date.

Of its two signs, as recorded, one is ⊢ and thus is the same as the simplest form of *SM* II AB 18 (Table I) — a sign which is grouped with others in *SM* II, p. 9, as difficult to distinguish with respect to origin and variants; the simplest form, i.e. the one in question, is of Linear A. The second sign on the jasper is recorded by Taramelli as being unlike any other. Evans thought it could be understood as a combination of *SM* II AB 4 and 10, but this is arbitrary and unconvincing.

SM II, No. 1719. Found by Halbherr (*AJA* 5 [1901] 289) at Kourtes, this is a seal-stone with one sign, shaped much like a *kappa,* and thus constituting yet another sign not found in Tables I-II.

SM II, No. 1720. This is entered in the present list, *SM* II, p. 65, as coming from Ayios Ilias at Pediada. Halbherr's article, from which it is taken, is in fact about this site; but he twice states distinctly that the present object was found by him at Praisos (*AJA* 5 [1901] 395). No other fact as to its date is given.

Evans does not attempt to identify any of the signs, which are five in number, or at most, for the drawing is uncertain, seven. All are simple, but none can be equated exactly with any in Tables I-II, except two ⋀ signs as in *SM* II A 58. The stone is said to be "Island," hence the piece, a bead-seal, may not have been inscribed in Crete.

SM II, No. 1721. SM II, p. 65 calls it a "bead-seal of black stone," but this is an error, since Halbherr (*AJA* 5 [1901] 395) gives it as a large block (0.71 × 0.52 × 0.12 m.) of sandstone. It was found "near the church" of Haghios Ilias at Pediada: again there is no evidence as to date. The two signs consist of a straight stroke and a sigma-like mark, each more than 0.50 m. tall. The shapes do not connect these with the Minoan or any other period.

SM II No. 1722. Found at Boghazköy in a context of *ante* ca. 1200 B.C., this inscription is

extremely unlikely, on historical grounds, to be Cretan at all. Crete was defeated, subdued, and without foreign commerce. *If* the lower text were Linear B, then it should be related to the Mainland, i.e. to Mykenai; but the date of the inscription would not extend the period of Mainland Linear B. The interpretation, however, by Güterbock *supra,* pp. 101-105 leaves little doubt that it is entirely Hittite.

G. Horsfield and L. H. Vincent (*Revue Biblique* 41 [1932] 425) discuss the inscribed and sculptured stele from Balu'ah in Moab. The sculpture, Egyptianizing, is of the twelfth or eleventh century B.C., but the inscription above it may be a millennium older. Another effort at a text, made from the published photograph; hardly more convincing, and not Linear B: R. Weill, *Revue d'Egyptologie* 3 (1948) 81-89. In any case the signs are much weathered and hard to read, but Weill's suggestion that the script is Minoan found little favor; it seems rather to be an early Byblian syllabic script (W. F. Albright, *Archaeology and the Religion of Israel* [Baltimore 1946] p. 189, n. 53; Prof. Albright writes me that he has additional evidence for the early date, which he was the first to propose). Both Linear A and Linear B are now fully available for comparison with the Balu'ah inscription as read. It is not Linear B; and the resemblance to A is only enough to warrant keeping the possibility in mind.

The inscription claimed as a Minoan-Greek bilingual in *RP* 20 (1946) 131-138 is shown, I assume correctly, to be early Greek, with no Minoan writing, in *RP* 21 (1947) 132-140.

Georgiev's title, "Inscriptions Minoennes Quasi-Bilingues" (*supra,* p. 97) is not intended to imply that the texts in question are bilingual in any sense relevant here.

MINOAN LITERACY

Introduction

In the remainder of this study three interrelated problems will be considered: (1) the extent and kind of literacy in Minoan times; (2) the language of Linear B; (3) the loss of literacy both in Crete and on the Mainland.

Method. In a field where so little is known, where even the extent of our ignorance cannot be fixed within wide limits, where new evidence will certainly appear, historical research has a peculiar task. That task is to discover and to set forth, fully and candidly, the particular hypotheses which the evidence in hand indicates; and to do so on the basis of facts so germane and reasonings so cogent that major new evidence, when it appears, cannot be fitted into place without an attempt again to do justice to those facts and reasonings. It is more important to envisage clearly a range of possibilities than to defend any one of them uncritically.

Literacy is usually spoken of, for instance, as a simple indivisible essence (so that we say "the Mykenaians were literate") whereas in reality literacy is a complex skill applicable to a wide variety of purposes, in fact, to practically all the purposes of human communication. It would obviously be hazardous to assume that as soon as a person — child, barbarian, or Minoan — learns to write, he will use writing for the full range of purposes familiar to us. The evidence suggests, rather, that in Mykenaian times literacy may have been applied only to a few special purposes. Similarly the persons who were literate may have been a limited group, naturally consisting of those, perhaps solely those, who were engaged in the businesses for which writing was used — the scribes in the palaces, the traders in the shops. If so, then the loss of this kind of literacy will bear a very different aspect from the terrible aspect which the loss of literacy would have in a society like our own.

Previous Studies. Not much has been written on Minoan literacy; only three previous studies need be considered. It is the merit of all three to have realized something of what is involved, and a review of them will provide an easy introduction to the whole subject.

Long before the texts were fully available, G. Glotz included a chapter on writing in *La Civilisation Egéenne* (1924 reprint, pp. 421-443). His method was to magnify, with impressionistic

zest, every scrap of evidence, not pausing to ask whether a very few graffiti on a wall, at only one site, really mean that many poor folk could write (p. 432); plenty of Minoan wall areas lack writing. Nevertheless Glotz' account is still to be read with attention; and it provides an excellent antithesis to the more cautious procedure *infra*.

M. P. Nilsson was the first to see that the extent of literacy is a problem or a datum for a problem (*Homer and Mycenae;* London, Methuen 1933; pp. 78-79; and in later writings). I think he might agree with the following formulation of assumptions, which he had kept tacit. If there are few inscriptions, literacy was uncommon, and being uncommon was easily lost completely. Contrariwise, if inscriptions are numerous, literacy was common and hence was not easily lost. Therefore if literacy was lost, it probably was not common.

Nilsson's application of these assumptions was only as adequate as the facts known in 1933 permitted. He accepted most of the Persson-Lindquist work on the Asine graffito, a translation about which most scholars seem to have reservations. Merely as an epigraphical problem, the graffito has long seemed to me to be insignificant idle scratchings, both near the (preserved) beginning and throughout the entire end; and I do not know positively that any Linear (A or) B signs can be definitely recognized in the middle. In 1933 this was the only Mainland inscription of any length, and Nilsson rightly emphasized its isolation.

In any case this one text does not affect the validity of the assumptions. Refined and cautiously applied, they seem to me the sort of axiom which careful pondering of these problems will lead to. Nilsson also provides help from history, recalling that some barbarians have learned to write only with difficulty: the great Theodoric could not write his own name.

F. Schachermeyr, answering a questionnaire involving as well some twenty other subjects, argued (*Mid-Century Report,* p. 44) that literacy must have been very restricted if in the one catastrophe of ca. 1200 B.C. it could have been lost completely. Ergo, he held that literacy was restricted to chancelleries. He also argued that the language used could *not* have been Greek, because Greeks would have been more tenacious of literacy in their own tongue: this assumption involves another, viz. that *if* Greeks had been able to write Greek, they would certainly have used writing outside chancelleries. Partly right, I think, and partly wrong, Schachermeyr's is the most vigorous and creditable attack on the problems.

Nature, Stages, and Kinds of Literacy. I have read nothing relevant on literacy in general. There is no critical study of literacy in Classical times, and I offer the following for what it may be worth, *a priori,* to help in opening up the subject.

Literacy is a skill: a kind of action which, so far from being an instinctive reflex such as a knee-jerk, involves prolonged, purposeful, more or less elaborate training, usually by at least one other human being. Whereas virtually everyone can and must speak and understand speech, not everyone receives comparable training for (written) communication by hand and eye. A majority of the human beings who have lived on the earth have been illiterate.

For purposes of historical studies like the present, the term literacy may be used to include knowledge of numerals and arithmetic (however elementary). It was natural and practical that in early American education, "the three R's" should constitute the basis: Reading, (w)Riting, and (a)Rithmetic. They make up the core of literacy, but strictly the term has to include, with whatever qualifications, the man who can only "make his mark," such as a simple "X," or stamp his symbol on a seal with his signet; and, at the other extreme, the Chinese man of learning who can read and write the ten thousand symbols of Classical Chinese. Thus many stages of literacy might be distinguished.

In particular, a phenomenon might be recognized which could be called Stunted Literacy. This would be the condition of an individual or a culture having the rudiments of literacy, i.e. some knowledge of a syllabary or an alphabet or the like, some inclination to write, and some material to write on. But not much: such people would write infrequently, clumsily, with too great an effort, never loving writing; would read rarely, and then "spelling it out." For

reasons internal or external or both, they would never advance in literacy, but would live their lives and perish with literacy still arrested at a low level. Despite the fact that they had an alphabet, the Keltiberians may be an example. The Maya attained a syllabary, but also composed histories in mere pictures.

There are, I think, *kinds* as well as stages of literacy. A phenomenon doubtless often present with and related to Stunted Literacy, but not always or necessarily, would be literacy used regularly only for limited specific purposes. This might be called Special Literacy. Thus in some inscriptions of 225-217 B.C., found together at Kafizin in Cyprus, the Cypriot syllabary "is exclusively the vehicle of the Cypro-Arcadian dialect; the [alphabet] of the *koine*" (Mitford, *Congrès,* 170). In modern Korea, if we may believe the *Encyc. Soc. Sci.* s.v. "Literacy," the governmental bureaucracy used one script, tradespeople a different and much simpler script. Compare also, in early German printing, the use of the three principal types, each for one of the principal kinds of printing: *textura* for religious, *bastarda* for vernacular, *rotunda* for the Classics (J. P. Elder, *Archaeology* 3 [1950] 146). But none of these examples is sufficiently drastic. More and better examples would be welcome.

If, however, these categories correspond at all to reality, they may help to put the problems of Minoan literacy in a wider setting. Linear A literacy, for instance, would be a case of Stunted Literacy, Linear B of Special. For present purposes, however, it will suffice to bear in mind these important possibilities, but to use merely such terms as "Linear A Literacy" and "Linear B Literacy." The meaning will be understood to be "a degree of skill sufficient to write and read Linear A (or B) with reasonable fluency, and to use the numerals."

Literacy and the Availability of Materials. It might well be argued that the availability of writing materials imposes restrictions on the extent of literacy in a given society. Cheap paper, for instance, is undeniably so important as to constitute almost a pre-requisite for widespread literacy in our own society, and our civilization alone has possessed the printing press. In contrast, the absence or high cost of anything comparable to paper, vellum, or parchment would surely be a powerful deterrent to literacy. Clay tablets, though cheap if clay is near, are fragile and bulky despite being limited in size.

On the other hand, physical factors can easily be imagined to be more rigid than they actually are. A wide-spread desire for literacy, and for written matter, often creates the means for its fulfillment. "Necessity [*scil.* strong public demand] is the mother of invention," as, for instance, of the whole paper-pulp industry. In Classical Greece the public wanted books and sheets of paper. Egypt supplied the want then, and it is difficult to see why Egypt could not have done so a millennium earlier — *if* the Minoans had wanted it.

Archaeology may conceivably give direct help in a related sphere. If archaeology shows that ink-pots and styli were common, the problem is as good as solved; but if they were rare, the absence of them is in some degree significant. *Any* surviving writing in ink proves that ink existed; of course, ink was not invented and used, except sporadically, for writing on clay, terracotta, or marble, but for writing on perishable materials. I must leave to others any thorough investigation of this matter, but note some evidence here. (a) No materials necessary for writing with pen and ink survive. There is one stylus or "graver," and a possible "template" for tablets, both from Palaikastro (*SM* II, p. 2 and last page of drawings). (b) One clay tablet (*SM* II, p. 66, and last page of drawings) bears designs drawn with a stylus: this suggests, but hardly proves, that much easier materials, e.g. paper and ink, were, therefore, costly or lacking. (c) Yet ink did exist in the Linear B period, as A. E. Kober has well emphasized (*AJA* 48 [1952] 92, and 88, n. 21), and in any case a civilization where painting on pottery was so familiar could hardly have missed the idea of writing with dark pigmented liquids. (d) The extent of writing on (or incising in) perishable materials depends, therefore, on what materials they had. About vellum and parchment we do not know. About palm leaves we can assume that *if* the long, thin, few-lined Linear B tablets, the so-called palm-leaf type,

really did originate in palm leaves, then that material was extensively used; but there is room for doubt (*infra* 117). About papyrus we know only that the Egyptians had it, and that Cretan intercourse with Egypt was so extensive that the Cretans must have come to know writings on papyrus. But if so, why did they use a material so cumbersome as clay for records which were to be kept long enough so that storage in wooden cabinets presumably constructed for the purpose was necessary? Or again, why did they resort to palm leaves (if they did), and then change from them, not to paper, but to clay? There is just one natural answer: they did not use writing enough to create a lively demand for importation of paper. This is perhaps a too-easy, over-simple conclusion, and confirmation would be welcome. In *SM* II, pp. 2-3, the claim is made that the process of engraving on clay tablets is easy, and no drawbacks are mentioned.

Literacy and the Difficulties of Learning. A second set of restrictions on literacy, part physical and part mental, is constituted by the nature of what has to be mastered. If the symbols are numerous and intricate, like those of Classical Chinese, literacy in any full sense will require exceptional ability, will cost heavily in time and energy, and will be restricted. Somewhere between the Chinese signary and our own admirably simple Phoenician-Greek-Roman alphabet is the Minoan. A few of the signs of Linear B are simple but many are intricate and fussy. In all there are ca. 199 signs to master. But, again, it must be admitted that a powerful desire for literacy, if such had existed, would have overcome the difficulties of scripts.

Literacy and Public Writings. Literacy operates sometimes, I suppose, to increase itself. This happens where there are numerous, prominent, and important public writings such as inscriptions and other signs constantly present to people. The process is not automatic — Greek peasants will live all their lives with Classical Greek inscriptions at hand and clearly legible, letter by letter, without striving to determine what the letters mean. Once more, strong desire is a factor. On the other hand, there can hardly be a doubt that the ubiquitousness of writing in Classical Athens did make literacy almost automatic. In the Minoan world, however, so far as we can judge, conditions were quite different. Public inscriptions in Linear A seem to have been limited to a few dedications visible in shrines, a few graffiti on walls, perhaps a dozen other occasional but rare instances of public writing. We know of no monumental inscriptions at all in Linear B (*AoC* 276-277). Similarly with private writings, except that of these we know less: *if* private writings were infrequent, and mainly for accounts of administrative and business transactions, as appears to have been the case, then the physical presence of writing was so uncommon that by itself it provided little incentive to literacy.

Measures of the Extent of Literacy. So much for the forces and factors which could help to make literacy common or uncommon. The measures of just how common literacy actually is in a given society are evidently numerous. Most obvious is the sheer number of persons who can read and write, and the frequency or infrequency of their use of writing and reading: literacy will perish more easily among people who write only once a month than among those who write once a day. The length of the writings is yet another component of literacy: not a single Minoan document yet known to us is more than a page in length, and the vast majority are only a very few lines. There is also the distribution of literate persons in society: if, for instance, monks and other clerics alone can read and write, literacy will have certain definite uses and limitations. The range of purposes for which writing is used is, therefore, an index of literacy; and to assess literacy adequately, a student would wish to know not only the uses actually made of writing, but also the needs for writing, such needs as those of administration, business, literature, laws, cults, calendars, etc. For if real need for written records exists, but has never been met by actual writings, then obviously literacy is limited. On the other hand, if some one need is removed, as for instance by the suspension of commerce, then literacy, actual or potential, is impaired.

Causes of the Loss of Literacy. The preservation of literacy depends upon the teaching of writing by one generation to the next. The cessation of literacy means either that all persons who can write have been killed, massacred, that is, all at one time, so that they could leave no pupils to carry on; or that the literate men of one generation presently ceased to write, and saw so little value in writing that they did not trouble to teach the next generation. The former alternative, viz. a complete massacre, would of course end all literacy, no matter how widespread it was. I do not know that this has ever happened. The latter alternative, viz. loss of incentive to write, will depend, in varying degrees, on some or all the factors, just discussed, which affect the extent of literacy.

In considering the loss of literacy, it will be helpful to attempt to shake off preconceptions based on what literacy means in our society, and on what its loss would mean. For present purposes, literacy is best conceived, following the definition *supra,* as a skill. Plenty of contemporary illustrations could be given. As the Industrial Revolution advances, every year skills applicable to materials and tools no longer used disappear, as those who possess them die; for a century now this process has been going on. Conceivably this is the closest analogy in our experience to the disappearance of Minoan literacy.

Evidence for the Loss of Literacy. Behind much of the present study there is a general question (which, however, may not have a general answer): Do we have a fair sample of the original writings, in kind and in quantity? If from some given period we have no writing, can we infer for that period complete illiteracy?

There are Minoan inscriptions, especially pictographic, excavated but not published; others, doubtless, surviving but not excavated (in nearly all excavations mere luck plays some part); and, finally, there may have been writings which once existed, but did not survive because they were on perishable materials. For instance, to compile sheer totals of inscriptions now known might be considered useless in view of the considerable increase of known texts in the Cypriot syllabary during the years 1941-1952 (Mitford in *Congrès*). In answer it could be pointed out, however, that interest and activity in regard to Cypriot inscriptions have increased recently, and that although the numbers of texts are greater, most continue to have the same character of extreme brevity or scrappiness.

Thus there are multiple uncertainties, and it is not possible here to explore, even half adequately, all aspects of the problem.

Cyprus. Comparative historical evidence, which is nowhere conveniently available, might provide valuable help, though as in the case of all other analogies, an exact correspondence of the terms must be proved before the analogy can be admitted as valid, and even then the conclusions, strictly, will be only suggestive. But, nonetheless, they might be persuasive. The instance of Cyprus is perhaps the clearest, most neglected, and most astonishing. Cyprus adopted its syllabary and used it ca. 1500-ca. 1150 B.C.; thereafter for centuries we have not a single piece of writing (or at least none has yet been published); then ca. 700 B.C. Cypriot inscriptions, in the same old syllabary, resume, to continue into the Hellenistic period, until as late, perhaps, as 100 B.C. Thus during the intervening three centuries and a half, the Cypriots wrote largely, perhaps exclusively, on perishable materials. Any argument based on the silence of the excavations, i.e. on the grand negative of no contemporary evidence whatever, would be false.

Those who would apply a precisely similar negative argument, from the silence of the excavations, to Crete, the other islands, and Mainland Greece, in the same or similar periods, must attempt some answer. They may urge, for instance, that Cyprus has not yet been sufficiently excavated, and that inscriptions may yet be found; for the very first clay tablet, just discovered, see the reference *supra,* p. 101. They may expect that the Early Geometric Cypriot sherds in New York, mentioned by Mitford in *Congrès* as possibly inscribed, will shatter the silence. They may urge, also, that the Cypriots were not like the Mainland Greeks in certain relevant ways: it is a known fact, for instance, that in some other particulars, perhaps in many,

the Cypriots were extraordinarly conservative.

Obviously, however, the Cypriot evidence needs full study. W. F. Albright, whose important article *AJA* 54 (1950) 162-176 stresses the instance of Cyprus, also remarks on how "Oriental archaeologists, with their memories of the sudden illumination of whole periods, previously unknown or very obscure, by a single fortunate discovery, are not likely to be much impressed by the lack of material culture in the Greek Geometric, as long as not a single substructure of a royal palace of the day has been reported" (pp. 164-165). It is wholesome to keep this in mind; and yet it involves assumptions, such, for example, as the assumption that royal palaces grand enough at least to be recognized as palaces were built in Geometric Greece. Many students of the period would doubt it.

Homeric, Hesiodic, etc., Evidence about Writing. The evidence, positive and negative alike, is important but not decisive. It must wait to be fitted in later. The same applies to certain bits of incidental historical and literary evidence tending to show, but not actually proving, that literacy existed in Crete after 1400 B.C. These have been assembled by Evans in *SM* I, pp. 54-61 and 100-106: they need not be repeated here, but they deserve consideration.

Linear A Literacy

By the end of MM II, the Minoans had long been accustomed to the use of masons' marks, labels, seals, and other such very brief writings (or sign-ings). Some of these usages had been begun crudely in EM, and pictographic writing had developed in MM I and MM II. Because, however, these writings are so primitive and brief, and because no text of any length prior to Linear A has been discovered, there is no ground for imagining that literacy existed in any developed sense.

Linear A was introduced at the beginning of MM IIIa (*AoC* 168; or at the end of MM II? — *SM* II, p. 1). Being syllabic, it widened tremendously the possibilities of writing. Linear A lasted throughout MM III, LM Ia, and LM Ib, i.e. from ca. 1800/1750 to ca. 1410/05 B.C. There was ample time for possible uses of writing to be realized, for literacy to spread, for written documents to accumulate.

Linear A inscriptions have been found in Crete at the following fourteen sites (the count is based on *HT*, cols. 592-602 and 543-592, slightly modified):

Apodhoulou	2 inscriptions
Arkhanais	1
Gournia	1
Juktas	1
Khamaizi	1
Knossos and near	16
Mallia	4
Palaikastro	11
Phaistos	5
Psykhro	2
Trypeti	1
Tylissos	4
Zakros and near	2
13 sites	51 inscriptions, omitting Ayia Triadha
Ayia Triadha	168 plus ca. 36 countermarks, labels, disks, seal(ing)s, *pessoi*(?)
TOTAL	219 or in all 255 with seals, etc. included

The 51 inscriptions from sites other than Ayia Triadha are so brief that five quarto pages in *HT* suffice to give practically all that is needed for texts.

The objects on which the 51 inscriptions are written are various. In the following list, I have relied on *HT* for the identifications; if subsequent study modifies a few, that will not seriously affect the impression made by the whole: tablets and bars of terracotta, 14; vases of terracotta, 8; libation tables, 6; seal(ing)s and "roundels," of stone and clay, 6; pithoi, 5; vases of steatite, 2; spoon-shaped mortars (one of alabaster), 2; and 1 each painted on a wall, incised in a door jamb, incised in a piece of gypsum, inscribed on a gold ring, on a bronze tablet, on a small altar, on a figurine, and on a larnax. The Ayia Triadha inscriptions include 154 on

clay tablets, 7 on ingots of copper (a form of currency?), 5 on pithoi, 3 graffiti, a half-dozen *pessoi*(?), and the ca. 30 seal(ing)s.

The Linear A tablets of Ayia Triadha have few guide-lines, and are none too evenly laid out. Items run over from one line to the next. In other respects also only a few tablets could be called neat. The signs themselves are crude, scratchy, loose, inept; judging by *HT*, there is not a single piece of handsome writing in Linear A. The inscriptions from sites other than Ayia Triadha may be a little better, not much; moreover, the shapes of these signs vary enough so that Carratelli feels obliged to add notes identifying them. "Local variations are considerable in Linear A" (*SM* II, p. 1).

That is the evidence at present, for a period of three and a half or possibly of four centuries. In judging the evidence, either one of two extreme, opposite views might be considered. It might be conceived that, since we have Linear A writing from 14 sites (plus two outside Crete, to be mentioned *infra*), and on some 17 kinds of object, literacy was widespread. We do not know that paper and ink were used; but it could be imagined, I think rightly, that the surviving inscriptions are only a hundredth part, or a thousandth, of the inscriptions which once existed. It could be argued also, in general, that ugly and unclear writing is a proof not of ignorance but of familiarity. Thus in modern times, when typewriters and secretaries were less common, the members of one of the most literate professions, viz. lawyers, notoriously have had the most execrable handwriting. Conversely, when writing was reintroduced into Greece, and we can observe to some extent the progress of literacy, we see that the first inscriptions are usually in large, clear letters, carefully cut; not until the middle of the fourth century did the Athenians inscribe very small (but accurate and neat) letters, and not until the late-third and early-second century B.C. did they inscribe letters so poor as to make any difficulty in reading. The first papyri, similarly, are among the most easily legible.

Admitting some truth in all this, nevertheless, the impression of near-illiteracy dominates with respect to Linear A. The writing is not that of the highly educated lawyer, too bored with writing to care about legibility; nor that of the Archaic Greek stone-masons, entranced with the new (Phoenician) letters; but rather that of the careless, half-educated schoolboy. In these periods, MM III and LM I, when accomplishment in other graphic arts was superb, writing was evidently disdained.

This suggests the other extreme view of Linear A literacy, viz. that it was severely limited. For a half century now Crete has been explored. The number of MM III and LM I sites listed in *AoC* is 62 and 67 respectively; inscriptions have come from only one site in about five. We have numbers of uninscribed seals; large numbers of sherds and whole vases; several fairly complete wall paintings; and other objects which *might* have been inscribed, objects many of which, in Classical Greece, *would* have been inscribed. Contrast also, with every allowance made, the fact that later Crete produced enough Greek inscriptions to fill the four (four thus far) volumes of M. Guarducci's *Inscriptiones Creticae*. The volumes, to be sure, cover a millennium, and a great number of the inscriptions belong in the Roman Empire, when Crete, to judge by the sheer number of sites, was more prosperous even than in LM I, i.e. more prosperous than at any time in antiquity. Suppose only the first four centuries were to be considered, viz. from the late-seventh century to 323 B.C. The number of inscriptions from these years, to be sure, is very much smaller, and teaches us to be cautious; but then there is the Gortynian Law Code, which by itself is an evidence of conditions respecting writing very different from those of Minoan Crete.

The truth is probably nearer this latter view, viz. that literacy was restricted. Writing was not rare; in each of the main centers, doubtless some few persons could write and could read. Dedications were sometimes inscribed; some simple governmental or business records were made, occasionally involving hundreds of objects, and also fractions, reckoned as the Egyptians did (and learned from them?). For some other uses also, writing was not uncommon. But there was little interest in it. This conclusion is confirmed by the finds in Knossos and its neighborhood. Granted that no bulky ar-

chives in Linear A were to be expected there: of Linear B we have thousands of pieces because there was no one to clean them up in the devastated Palace at the end of Linear B. Previous masses of tablets had doubtless been removed and scrapped long before the disaster. But even admitting this, where so many uninscribed objects did survive, the inscribed ones, 16 from Knossos and vicinity, less than a dozen from the Palace itself, in some 350-300 years, must be conceded to make a poor showing.

One further indication of the amount of literacy in Linear A may be had from exports of it. If, despite the absence of many inscriptions in Crete itself, many had been found abroad, then the inference might well be that excavations in Crete had simply failed to give a fair sample of what really was there. Actually the opposite is the case. Two from Melos and one from Thera are all the Linear A inscriptions from outside Crete, with the minor exception of a half-dozen ingots with one sign each, one being from Mykenai; and with the possible but dubious major exception that Cyprus may have learned literacy in the form of Linear A. As to the Mainland, one should recall that it was in the sixteenth and fifteenth centuries that Minoan influence mounted to its height; yet the grave furniture of the Shaft Graves at Mykenai, as well as the stelai, are letter-less; nor have the graves recently excavated yielded any inscriptions.

The Language of Linear B

The Relation of Linear Script A to Linear Script B. Linear A began to be used ca. 1800 or 1750 B.C., whereas no Linear B writing earlier than ca. 1450 has been found anywhere. If further (to anticipate) we admit the language of Linear B to be Greek, then Linear B is extremely unlikely to have come into use as early as ca. 1800 B.C., because at that time the Greeks had been in Greece only a century or so and had certainly not acquired more than a little of Minoan civilization. Linear A is definitely much older, therefore, than Linear B.

Linear A, found in many towns of Crete, and used for many purposes, is a growth of the soil — a thin growth, but a real part, evidently, of Minoan culture. Linear B is found only at Knossos in Crete, and was heavily used there. If Linear B were a development independent of Linear A and equally old — derived from a common origin, but developed parallel to A — then it would be expected to have spread from Knossos, culturally the capital, to at least a few other towns. *Any* script normally and freely developed would be expected to have spread. Linear B, apparently, did not. At the outset of the present inquiry, therefore, unnatural circumstances attract attention. Study of the problem of language may tell much beyond itself.

A glance at *SM* II, Tables I and II, will show that roughly a half of the signs of Linear A appear in Linear B. Of the running text, moreover, only ca. 15% consists of signs peculiar to Linear A or B (E. L. Bennett, *AJA* 56 [1952] 204). More exact studies will eventually be made, but these figures suffice to show that the two scripts are not strangers to each other. Linear A had been used — or, at least, has been found — at Knossos. In short, compelling evidence will be needed to prove any notion of a synchronous parallel development from a common origin (cf. *PM* IV, p. 683). On the contrary, it is reasonably certain that Linear B was developed out of Linear A.

The Relation of the Language(s) of Linear A and B. When they were last compared — roughly only, so that with the new material a definitive study of this crucial aspect is needed — only ten two-sign groups, plus three three-sign groups, were found to be identical as between the Linear A and B texts. Some 50 groups are similar, but not the same; no more (C. D. Ktistopoulos, as cited by A. E. Kober, *AJA* 52 [1948] 101, n. 54; E. L. Bennett, *AJA* 54 [1950] 204). The word for "total," the only word positively known in both scripts, is different.

Nothing could better illustrate the difficulty of studies like the present, and the consequent need for care at every step, than the fact that as late as *Mid-Century Report* most scholars believed the language of Linear B to be the same as that of A; in that year also Bennett listed

several variant theories (*AJA* 54 [1950] 204). Yet surely there are only two conceivable explanations for the linguistic facts set forth *supra* in the paragraph preceding this. One might imagine that Minoan, or at least Knossian, economy underwent some radical change, whereby the commodities which were the staples of life, i.e. the commodities named on the tablets, were no longer the same, but that other commodities were used, or at least were listed. In simple form this suggestion, as made tentatively in *AJA* 54 (1950) 220, could be offered only to be queried. Bread, wine, cheese, olives, and the familiar domestic animals, all or most of them, undoubtedly constituted the staples of life before as well as after the beginning of LM II: we know of no cataclysm or other event ca. 1450 B.C.

A more refined hypothesis might be that new terms were adopted for old things, expressed in new signs, and measured by new methods. In this view Linear B was merely an administrative revolution. Practically all the proper names, naturally, were different; ca. 13 [common] nouns only were retained. The hypothesis might be added that, since the tablets probably represent tribute in kind (?), there may have been *some* change in the type of commodities exacted as payment; or, more plausibly, that many more Linear A tablets are needed to give assurance that the 168 tablets from Ayia Triadha provide enough of the Linear A vocabulary to judge by.

Although this set of "refined" hypotheses is obviously a *pis aller,* which would hardly occur to anyone except as a last resort, still it does accord best with our knowledge of certain other historical conditions. Pendlebury, whose opinion is perhaps worth most, formed the impression that throughout LM Iab-LM II (from ca. 1580-ca. 1410/05 B.C.), "Crete must have been peaceful in the extreme" (*AoC* 184). By LM Ia, Knossos appears to have gone far toward (peacefully) unifying and dominating Crete. Roads and watchtowers were built for increased peaceful intercourse, perhaps for military domination; and in fact, to go with thalassocracy, an empire in Crete is freely spoken of (A. J. B. Wace, *CAH II* [1931=1924] 432, 437; *AoC* 208, 285-286). In a period of tranquillity such a system of relations does not collapse overnight. Ergo, the change at ca. 1450 was administrative, a sort of verbal counterpart of the roads and watchtowers. Linear B meant neater, more extensive records of an empire held together more tightly, and taxed more profitably, than before: such would be the conclusion of this argument. The change might be compared to the adoption of Latin letters and newly regularized spelling in Turkey under Mustapha Kemal. Future archaeologists may easily err in imagining that the change indicated conquest of Turkey by non-Turkish Western powers, whereas it was, in fact, carried out in time of peace by an ultra-Turkish regime.

Thus the case for the continuity of one and the same language in Linear B as in Linear A — the language which at present can best be called "Minoan," and which for historical reasons cannot have been Greek — is a plausible case. After all, Linear B was developed at Knossos; far the largest number of tablets have been found there; they deal undoubtedly with the contents of the Knossian palace. The language *ought* to be that of the cultural metropolis, Knossos, not that of any foreign, culturally provincial city such as Pylos.

Analysis of the foregoing case will show that although it originates in linguistic difficulties, it rests mainly on historical probabilities. The linguistic facts, however, cannot be slurred over. No hypothesis involving any imaginable change of administration or economy can do justice to the fact that only a few words of Linear A were retained. The change was too complete, too thorough. A few words were borrowed, naturally enough, but the alterations of endings which in Linear B seem to indicate inflection are absent in A. The differences extended to measurements and fractions. In short, the special urgency that lay behind all the changes of Linear B was an urgency related not to words only, but to the expression of thoughts: just what a different language ought to involve.

The Development of Linear B from Linear A. Linear B comes before us fully developed, but the process of development cannot have been instantaneous. Some of the changes, to be

sure, were simple. The tool used for incising clay tablets, a simple point, was retained. The shape of tablet, i.e. the page shape, was not altered; and no great effort was needed to add the palm-leaf shape — it was possibly a mere equivalent in clay of what had been used with actual palm leaves, but more likely it was merely a development of the square-sectioned clay bar used in Linear A. The ruling of guide-lines was not an innovation but merely an adoption of sporadic Linear A usage, prompted by the need to make the longer inscriptions of Linear B orderly. The sign for "ten," a short horizontal, written within the circle-with-spokes which stood for "one thousand," easily gave a sign for "ten thousand." All these simple innovations were easy and doubtless quick.

The rest of Linear B was certainly not produced so easily. Many new signs had to be invented. Apart from *SM* II, we lack any close and full study of details. Some of the shapes, however, suggest that the scribes set about inventing, and at the same time conventionalizing, a series of new pictographs — for swords, chariots, *et al.* But as the tablets come to us, a large number of the shapes are apparently so highly developed as to suggest thousands of repetitions, taking the shape far from its original; in short, a lengthy process.

The drastic character of the change is shown clearly by the complete alteration in the method of measuring and recording fractions. Not only was the method of handling fractions and recording them changed, by substituting the Mesopotamian for the Egyptian, but also whole new sets of measuring vessels were required for everyone who had to measure the commodities in question.

The process of creating a new script must have been lengthened considerably by the circumstance that it had to be fitted to a different language. This would be true no matter what the new language was. If we admit that the language in question was Greek, and that Greek had never before been reduced to writing — propositions to be proved *infra* — prolonged efforts would be needed to create signs which would correspond to sounds, and then to reduce great numbers of spoken words to signs.

The question arises, Why did they create any new script? Why did they not use Linear A? The motive was no mere desire to obtain novelty for its own sake: the numerals were kept virtually intact. The answer, surely, is simpler: No one would go to all the trouble necessary to create Linear B unless repeated trials had shown that Linear A was unsuitable for Greek.

Place of Origin of Linear B. No evidence survives, of course, to tell us explicitly whether Linear B was developed at Knossos or on the Mainland. Because Linear B was used for two centuries and in many towns on the Mainland, one could argue that it was created there. Along with the craftsmen and material apparatus of Minoan civilization which the Mainland imported from Crete, literacy would be the creation of Cretan men of (Linear A) learning, free or slaves (cf. the learned Greek slaves in third- and second-century Italy), brought to the court of Mykenai to create a signary and teach the use of it.

There are two objections to this theory; they do not exclude it, but they render it improbable. Hardly any of Linear A is found on the Mainland: it was not good enough for export, not adapted in any case to Greek. Before they received Linear B, the Mainland had been totally illiterate. In this condition, the Mainlanders would be far more likely to glimpse the advantages of literacy, and to achieve it in their own language, if they were living in age-old Knossos, with literate people and writing at hand, than if they had come to know literacy only through chance encounters with foreigners — with Cretans, that is, not others; for the Greeks did not learn writing from the Egyptians, Syrians, or Hittites. And yet no one supposes that later, in order for the Greeks to have learned writing from the Phoenicians, they had had to be settled among Phoenicians on any large scale, or Phoenicians among them: so this argument is inconclusive. It merely creates a preference.

More compelling is the consideration that Linear B was heavily used (and at that for Greek, we assume) in the Palace at Knossos itself. Of course, after they had caused it to be created on the Mainland the Greeks *could* have

brought it to Knossos for purposes unknown, but it seems much more likely that the reason Linear B was used at Knossos was because it was there that the Greeks had first perceived the usefulness of literacy, it was there that they had caused Linear B to be created out of the Linear A which was familiar at Knossos, and it was at Knossos that they had intended first of all to make use of it. Obviously this argument will be stronger if Greeks can be shown to have been settled in numbers at Knossos, to have held supreme power there, and to have done other things there which together make a setting in which Linear B is at home.

Knossos and the Mainland in LM II. Linear B is confined in Crete not merely to Knossos but also to one brief period at Knossos: all our Knossian Linear B is from LM II, a period which is dated ca. 1450 to ca. 1410/05 B.C. Now the striking fact is that the developments in pottery, etc., which constitute LM II, are found in Crete, like Linear B itself, at Knossos alone. LM II, although it develops out of the pan-Cretan culture of LM Iab, is confined to Knossos, which, therefore, stands apart from all the rest of the island. In precisely the same period, Linear B develops out of the pan-Cretan script Linear A, again solely at Knossos, where in LM II Linear B is used, alone and exclusively; Knossos was thereby cut off from the rest of Crete by language, writing, and measures.

Without considering writing in this connection, Pendlebury was clear that the strongest external influences that went to the making of LM II were definitely those of the Mainland (*AoC* 224). The items of evidence known to me are the following:

Pottery. Wace has called attention again to the fact that Knossos imitated (Mainland) Ephyrean vases and alabastra (*Antiquity* 27 [1953] 86). The distinctive Knossian vases of the period had already called forth a telling remark from Pendlebury. "The stiff formal vases of LM II from the Knossian workshops have the appearance of intrusions, and this style must be brought into close relationship with the 'Palace Style' vases of the Mainland whose beginnings seem rather earlier" (*AoC* 287; and especially the reference to Snijder in 227, n. 1, along with 229-230). The experts have more to say, however, about the Palace Style, and it cannot yet be claimed with assurance as the telling evidence which some day it may be proved to be. Among motifs of decoration, the "ogival canopy" has been assigned to a Mainland origin; it occurs, however, only twice in Crete (*AoC* 207 and refs.).

Frescoes. Wace cites the Knossian wall paintings, and their greater resemblance to those of the Mainland than to those of Phaistos and Ayia Triadha (*loc. cit.*). Certainly we must reconsider them.

Throne Rooms. Both on the Mainland and in Crete there are throne rooms. This item also is backed by the great authority of Wace (*loc. cit.*); whether the rooms are sufficiently similar in shape, appointments, etc., may be questioned, but it is possible that the argument is nevertheless sound.

Armor. In Crete body armor was not used, apparently, until LM II, and Pendlebury suggested that most likely it was introduced then from the Mainland (*AoC* 271 and n. 4; G. Glotz, *La Civ. Egéenne* [1923] 101-103). The suggestion may be offered that Mainland military improvements naturally would not have stopped there. The Linear B tablets have revealed that the Palace of Minos was an arsenal: its administrators were interested in records of swords, spears, and arrows (*supra,* p. 96). Crete had had swords for some time, and daggers for a much longer time, but the hypothesis may be ventured that the adoption of some kinds of these (the horned sword appears in Crete first in LM I-II), and the storing of great quantities of them, were due to a Greek militarism which replaced the more peaceful ways of the Knossians.

Chariots. Akin to these articles and records is the appearance of the chariot signs, invented doubtless for Linear B. The horse had already been introduced into Crete, in MM III (*AoC* 172), but quite possibly it took some time to develop and introduce so elaborate a contrivance as the chariot pictured in the signs. If the Greeks came in force, they probably brought it.

Money, etc. Ingots were found, inscribed

in Linear A, at contemporary Ayia Triadha, and it would be reasonable, I think, to suggest that the Mainland introduced this form of currency. Ingots were also found at Mykenai, and nothing could be more natural, along with the changes implied in the invention of Linear B, than the introduction of reforms affecting currency. A weight of purple gypsum dates from LM I-II: measures were altered in Linear B, and along with currency, weights may well have been. Throughout the Classical period, reforms of measures, currency, and weights regularly were introduced together.

Wace *(loc. cit.)* declared roundly that "the LM II culture of Knossos was closer to the Mainland than to the rest of Crete." This statement was made without the benefit, if there be any, from the conjectures offered *supra* about armor, chariots, and money.

Historical Arguments that Linear B is Greek. In short, Linear B, so far from being an isolated phenomenon, takes its place in a series of developments. They are not all separate and accidental developments, but some are related to others. The impetus for them all came from the Mainland.

They wrenched Knossos out of its Cretan orbit, since Knossos now differed from the other large Cretan centers in language, in writing, in measures, in arms, and doubtless in ways unknown to us. Leave out the fact, now known, that the language was Greek: there is still ample evidence, in Linear B and in fractional measures, and in the archaeological items, to uphold the theory that Greeks were running Knossos. This cannot have happened by remote control. It means rather the presence of a force of occupation. Exactly contrary to what Evans imagined, Greeks controlled the very Palace of Minos.

If more evidence were needed, it could be found in the history of Bronze Age commerce. There has been a strong and growing tendency to push back the date of Mainland *commercial* domination, and with it all other forms of control, into LM II and even into LM I. Blegen, Heurtley, Karo, Persson, Schachermeyr, Wace, and Wilamowitz have all, in various ways and degrees, furthered the idea; especially the two who know the remains best, Wace and Blegen (*Klio* 32 [1939/40] 131-147). The archaeology involved is now systematically studied and presented with generous illustrations and references by H. J. Kantor in her monograph of 1947 (*supra,* p. 81), chs. II and III. On grounds wholly other than those of scripts and languages, Miss Kantor sees the Mainland as dominant over Crete, in a very real sense, from LM I on. The thalassocracy of Minos must either disappear or be pushed back into MM II, when Crete really had its great trading days.

Even if this thesis in its extreme form has to be modified (evidence has appeared which shows that the date was pushed too far back), still for the present study that will not matter. Miss Kantor's book provides the perfect setting for Mainland supremacy in the Palace of Knossos during all of LM II, and perhaps, before 1450, part of LM I.

The Persistence and Fixity of Linear B. In such a setting, it seemed to me, it would be strange indeed if the language of Linear B were not Greek. But this is not all the reasons for believing so. First of all was the persistence of Linear B on the Mainland. From a period two hundred years later we have Linear B tablets, discovered at Mykenai by Wace in a private house, obviously recording private business. Could they still have been using a Minoan language? The Greeks of the Mykenaian Age are not usually thought of as being so helplessly docile. Since that time, Greek has overcome every other competing language except Albanian; Albanian has not overcome Greek, but has lived on for some five centuries beside it.

The astonishing degree of homogeneity and of fixity in Linear B on the Mainland will be exposed *infra* in the next section. Greeks would certainly have been more likely to make changes, over the course of two hundred years, if the language of Linear B had been Minoan.

Summary. Mostly as they were then set down, I have given the reasonings which in spring 1953 forced themselves upon me as decisive in favor of the then (otherwise) unproved hypothesis that Linear B was Greek. It has seemed

to me that an instance of historical and archaeological argumentation which has been proved to be correct is worth attention for its own sake. More importantly, the argumentation involves a whole range of facts above and beyond proof of the identity of the language: the reasoning lays a basis, however provisional in details, for new history.

Looking back, I think the crucial point was realization of the barriers which Linear B raised between Knossos and the rest of Crete; and the most telling aspect of these barriers, to me at least, was Bennett's new findings on fractions and measures. It is a good principal in history (and prehistory) that *for a given result a cause must always be conceived powerful enough in itself, and operating in such a direction, as to effect that result.* In the present instance it was clear that Knossos was in the grip of a strong, intrusive, non-Cretan force. This force was shown by ample evidence to have been Greek. From commercial supremacy, the Greeks had gone on to physical domination over Knossos. Closely bound up with that domination — and inevitably Greek — was Linear B literacy.

Linear B Literacy

Linear B Literacy in Crete. All or nearly all of the Linear B inscriptions found in Crete come from the Palace itself at Knossos, and all or all but a few (*PM* IV, p. 729, fig. 711 ?) should be dated not earlier than ca. 1450 nor later than ca. 1410/05 — but possibly 1420/15-1410/05, as we have seen. Likewise, practically all the inscriptions are accounts of some sort. These propositions are subject to some revision when a final publication is made, but at present they point to the inference that Linear B literacy in Crete was limited to the Knossos chancellery during about one generation.

The rest of the island — Ayia Triadha, for example, in these very years — continued to use Linear A. Possibly Linear A would have been used in Knossos town itself at this time if, say, a dedication were to be inscribed by someone not immediately connected with the Palace. It is likely enough that even a native Knossian connected with the Palace would use Linear B, i.e. Greek, if he were to inscribe a dedication. All this does not greatly matter. Plentiful exceptions could be admitted without impairing the validity of the proposition that in Crete itself the use of Linear B was special and restricted.

This is still said with allowance for considerable writing by the Palace secretariats themselves. At Knossos in LM II, at least, there were archives, i.e. wooden cabinets with metal fixtures, to preserve records. One new consideration may be added. Tablets which record, apparently, many separate and diverse transactions within, perhaps, a year, would seem to demand, I suggest, some sort of central record — a series, one would say, of large rolls, in fact "books." But even to grant this is not to modify seriously the impression that the evidence in hand indicates: which is, that even if a generous allowance is made for various writings not attested, writing was used for limited purposes only.

Capitol, court, granary, storehouse of oil and wine, arsenal, the Palace was a busy place. The records deal with thousands of transactions, most of only one item each. The records were in Greek, hence were written for the overlords, not for the Cretans who brought in the goods. Any receipts or other written matter covering payment for such Knossian vases as we know to have been imported by Pseira, Palaikastro, and Gournia would have to be written in Minoan, in Linear A. But the use of Greek shows who was in control in the Palace. One may compare the use of Latin in royal writs, which was begun (so H. M. Cam has kindly informed me) by William the Conqueror some few years after 1066, although English had been used theretofore, and continued until the second half of the thirteenth century; Domesday Book, much resented, had also been written in Latin. Yet the Greeks did not attempt a tight control over all Crete. From the study of pottery it had seemed that while the East had remained independent, except for a few importations, the South had been dominated by Knossos (*AoC* 208). Ayia Triadha nevertheless went right on with Linear A and the Minoan language.

The Mainland Illiterate until ca. 1450 B.C. So

far as is positively known (Bennett, *per litt.*), the Mainland had made no use of Linear A. Even allowing for the chance that some Linear A may exist there, as has been claimed, still the present point will cease to be sharp only if the finds are numerous and distributed enough to prove that already by 1450 B.C. Linear A literacy was firmly rooted in the dominant centers. Actually there are only one or two dubious stray signs on ingots. No writing exists on any of the numerous objects from the Shaft Graves, nor on their stelai, including those most recently discovered. Even the ownership of signets (seals) was rare, and their use was still rarer (*MMRel*² 19) — at least until LH III, for which Mykenai has just provided new evidence. The Mainland, including its most advanced centers, was illiterate until ca. 1450.

Linear B Literacy on the Mainland. Literacy on the Mainland did not begin before 1450 B.C., at the earliest, and perhaps only a little before 1400. Reason will be shown for believing that it ended ca. 1200 B.C. From these 250-200 years we have at present four groups of inscriptions (*HT* 603-610): (1) tablets from the palace at Pylos: apparently these are all palace accounts and related documents (sealings, etc.); (2) tablets from Mykenai: accounts of a wine merchant *vel sim.;* (3) brief texts painted on vases found at Thebes, Tiryns, Orkhomenos, and Mykenai; presumably these have some one (or more?) of the functions which wine-jar inscriptions usually have, such as the source, date, kind, quality, etc. (evidently not the price, since none is a numeral); (4) one or two possible dedications, such as the dubious Asine sherd (*supra,* p. 109) and the brief vase graffito at Eleusis.

Wace himself, inspired by his discovery at Mykenai, has put forward a view like that of Glotz: inscribed tablets are to be expected in every house or palace of LH III. Buildings where at least a few have not been found have not been properly excavated. Literacy existed and was utilized in all the principal centers.

In what Wace says there is obviously much truth. More than just one or two secretaries must have understood the Theban labels. Tablets in a private house may not extend the range of types of tablet and *types of use* known to us — the texts are still mere accounts — but the discovery does extend the probability of more *kinds of users.* Bennett finds six hands at work on the 38 tablets from the House of the Wine Merchant, and some 30 hands at Pylos. Linear B literacy presumably spread over most of Mykenaian Greece: it can no longer be considered a rarity. Occasionally brief inscriptions were put on articles exported, as to Ras Shamra and even Eski Samsun (*supra,* p. 101).

Doubtless many more inscriptions, possibly several more groups, will eventually be discovered. Allow for three, or for six, times as many, and it is still not an imposing list; not when compared to later Greek inscriptions, or to the grand monuments themselves of the Mykenaian Age. The notion that writing was uncommon on the Mainland should not be hastily abandoned. A sample lot, consisting of hundreds of inscribable objects, was provided by C. W. Blegen's 52 LH chamber tombs, excavated and published with minute care (*Prosymna,* 2 vols., 1937): there is no writing whatever. Doubting that even three known pots from Mykenai are inscribed, F. H. Stubbings remarks, "Certainly I have never myself seen one of these marks on any of the hundreds of Mycenaean pots from Greek sites which I have examined" (*Mycenaean Pottery* 51).

In any case the kinds of usage appear to have been very limited. Apart from an allowable fringe of exceptions, such as the Asine and Eleusis sherds may (?) represent, and a very few (actually *only* two now known) found abroad, all of the Linear B documents have to do with business: they are all accounts, labels, and the like. The interesting question is: was writing on the Mainland virtually restricted to the purposes of government and business?

Evidences of Restriction. The first part of the answer is obvious: Linear B apparently began, in Crete, as a special-purpose, chancellery script, created for accounts in Greek. Nothing could be more natural than that it should retain that character, partially, predominantly, or exclusively, on the Mainland.

In the second place, this was the beginning. No ancestral tradition, no inscribed monuments helped to broaden the tradition. Moreover,

clay had to be used at least in part, perhaps always. There were ca. 199 signs to master, along with the numerals. Most, if not all, the obstacles to full literacy outlined above, pp. 110-111, were present.

Another kind of evidence is the strange fixity of Linear B. Having learned it before 1400 B.C., the Mainlanders ca. 1200 were writing, in the same way, on the same kinds of tablets, using signs which were almost identical; in all those decades only one new, frequently used sign was added on the Mainland [but I am told that of this sign one instance has now been read at Knossos]. They had learned their lesson with astonishing accuracy, so accurately as to call for an explanation. In contrast, the Cypriots, *if* the script they had learned was Linear A, apparently were only as careful as one would expect. Likewise the Greeks of the later period were not slavish in copying Phoenician letters and in preserving the exact forms. In fact, it would be difficult to select a period of two centuries in the history of later Greece when letter shapes did not change more radically, and this despite the fact that the later (Phoenician) letters were mostly far more simple, i.e. far less in need of simplification or capable of it, than most of the Minoan.

Akin to the fixity of Linear B is its homogeneity. "Almost complete uniformity in the shapes of the signs, and in the spellings of words, is shown between Knossos, Pylos, Mycenae, and Thebes" (Ventris-Chadwick, *JHS* 73 [1953] 85). Of course this is a round statement, made on the basis of data which eventually will be considerably supplemented; but even so, the allowances that have to be made for possible or likely alterations are slight. Linear B is so uniform everywhere as to astonish anyone who has the least knowledge of the numerous local variations in the later (Archaic) epichoric Greek alphabets.

"The more one looks at Linear B," writes Ventris (*per litt.*), "the more one is struck by the stereotyped nature of the tablets, going far beyond mere identity of signary or language. Their similarities imply continuous operation of a scribal routine having a common origin and identical milieu, and imply too that this routine had already been in operation some time before the Knossos tablets were written." Several of the Linear B signs involve six or more separate small marks: they are fussy to write: they fairly cry out for simplification. With vastly more conservatism than the Phoenicians showed in their writing, the Minoans and Mykenaian Greeks retained elaborate pictographs — primitive, delicate, fussy signs — unchanged to the end.

It would seem likely that some connection must have existed between the extent of literacy and the foregoing facts (viz. the homogeneity, conservatism, and complexity of the signs). This may be suggested by study of the opposite, viz. the facts about writing in Greece after the Phoenician letters were adopted. These signs were few and wonderfully simple. Being few, simple, and far from pictographic, the shapes could vary considerably without ceasing to be intelligible. Other factors operated, of course, but local variations were numerous. Literacy was certainly not restricted to court scribes and to merchants. On the contrary, such finds as the Hymettos sherds and the Theran rock inscriptions suggest very strongly that all sorts of people, including low sorts, learned to write. It was not very difficult, and, in an age of individualism, they wrote more or less as they pleased. Written literature, redactions of law codes, and finally ostracism are successive proofs that literacy, whatever its precise extent, was far from being restricted to a very few. (Not all states were alike with respect to the extent of literacy in them; and it is odd that the simpler [Phoenician] letters came to be supplemented by dozens of local numeral systems, all of which were much more complicated than the numerals of Linear B.)

One cannot argue that opposite conditions in Linear B (fixity, difficulty) *automatically* produced an opposite result, viz. the condition described *supra,* p. 110, as Special Literacy. The indication is plain, however, that limited groups of scribes, accountants, traders, and perhaps others jealously preserved the 199-sign signary against change; *and* that this was natural and easy, because there was little, or at least limited, other use for writing. The later (Phoenician-letter) literacy, so far from being analogous, is the opposite in every respect.

Numerals

To speak of "Minoan Mathematics" is to give a false overtone; even "Minoan Arithmetic," so far as we know, involves nothing more complicated than addition, fractions, and proportions. What can be said, however, will throw some light on the Minoan mind.

Three negative items first. The Minoans adopted from Egypt, or invented by counting their fingers, the decimal and not the duodecimal system (the system in which the second "decimal" place is used for numbers beginning not at ten but at twelve; then duodecimal "100" equals what we write as 144 units; and so on). In the Mesopotamian-Hittite cuneiform tradition, the sexagesimal system, sometimes at 60 and over, was blended with the decimal; and we still follow them in the division of our minutes, hours, days, and circles. But the Greeks and Romans copied the decimal system of the Egyptians and the Minoans; we are still paying the penalty. The Minoans should not be specially blamed. They failed to advance on their predecessors and to attain what no people has attained fully.

The Minoans made errors in adding fractions. All sorts of records, including many Athenian accounts published on marble, contain more or less venal inexactitudes and definite errors. Errors are as much an indication of familiarity and carelessness as of unfamiliarity and struggles: "Many mathematicians dislike all numerical computation and are not particularly expert at it" (Whitehead, *Mathematics* [cited more fully *infra*] p. 70). Hence, the errors in Minoan addition cannot be held to be significant of anything except occasional failure to check. They did, however, check occasionally, since Bennett has shown that the mark × is a check-mark. The check-mark is found (*Ind,* p. 117), however, in only 39 Linear B inscriptions (15 in the *Dk* lot; the rest scattered).

The extant Linear B records do not give us any number requiring a numeral in six or more decimal places, i.e. for 100,000 or higher, although the Egyptians had numerals for seven, i.e. 1,000,000. This is argument from silence, but the probabilities favor it. In the Linear A tablets, and also in Linear B at Pylos, there is no numeral of a magnitude as great as five places, i.e. 10,000.

Of positive and definite significance are certain general features of the Minoan numeral system. Most striking is their failure to invent a separate symbol for "five"; instead, they repeated the unit-symbol all the way from "one" through "nine." In this, most Greek acrophonic systems, including the Attic, and also the Roman system, were superior. The invention of a symbol which should replace five marks with one should not be very subtle or difficult for any people who could produce a symbol for "ten." Although the Egyptians and the Mesopotamian-Hittite group also failed, in favor of the latter it must be realized that the number of shapes which can be attained with wedges is more limited than when curves can be used. The fact that these peoples failed to invent a symbol for 5 (or for 50; 500; 5000; or 50,000) suggests indeed that although they used numerals during several hundred years, they did not use them enough to make them even as efficient as the Greek or Roman numerals. (It is chastening, however, to recall that our [Arabic] 5 originally was and in a sense is really five lines, 5.)

One primitive aspect of counting is seen in mere tallying. In *Ind,* p. 117, Bennett has collected the instances for the first time, alleging six. The latter three (*Lc586, U736, V56*) seem to me dubious. In Ab19 and *C162* the number of units was small enough so that the method has no present significance; but in Eq03rev, no fewer than 137 [cattle] had to be counted, and the unit strokes are put down, intelligently, in groups of five aligned vertically; 130 of the marks are preserved. The modern device of a slash through every four vertical, 𝍸 = 5, was perhaps unnecessary; on the other hand it is curious that they had the notion of groups of five without progressing to invent a symbol for five.

The whole Minoan notation is made from two shapes alone, the straight line and the circle. This simplicity contrasts with the complexity of many of the other, i.e. non-numerical, signs. In many cases, if not all, the signs had pictographic origins, whereas there was no temptation to try to picture, say, 100. Insofar

as the inventors of Minoan numerals were acquainted with the Egyption numerals, however, they deliberately resisted complications (*infra*, p. 125).

Even so, the Minoans did not anticipate the simplicity and advantages of the modern two-sign-plus-position notation used, or its equivalent, in mechanical calculators ($0 = 0$, $1 = 1$, $10 = 2$, $11 = 3$, $100 = 4$, $101 = 5$, $110 = 6$, $111 = 7$, $1000 = 8$ . . .). Instead, the Minoan system is so cumbrous that multiplication or division in it would be as difficult as in the Roman, or more so. We may reasonably conceive that the Minoans had no "mathematics" much beyond the sort preserved to us. On the vast possibilities and importance of an efficient numeral notation, see A. N. Whitehead, *An Introduction to Mathematics* (*Home University Library,* London, n.d., Williams and Norgate) 59.

Consonantly, the Minoans, like the Greeks and Romans, but unlike the (Asiatic) Indians and the Arabs, appear to have had no zero (Bennett having shown that × does not have this meaning). Whitehead, *op. cit.* p. 63, suggests what they missed; and I imagine that O. Spengler, if he had had the data before him, would have found the Minoan soul to be sadly deficient in mathematics (*The Decline of the West* [Eng. trans.; New York, Knopf, ed. 2, 1928], I, p. 66, on the absence of zero as an index of the "Apolline" [Greek Classical] soul).

As to fractions, I can add nothing to what Sundwall, Kober, and Bennett have written; it suffices to say that even if there are minor difficulties of interpretation, thus far there seems to be no evidence in this quarter of more than a modest degree of primitive mathematical ability. Some tablets dealing with percentages and other proportions reveal what is at present the most advanced arithmetic in Minoan records. It may be grade-school stuff, but would evidently repay full study: it is to be hoped that Ventris will publish his *Work Note* 18 (15 Feb. 1951; with material from the earlier pages 152-154). Attention may be drawn also to Bennett's five tablets (*Yale Sci. Mag.* 25 [1951] 36), with the actual or approximate regular sequence of six related amounts, e.g.

28	28	8	12	6	600

the formula being

$$X \quad X \quad \frac{2X}{7} \quad \frac{3X}{7} \quad \frac{3X}{14} \quad \frac{300X}{14}$$

This is the most complex set of relations as yet discovered, but is still not very "advanced."

There is one other series of details which may repay attention. In reporting to historians of science what A. J. Evans had established for Minoan arithmetic, G. Sarton (*Isis* 24 [1935/6] 379) remarked that there was no principle of position in Linear AB numeral notation. This is correct, in the sense that position by itself never makes value.

Doubtless Bennett, or anyone else who has copied many tablets, has noticed that other rules of position do nevertheless govern the way numerals are written. These rules have never been studied and stated. They will be seen to enable certain restorations to be made with virtual certainty, and they throw some light on Minoan mathematical ability.

Until photographs are published of all tablets with numerals, one can only say that at Pylos the numerals for the units approximate to a regular form:

One	𐄇	Four	𐄈	Seven	𐄉
Two	𐄇𐄇	Five	𐄋	Eight	𐄊
Three	𐄇𐄇𐄇	Six	𐄌	Nine	𐄍

I have relied on the transcripts in *Py*. These show a high degree of regularity. Thus, e.g. "five" is never shown in the transcripts as 𐄋 though it may be 𐄈𐄇; and the strokes e.g. of 𐄊 are sometimes not exactly aligned. The most impressive evidence is Aa05, in which 𐄌 was erased entire when the number was found to be "eight," and not "nine." Instead of erasing one unit, the scribe erased all to write 𐄊.

There are scores of positive instances. The following are the sole exceptions (comments by Bennett *per litt.* in parentheses):

An23edge		said to have – over 𐄊 erased (space probably a factor).
Eb35.3	𐄊	(space possibly a factor; there is just room for the normal scheme).

Ec07.1	𐄇	
En02.17	𐄁	at the end of the longest line (space definitely the reason). Other lines have 𐄀.
Ep03.9	𐄁	at the end of a long line (space definitely the reason).
Ep03.14	𐄇	(narrow line).
Fn01.14	𐄇	(no reason apparent); other lines have 𐄂.
Ua02rev	𐄇	
Ua03rev	𐄇	(messy, much erasure; looks like tallying).
Un02.2	𐄇	although 𐄂 also occurs.

Apparently some few scribes, in a very few instances, in the case of the numerals for "three," "four," and "nine," departed from the regular forms: they could do so without being misunderstood. The numerals had almost, but not quite, all taken on rigid conventional forms: and this gives us an idea of what the Minoans had accomplished.

The exceptions being, however, rare, the regular forms should offer a guide to readings in all doubtful cases. Restorations can now be made in Ae07, Ae08, An10.3, An21.1, An22rev.6, An22rev.7, An23rev.4, Eb15, Jn02.9, Xb07, and Xn76. *SM* II, no. 1722, for this reason if there were no others, could be rejected as non-Minoan (*supra,* p. 104).

Knossos deserves fuller study than I can give it, but inspection seems to indicate, as would be expected 200 years earlier, somewhat less regularity.

As to the *tens,* a similar scheme holds:

Ten	𐄐	Sixty	𐄛
Twenty	𐄑	Seventy	𐄜
Thirty	𐄒	Eighty	𐄝
Forty	𐄓	Ninety	𐄞
Fifty	𐄔 or 𐄕		

The exceptions noted, at Pylos and/or Knossos, are Thirty 𐄑𐄐 (crowded?) Forty 𐄜 Fifty 𐄝 Ninety 𐄞 and a few more flagrant instances of crowding hundreds with tens, or tens with units.

The *hundreds* fall into somewhat the same formations. For them and for the tens closer study will certainly suggest readings and restorations. It may be added that the order of magnitude is regularly descending, left to right. To this there is no flagrant exception; but crowding (necessary or not) could cause a hundred to be put above tens, or tens above units; in Cn15.2 a hundred occurs under twenty, thus 𐄇 giving a quite exceptional, but a legible and doubtless not incorrect formation. The Cretans had instincts and habits in their numeral notation, but it was only later, in the hands of Greeks on the Mainland, that more nearly rigid groupings of the unit-sign developed.

In short the study of Linear B numerals supports the notions which will be adduced *infra* about literacy: a simple notation; a simple arithmetic; not much use for such things.

There is some interest in the realm of origins, a study which might be pursued along the following lines. The Linear A numerals appear to be laid out without much order. The Egyptian numerals also are not reported as having any fixed groupings (A. Gardiner, *Egyptian Grammar*[2], p. 191): "six" is represented, for instance, by six verticals all in one row, or by two superposed rows of three verticals each, or (I suppose) by any placing of six simple verticals. In contrast, the Hittite cuneiform begins like the Minoan, but is different in 4 𒐚, 5 𒐛, 7 𒐜, and 8 𒐝. The differences from Minoan are not arbitrary, but lie in the nature of wedges: wedges make a neater figure when one wedge is placed, not exactly below the one above, but below the interval between two above. The origins of the Minoan numerals should be sought in Egypt rather than in the cuneiform tradition. And, in fact, Minoan "hieroglyphic" numerals do resemble the Egyptian (*AoC* 140), much more than do Linear A or B numerals. But apart from these elements, and with the exception of the system of fractions, Minoan numerals, like their signaries, were developed independently of Egypt, as Evans saw (*PM* I 281).

The Cessation of Literacy in the Aegean

Loss of Literacy. It might reasonably be expected that after almost 400 years of writing in Crete, the two developed Minoan scripts, Linear A and Linear B, would not have died out all at once. Of the two causes for the cessation

of literacy in any given instance, viz. massacre, or the literate men of one generation seeing so little value in writing that they did not trouble to teach the next generation, clearly the latter is involved. There was no sufficient massacre; other skills survived. Even so, when a whole civilized nation stops writing — people on two mainlands and many islands, people in the great centers and in sequestered hamlets — then (one would suppose) something appalling has happened. In the darkest periods of the post-Roman Dark Ages, i.e. in the sixth-seventh and, even worse, in the ninth-tenth centuries after Christ, literacy was not lost. In fact, the subject of our present study is the only time Europe has lost literacy. The tradition has been unbroken since the Greeks regained literacy sometime before 700 B.C.

The observation by J. P. Harland (*AJA* 38 [1934] 90) is significant because he was among the first to realize the apparently terrible implications of the utter cessation of literacy. *Some* spark of literacy, he thought, must have lingered on through the "Dark" (dark, that is, to us, because we are ignorant) Ages, vital enough to be ignited again when an easier way of writing, viz. the Phoenician, presented itself. This whole way of viewing the situation, clinging as it does to the deep-seated improbability that any people, especially any Greeks, could utterly lose literacy once they had gained it, will doubtless continue to attract all students who seriously consider what is involved. No less a scholar than G. Klaffenbach (*FuF* 24 [1948] 195) is the latest: it seemed likely to him that Minoan literacy lingered on in certain eastern areas, as it certainly did in Greek Cyprus, until the time when Phoenician letters were adopted. For him, and for everyone, the probability that Minoan writing survived was greater, and the theory was more attractive, when the adoption of the Phoenician letters could be dated in the tenth century, and a Not-So-Dark Age of comparatively short duration, ca. 1100-ca. 950 B.C., could be imagined.

Accordingly there is ample justification for trying to prove that literacy did not really cease in Crete or elsewhere during the tremendous interval which, as we now see, may have stretched out from the twelfth century (i.e. the Pylos tablets, some few years in the period ca. 1210-ca. 1100) to late in the eighth; or in Crete itself even from 1410/05 to almost 700 B.C. (on the latter date, *supra,* p. 81, under 1933).

The End of Linear A. The problem is complicated by the fact that literacy of two kinds is involved. Linear A writing is of the Minoan language, and is spread widely, if thinly, in Crete; it is a growth of centuries. When we turn to the actual surviving inscriptions, we find that at the only site where we have really abundant tablets, viz. Ayia Triadha, our evidence for Linear A comes to an end with the destruction of the New Palace at the end of LM 1b — the universal disaster of ca. 1410/05 B.C. The 51 various scattered inscriptions of Linear A from sites other than Ayia Triadha are also dated anterior to LM III. To investigate the date of each of the 51 would be a considerable task, requiring a specialist, and I shall assume for present purposes that the accepted view is, at least in most instances, accurate, viz. that the Linear A inscriptions all, or almost all, date from MM III, LM 1a, and LM 1b; not later. If eventually it is established as a fact, the cessation of Linear A literacy at ca. 1410/05, instead of at ca. 1200, will be a remarkable datum for Minoan history.

The End of Linear B. Linear B is a quite different phenomenon in Crete: confined to one place, created and used for the speech of a foreign power, its continuation would depend largely on that power. The Mainland seems not to have intermeddled in Crete during the period LM III. On this reasoning, the cessation of Linear B at 1410/05 would be natural.

The only tablets which had been regarded as later than ca. 1410/05 B.C. seem now to be dated within LM II (*SM* II, p. 57 and refs., under B69). The results of studying the inscriptions assigned to the later periods in Crete (*supra,* pp. 105-108), of which some or all might equally be Linear A, may be summarized as follows:

1715: should be assigned to Mainland, LH III.

1716: no signs, merely Geometric decorations.

1717: dubious: at best, one real Linear sign plus two variants; but possibly not regular script at all.

1718: one possible Linear A-B sign, and one unique sign.
1719: a unique, *kappa*-like mark.
1720: might be assigned to an island; undated; 5-7 signs, only one (repeated once) recognizable as Linear.
1721: great marks, probably meaningless, undated, on a building block.
1722: not Minoan (*supra*, pp. 101-105).

In short, there is no Minoan inscription from Crete positively dated after 1400, and none from the Mainland or elsewhere which can be definitely assigned to the Sub-Minoan, Proto-Geometric, or later periods. Even if such items as 1717, 1718, and 1720 — the sole possibilities — could be accepted as writing and could be dated 1400-700, they would give us a maximum total of just a dozen signs, apparently making up just three words. Not a single one of the dozen signs is clearly and unequivocally Linear A or Linear B.

These are strong negative data. If, in studies like the present, it is wise to remain as generous and open-minded as possible, then one might try to believe in the persistence of a thin trickle of literacy, vague and incompetent, for a few decades, perhaps even for a century or two. The present evidence will not justify more. Candidly faced, it favors, rather, the supposition that the few surviving post(?)-Minoan signs, viz. in 1717, 1718, and 1720, were personal signet-marks, similar to the old masons' marks of early Pictographic; or even that in some instances they were really meaningless, comparable perhaps to the nonsense inscriptions on later Athenian vases. These explanations would mean that literacy, in any significant sense of the term, was lost in Crete during the long interval between ca. 1400 (at the earliest) and ca. 700 B.C. (at the latest).

Is it possible to urge that writing may actually have continued, on perishable materials, and to fall back on Cyprus (*supra*, p. 112) as a possible analogy? Unfortunately there are dissimilarities. Cyprus retained her old syllabary even after Phoenician letters were introduced, whereas Crete certainly at *some* time utterly lost Minoan writing, and at most the analogy of Cyprus might suggest that literacy lingered on only for a while. But against even this is the fact that Cyprus had no universal catastrophe such as that of 1410/05 in Crete. Moreover, Cyprus preserved tenaciously other old-fashioned institutions, a phenomenon which has no analogue in Crete.

The only escape is to imagine that undiscovered inscriptions may exist in Crete. They may; particularly from the years 1400-1200. But further reasons can be given for considering that any find in Crete comparable in number to the mass of Pylos tablets and datable ca. 1000 B.C., for instance, would be utterly astonishing.

Conclusions

Linear A Literacy. Being what they were, Cretan government and commerce did not require much writing or extensive records. Egypt wrote extensively, but Linear A was home-grown; it had not been derived to any determinative extent from Egypt. Later the Phoenician alphabet with its dynamic simplicity and the backing of Greek enthusiasm was to fan out west and east, being adopted eagerly everywhere. Minoan Linear A evoked little enthusiasm; it is uncertain whether it was adopted even in one area outside Crete (Cyprus). Linear A literacy was not good enough, or extensive enough in Crete, for export.

The Cretans expressed themselves more and better in other ways than in writing.

The Minoan was not a highly literate culture-civilization. It was one of the least literate; it fulfills and enlarges the conception (*supra*, p. 110) of the cultural phenomenon which I think might be recognized as Stunted Literacy. The Minoans never attained to any appreciation of the possibilities of the monumental uses of lettering in works of art, as did the Greeks some, but more the Romans; and the reason cannot be solely the lack of marble in Crete. Of the signs themselves, many remained pictographic or nearly so: primitive and pretty, not monumental.

So also, in a higher sphere, the Minoans probably did not attain to any appreciation of the possibilities of written literature. Doubtless

they had an oral literature. The harvesters on the Harvesters Vase are singing, but there is no reason to believe anyone recorded their song. Akin to these limitations are the low development of numerals and arithmetic, and the failure to develop a practical monetary currency.

In LM III the Cretans lapsed into the long final stage. There may have been some writing; but the scarcity or (as appears from the present study) the virtual absence of it is a surprise. Trying again to match so drastic a result with causes powerful enough to be efficacious, one thinks first of massacres, conceived as having accompanied the burnings of 1410/05. It was because of the massacres, I conceive, that some sites, even though not burned, remained deserted after 1410/05. But no massacres which left many inhabitants living as these did — Cretans are difficult to exterminate, and the Mainlanders cannot have attempted to; Crete was well populated in LM III — would annihilate even a half-vigorous tradition of literacy. And so, although one's first thought is that literacy itself had been burned with the towns and palaces, massacred with the educated citizens, the real fact must be that Linear A literacy had always been just as feeble in Crete as its actual remains suggest. One cataclysm ended it.

Linear B Literacy. When they arrived at Knossos, doubtless the Greeks found the palace records, probably few and poor — worse, because they were presumably less developed, even than those of Ayia Triadha two and a half centuries later — being kept in Linear A. They found Linear A inadequate for Greek, as quite possibly it was for Minoan also. In the interest of more efficient taxation and trade, they enlisted Cretan help in creating Linear B. It was a half-new signary made, like the Cyrillic, specially for a language never before written down. In the neatly ruled, regularly laid out Linear B tablets, and in the efficient-looking lists of items, some part of the genius evident in the Mykenaian tholoi can be perceived. If the new signary itself was not especially well adapted to Greek, that is because the Minoans could do no better for their masters. But then nothing extraordinarily good was needed, because apparently literacy was to serve only for records: if items in lists were recognizable, that sufficed.

Four or five hundred years the Greeks had lived in Greece before they learned to write. In other skills and arts, including those of power, they had advanced tremendously. In literacy — the very nerve of Classical civilization — the Mykenaian Greeks, after they once got it, made no advance at all. Other imported skills touched their imagination, so they developed them; but literacy arrived tightly associated with practical day-by-day bread and butter purposes. Created for these purposes, it was all too adequate for them: writing remained specialized and ossified. I have ventured to suggest for this phenomenon the term Special Literacy.

If in the future the fact becomes fully established that literacy on the Mainland was thus restricted as long as it lasted, then both its origin and its end will accord with that fact. The origin was in government and commerce, not in *belles lettres*. When, with the coming of the Dorians and the Dark Ages, the purposes which writing served — commerce and elaborate government — were choked off, writing ended; whereas literature — oral, that is — went on.

The First Period of European Literacy. The nature of the Linear B documents is clear enough to clarify the prospect about future discoveries. At present there is no reason whatever to hope for an *Ur-Ilias*. At present, apart from a few dedications and the like, we cannot expect anything but linguistic, economic, "social," and governmental data. It would be stupid to rate these low, and ungrateful to complain. Linear A promises more variety, perhaps, but all the surviving texts are brief, even the main bulk of them, which is the Ayia Triadha accounts. It is curious that a civilization so free, daring, and pretty in its art, its sports, and its costumes, should leave behind, in written form, nothing much except book-keeping.

Europe's first taste of literacy was comparatively brief, meager, and unpromising. However severe the cataclysm that caused it, the loss of that literacy was not itself an unqualified disaster. The oral tradition which gave us the

Homeric poems may well have been saved at an early stage (i.e. before the twelfth century) by the restricted nature of Mainland literacy, which doubtless excluded it from the field of heroic poetry; and heroic poetry remained oral, i.e. unthreatened, during its great period of growth, because in that period literacy, instead of expanding, perished.

The disappearance of Linear B literacy was a blessing also in respect to Europe's second period of literacy, the Phoenician-Greek-Roman, our own. The cumbersome signary was out of the way and, with the odd exception of Cyprus, the ground was clear for better signs and for a wholly new tradition of writing — for a less limited, indeed an almost unlimited, kind of literacy. In Egypt, "writing went through pictographic, symbolic, syllabic, and alphabetic stages before Dynasty IV, but retained them all to Roman times, with the further addition of the simpler cursive demotic in the seventh century B.C." (R. H. Pfeiffer). No one can be sure that the Phoenician script would have been given a monopoly in Greece, or indeed would have been adopted at all, simply because, as is clear to us, it was far superior.

HARVARD UNIVERSITY
December 1953

FIG. 1. AFTER XANTHOUDIDES, *EphArch* 1909, Col. 181, Fig. 1

FIG. 2. AFTER XANTHOUDIDES, *ibid.*, Col. 182, Fig. 2

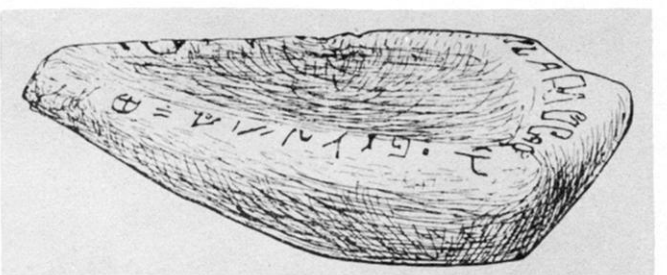


FIG. 3. AFTER XANTHOUDIDES, *ibid.*, Fig. 3

FIG. 4. AFTER XANTHOUDIDES, *ibid.*, Fig. 4

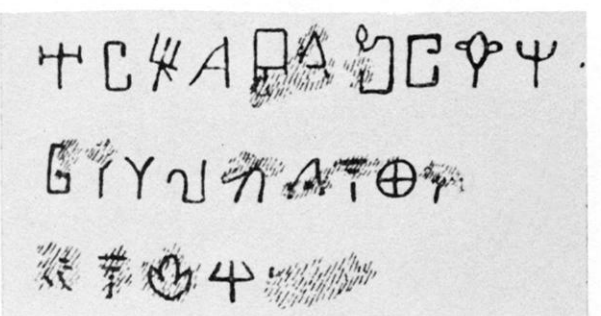


FIG. 5. AFTER CARATELLI, *HT*, Col. 601, Fig. 249

THE LADLE FROM ARKHANAIS

(Dow, pp. 77-129)

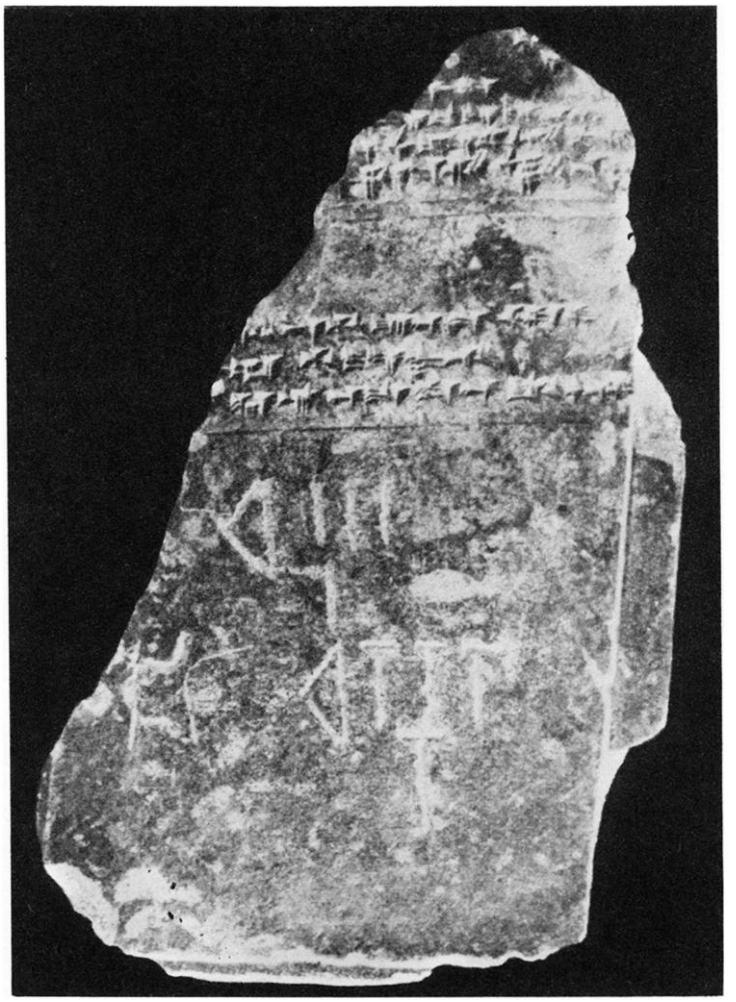


FIG. 6. THE TABLET FROM BOGHAZKÖY
(After H. T. Bossert, *Altanatolien,* pl. 163)

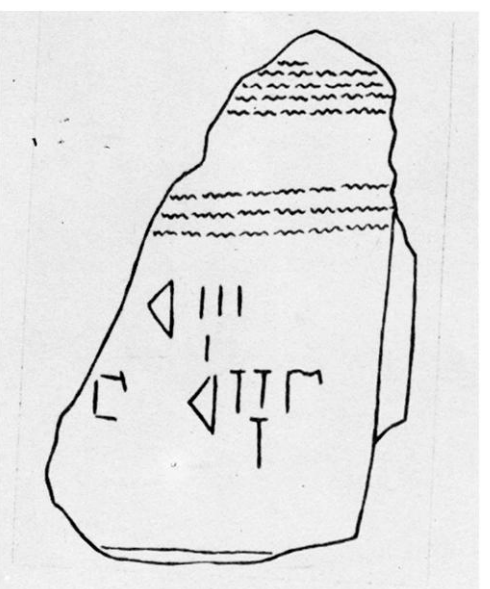


FIG. 7. THE TABLET FROM BOGHAZKÖY
(Photostat of *SM,* No. 1722)

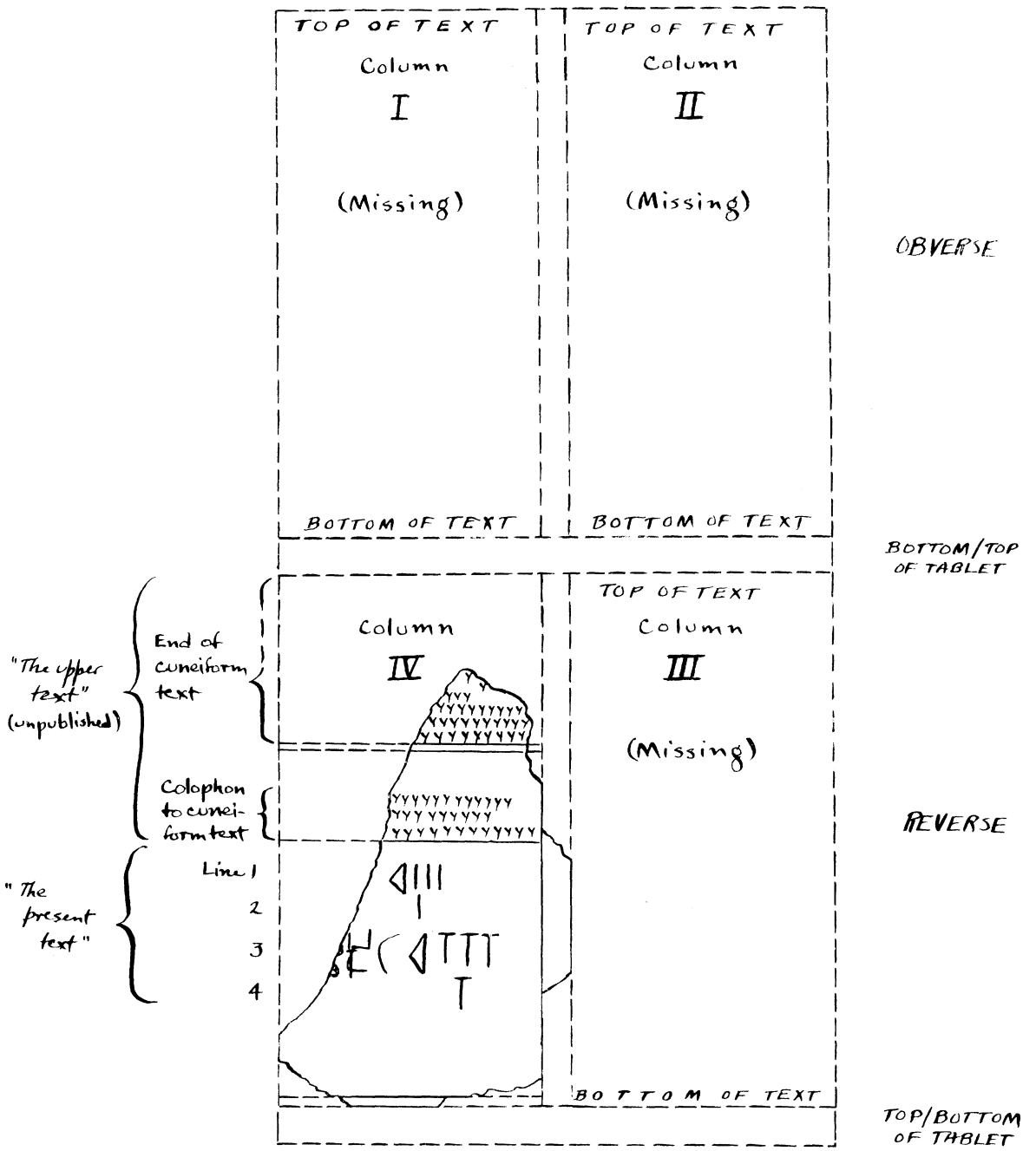


FIG. 8. THE TABLET FROM BOGHAZKÖY
(Schematic Restoration, not based on measurements)