1978

Mycenaean Masonry Practices and Elements of Construction

James C. Wright
Bryn Mawr College, jwright@brynmawr.edu

James C. Wright, “Mycenaean Masonry Practices and Elements of Construction” (Ph.D. diss. Bryn Mawr College, 1978)

AN EXPLANATION AND GUIDE TO THE READER

I am here providing an open-access pdf version of my 1978 dissertation at Bryn Mawr College. Previously it has not been available except at the Blegen Library of the American School of Classical Studies and at Bryn Mawr College. Every now and then I get requests for the dissertation and it is past time to make it universally available, even though it is out of date and contains errors and omissions. Some information in it may be valuable to scholars, not least the photographs, which were taken by me between 1974 and 1977 when many of the remains discussed were more visible or not yet restored by conservators.

This version is made from my personal copy, which includes some corrections in pencil but does not eliminate all the errors and lacunae of the original. The dissertation was never deposited to what at that time in the US was University Microfilms International (UMI), in part because some of the information I had been allowed to use had not been published by its excavators but also because submission to UMI was not required by Bryn Mawr College if two articles drawn from the work were published in peer-reviewed journals. These are

- Wright, James C. 1980, “Mycenaean Palatial Terraces,“ *Athenische Mitteilungen des deutschen archäologischen Instituts* 95, pp. 59-86.
- Wright, James C. 1982. “The Old Temple Terrace at the Argive Heraeum and the Early Cult of Hera in the Argolid,” *Journal of Hellenic Studies* 102, pp. 186-201.

Other articles derived from the dissertation are

- Wright, James C. 1984, “Changes in Form and Function in the Palace at Pylos,” in C. W. Shelmerdine and T. G. Palaima, eds. *Pylos Comes Alive*, New York, pp. 19-29.
- Thomas G. Palaima and James C. Wright 1985, “Ins and Outs of the Archives Rooms at Pylos: Form and Function in a Mycenaean Palace,” *American Journal of Archaeology*, 89, pp. 251-262.
- Wright, James C. 1987-88. “The History of the Palace at Pylos during the Thirteenth Century B.C.,” in *Praktika Tritou diethnous synedriou Peloponnesiakon Spoudon (Acts of the Third Congress of the Peloponnesian Studies Association, Kalamata, September 1985)*, Athens,” pp. 346-348.
- Wright, James C. 2005. “Offsets in Mycenaean architecture,” in *Autochthon: Papers presented to O. T. P. K. Dickinson on the occasion of his retirement,* Dakouri-Hild, Anastasia and Sue Sherratt, eds. (BAR-IS 1432), Oxford, pp. 191-199.
- Wright, James C. 2006. “The formation of the Mycenaean palace,” in *Ancient Greece: From the Mycenaean Palaces to the Age of Homer,* Deger-Jalkotzy, Sigrid and Irene S. Lemos, eds. (Edinburgh Leventis Studies 3), Edinburgh, pp. 7-52.
- Wright, James C. 2020. “Mycenaean Ashlar Masonry: An Overview,” in *Ashlar: Exploring the Materiality of Cut-Stone Masonry in the Eastern Mediterranean Bronze Age,* Devolder, Maud and Igor Kreimerman, eds. (Aegis 17), Louvain-la-Neuve, pp. 187-213.

Jim Wright
Bryn Mawr
February 10, 2023

Mycenaean Masonry Practices

and

Elements of Construction

by

James Clinton Wright

March, 1978

Submitted to the Faculty of Bryn Mawr College
in partial fulfillment of the requirements for
the Degree of Doctor of Philosophy

ABSTRACT

This dissertation is a study of the basic practices and primary elements of construction in Mycenaean architecture: foundations, terraces, rubble and ashlar masonry, cyclopean masonry and its relation to circuit walls. Special consideration is given to conglomerate masonry in the circuit walls and the practice of corbelling. Addenda deal with the cyclopean terrace at the Argive Heraeum and the construction of the Southern Citadel of Tiryns.

The study is a summation of a detailed catalogue of information gathered from published reports of excavations and from on the spot inspection of most of the sites discussed; it is accompanied by 155 photographs documenting the discussion and relevant plans and sections.

The text discusses the appearance and development of different kinds of foundations and terraces at sites from early through late in the Mycenaen period. Special consideration is given to the development of palatial terrace platforms at Tiryns, Pylos, Gla and Mycenae. Rubble masonry and Ashlar masonry are discussed and contrasted; ashlar is examined in relation to its appearance in the tholos tombs and the palaces. Cyclopean masonry is presented as it develops in fortifications from MH through late Mycenaean times. Considerations of style and construction are stressed and detailed attention is given to

the forms of cyclopean masonry at Mycenae and Tiryns. Ashlar masonry of conglomerate is discussed as a style peculiar to Mycenae and its relation to poros ashlar in tholos tomb construction is defined.

In conclusion the study summarizes the architectural history of the practices examined and examines the question of foreign influences in Mycenaean architectural practices as well as the indigenous character of Mycenaean architecture. Avenues of further study are indicated.

Table of Contents

Preface

In autumn, 1974, the subject of this study was suggested to me by Prof. M. J. Mellink while conferring with me at the American School of Classical Studies at Athens. I was at that time searching for a dissertation topic that was concerned with construction practices and techniques, and this one seemed to best suit my interests. Prof. C. Nylander was appointed advisor.

The initial aim of research was to collect as much published data on every aspect of Mycenaean architectural construction, materials and tools as possible. With this in mind a master catalogue was prepared by culling final and preliminary publication reports and other works dealing with the Late Bronze Age architecture of mainland Greece. As well extensive notes were taken on initial surveys of certain sites, especially Mycenae and Tiryns, and significant material was documented by photography using a 0.30 m. and a 0.10 m. scale. Work continued on the site survey in 1975, 1976 and 1977 with visits extended to every major and many minor sites in central Greece, with the exception of Thessaly, and in the Peloponnese. Visits were also made to Crete, Kea, Milos and Thera.

Initial summation of the information from the site survey and catalogue was begun in 1975 by writing detailed summaries of individual sites. These were organized after the chapters on materials and construction in R. Naumann's Architektur Kleinasiens. Originally it was thought that organization along these lines would be most fruitful for presenting the evidence and for attempting to recognize regional variation in the architecture, especially in terms of materials. At that time I was advised by Dr. H. Catling to abandon study of tools and toolmarks as being too involved for the purpose of my interests. Then, at the urging of Prof. Nylander I decided to forsake my attempt to organize the material along regional lines and instead consider it as a homogenous unit of Mycenaean architecture. This proved invaluable advice, for the amount of information I had collected was so great that it appeared the study might not proceed beyond the initial stage of cataloging architectural practices. As a result of this broader approach I was able to focus on the more basic problems of the evidence before me: describing the basic practices and elements of construction in Mycenaean vernacular and civic architecture. The importance of materials, except in specific instances, diminished.

With the aid of a Whiting Fellowship in the Humaniities from Bryn Mawr College and Educational Benefits from the Veterans' Administration, I was able to complete this study within the academic year 1977-1978. Fortunately the fellowship stipulated that I complete the dissertation within a year of its receipt. With a goal in mind I began to write the study in the summer of 1977. In this I was aided by the generosity of Mr. C.K. Williams, II, Director of the Corinth Excavations, who offered my wife, a Fellow of the Excavations, the use of Shear House as a residence for the year. This enabled me to establish myself in the field and with the further aid of a gift Volkswagen and instruction manual, I was able revisit most of the sites in my survey while actually writing the first draft of the study during the autumn. During this time the following chapters were written: Foundations, Terraces, Masonry, Cyclopean Masonry and two others on Half-timbering and Mudbrick, which for reasons of length and time are not included here. It had been planned in July, however, to be able to write other chapters dealing with the numerous details of construction - doors, windows, column bases and so forth. But owing to the pressure of time and the complexity of the problems in dealing with the published versions of the major citadels, it was impossible to accomplish this goal. Thus the present study is a fragment concerned only with the most fundamental practices and elements of construction. Yet it forms a coherent unit and well performs the function of establishing the validity of this line of inquiry and indicating directions of further research. Much remains to be done, and it is hoped that future research will enable a complete conspectus of Mycenaean architectural practices to be published and, eventually, the appearance of a general work on Mycenaean architecture discussing mateerials, practices and techniques, plan and settlement organization.

There are gaps in the reporting. I initially preferred only to discuss those sites that I had studied in detail - thus the preponderance of discussion of Mycenae, Tiryns, Pylos and the Menelaion. But I was persuaded of the need to add greater detail here and there, to give more evidence for some points of view and to place the evidence in an historical framework. The latter consideration was forcefully brought to my attention by the appearance of S. Iakovides' chapter on "Vormykenische und mykensiche Wehrbauten" in Archaeologica Homerica; it provided a skeleton on which I could add the flesh of my numerous detailed observations. My gratitude for its timely appearance is hard to acknowledge. I have, nonetheless, refrained from putting much if any emphasis on sites that I am not personally well acquainted with, thus there is no mention of Eleusis, Thermon and the many sites in Thessaly and only occasional reference to tholos tomb construction.

I have received much aid in this study and I cannot adequately express my debt to all who have guided me on this path. I wish to begin by thanking Prof. Mellink who has taken a lively interest in this project from the start and encouraged me along the way as well as given much useful advice, especially when the work was in draft form. To Prof. Nylander I express thanks for visiting me in Greece and discussing the project, especially for pointing out what final form the investigation should take. To Prof. James R. Mc Credie much gratitude is owed for taking me on as Secretary of the ASCSA and facilitating my research by granting me leave to visit sites on numerous occasions, even when this meant a suspension of some of my duties.

To the Ministry of Culture and Sciences, General Direction of Antiquities and Restoration, I am grateful for permissions granted in 1975 and 1977 to photograph, measure, draw and record observations at Tiryns, Pylos and Thebes. Thanks is due to the respective Superintendents of Antiquities responsible for these sites for allowing me to pursue my researches: Mrs. E. P.- Deflaki, Mr. A. Liangouras, Miss A. Andreioumenou. To Mrs. A. Demakopoulou I am indebted for courtesies and discussion when working at Thebes.

For permission to study other sites I am particularly indebted to Prof. G. E. Mylonas who not only has given me a free hand at Mycenae, but also provided me with a place to stay, McCarthy House, when conducting my initial survey of the site in winter, 1975. My debt to his scholarly researches is apparent in the pages that follow.

To Dr. Catling, Director of the British School at Athens I am indebted for allowing me to read the notebooks and visit the site of the Menelaion. His generosity and advice and encouragement will not soon be forgotten.

For permission to study at Tiryns I am grateful to Dr. U. Jantzen and to Dr. K. Kilian, present director of the excavations. I am especially thankful to Dr. Kilian for discussing his excavations in the Lower Citadel with me and allowing me to mention them here. In like vein I thank Lord William Taylour for permission to study the remains of Citadel House, Prof. W.A. McDonald for permission to study the architecture of Nichoria, Mrs. I. M. Shear for discussion of the Panagia Houses and permission to reproduce Figs. 160, 185; Dr. R. Hägg and A. Westholm for information and a tour of Asine, Prof. C. Renfrew for a visit to Phylakopi, Dr. C. Doumas and Dr. A. P.-Iliaki for hospitality and an excellent tour of the excavations at Akrotiri, Thera; Dr. S. Iakovides for permission to inspect the citadel of Gla.

To E. Vanderpool, C.J.W. Eliot, C.K. Williams, II, C.N. Edmonson, J. Binder, E. Smithson, C. Podzuweit, J. Rutter, J. McEnroe, K. Petruso, J. Davis and K. Schaar are due many thanks for much discussion and encouragement. To the students of the American School who on numerous occasions I have used as sounding board I am grateful. Special thanks goes to Dr. N. Winter for numerous library courtesies.

K. Dimler printed the photographs with speed and quality; C. Lyons and B. Hamanaka did the plates.

To the guards at the many sites I offer a special note of thanks for their help and interest, especially to Dionysios Androutsakis, Head guard at Pylos, whose tales of excavating with Blegen do not begin to match the care he devotes to keeping the Palace of Nestor ready for scholar and visitor alike.

Last of all thanks go to my parents for starting me on this journey and to Kathleen Slane Wright for support and counsel in times of doubt.

Abbreviations

<u>AE</u>, 1962 — G. Mylonas, "E Akropolis ton Mykenon, part 2, Oi Periboloi ai Pylai kai ai Anodoi", <u>ArchEph</u>, 1962.

<u>Aghios Kosmas</u> — G. Mylonas, <u>Aghios Kosmas, An Early Bronze Age Settlement and Cemetery in Attica</u> (Princeton: 1965).

<u>Ancient Mycenae</u> — G. Mylonas, <u>Ancient Mycenae, the Capital City of Agamemnon</u>, (Princeton: 1957).

<u>AR</u> — Archaeological Reports, <u>JHS</u>.

<u>Argive Heraeum</u> — C. Waldstein et alia, <u>The Argive Heraeum</u>, 2 vols. (New York: 1902).

<u>Asine</u> — O. Frödin and A. Persson, <u>Asine, Results of the Swedish Excavations, 1922-1930</u> (Stockholm: 1938).

Bridges, <u>Tombs</u> — R. Bridges, <u>Mycenaean Tholos Tombs (An Architectural Study)</u> (Bryn Mawr College, Ph.D. diss. 1974).

<u>BSA</u>, 25 — A. Wace, "Excavations at Mycenae", <u>BSA</u>, 25 (1921-1923).

<u>CMP</u> — A. Furumark, <u>The Chronology of Mycenaean Pottery</u> (Stockholm: 1941).

Dickinson, <u>Origins</u> — O. Dickinson, <u>The Origins of Mycenaean Civilisation</u>, <u>SIMA</u>, 49 (Göteborg: 1977)

<u>Domestic Architecture</u> — I. Shear, <u>Mycenaean Domestic Architecture</u> (Ann Arbor: University Microfilms, 1968) Bryn Mawr College Ph.D. diss.

<u>Eutresis</u> — H. Goldman, <u>Excavations at Eutresis in Boeotia</u> (Cambridge, Mass.: 1931).

<u>Fundstätten</u> — P. Ålin, <u>Das Ende der mykenische Fundstatten auf dem griechischen Festland</u>, <u>SIMA</u>, I (Lund: 1962).

<u>Karten</u> — Steffen, <u>Karten von Mykenae</u> (Berlin: 1884).

Kirrha — L. Dor, J. Jannoray, H. and M. van Effenterre, Kirrha, Etude de prehistorie Phocidienne (Paris: 1960).

Korakou — C. Blegen, Korakou, A Prehistoric Settlement near Corinth (New York: 1921).

Krisa — J. Jannoray and H. van Effenterre, "Fouilles de Krisa", BCH, 61 (1937) pp. 299-326.

LCG — G. Mylonas, Mycenae's Last Century of Greatness, Occasional Paper n. 13, 1968, Australian Humanities Research Council.

MAA — S. Iakovides, E Mykenaïke Akropolis ton Athenon, (Athens: 1962).

Minoan Architecture — J. Shaw, Minoan Architecture: Materials and Techniques, ASAtene, 49, n,s. (1971).

MMA — G. Mylonas, Mycenae and the Mycenaean Age (Princeton: 1966).

Mycenae — H. Schliemann, Mycenae (New York: 1880).

MycTabs, II — E. Bennett, ed. "The Mycenae Tablets, II", TAPS, n.s. 48 (1958).pp. 1-122.

MycTabs, III — J. Chadwick, ed. "The Mycenae Tablets, III", TAPS, n.s. 52 (1962) pp. 3-76.

Mycenaean Citadels — N. Scoufopoulos, Mycenaean Citadels, SIMA, 22 (Göteborg: 1971).

New Tombs — A. Persson, New Tombs at Dendra near Midea, Skrifter Utgivna av Kungl. Humanistiska Vetenskapssamfundet, I, Lund, 34 (Lund: 1942).

Prosymna — C. Blegen, Prosymna, (Cambridge: 1937).

Pylos, I — C. Blegen and M. Rawson, The Palace of Nestor at Pylos in Western Messenia, vol. I: The Buildings and their Contents (Princeton: 1966).

Pylos, II — M. Lang, The Palace of Nestor at Pylos in Western Messenia, vol. II: The Frescoes (Princeton: 1969).

Pylos, III — C. Blegen and M. Rawson et alia, The Palace of Nestor at Pylos in Western Messenia, vol. III: Acropolis and Lower Town, Tholoi, Grave Circle, and Chamber Tombs, Discoveries outside the Citadel (Princeton: 1973)

Royal Tombs — A. Persson, Royal Tombs at Dendra near Midea, Skrifter Utgivna av Kungl. Humanistiska Vetenskapssamfundet I Lund, 15 (Lund: 1931).

Schachermeyr, Die mykenische Zeit — F. Schachermeyr, Die ägäische Frühzeit, vol. II: Die mykenische Zeit und die Gesittung von Thera, Österreichische Akademie der Wissenschaften, philosophisch-historische Klasse, Sitzungsberichte, vol. 309 (Vienna: 1976).

SME — N. Valmin, The Swedish Messenia Expedition, Skrifter Utgivna av Kungl. Humanistiska Vetenskapssamfundet I Lund, 26 (Lund: 1938).

Thorikos, V — H. Mussche et alia, Thorikos, 1968 (Brussels: 1971).

Tiryns — H. Schliemann, Tiryns (1885; rpt. New York: B. Blom, 1967).

Tiryns, II — G. Rodenwaldt, Tiryns, vol. II: Die Fresken des Palastes (Athens:1912).

Tiryns, III — K. Müller, Tiryns, vol III: Die Architektur der Burg und des Palastes (Augsburg: 1930).

Tiryns, V — U. Jantzen, ed. Tiryns, vol. V: Forschungen und Berichte (Mainz: 1971).

Tiryns, VI — U. Jantzen, ed. Tiryns, vol. VI: Forschungen und Berichte (Mainz: 1973).

Tiryns, VIII — U. Jantzen, ed. Tiryns, vol. VIII: Forschungen und Berichte (Mainz: 1975).

Wace, Mycenae — A. Wace, Mycenae, An Archaeological History and Guide (PrincetonL 1949).

Wehrbauten — S. Iakovides, "Vormykenische und mykenische Wehrbauten", Archaeologia Homerica, I, E:1, (Göttingen: 1977) pp. 161-221.

Zygouries — C. Blegen, Zygouries, a Prehistoric Settlement in the Valley of Cleonae (Cambridge, Mass.: 1928).

I. INTRODUCTION

The study of Mycenaean architecture cannot be said to have been neglected. Beginning with Pausanias descriptions of Mycenaean architectural remains have been given. Early travellers such as Colonel Leake and Dodwell were among the first in modern times to offer first-hand accounts of the preserved remains at many sites on the Greek mainland and to correlate the ruins with literary testimonia.[1]

Actual attempts to categorize Mycenaean architecture began with Schliemann's work at Mycenae.[2] These were primarily concerned with descriptions of the different masonry styles found in the circuit walls of the citadels, particularly Mycenae. Steffen's introduction to the Karten von Mykenai, which appeared in 1884, and Dörpfeld's chapters in Schliemann's Tiryns, published two years later, constituted elaborations upon these observations based upon closer inspection of the remains and further excavation. Dörpfeld's study in particular set the tone for all future work in the field.

Subsequent publications tended to concern themselves with summary presentations of Mycenaean culture: thus Tsountas' Mykenai kai Mykenaios Politismos, which appeared in 1893,[3] Frazer's commentary on Pausanias (1898) with his erudite summaries, and Fimmen's work, Die kretisch-mykenische Kultur, which was published in 1924. In the same year Wace's lengthy report on the seasons of excavation at Mycenae appeared in volume 25 of the Annual of the British School at Athens. Here were collected numerous references to the architecture of the citadels of Mycenae and Tiryns and a lengthy publication of the tholos tombs at Mycenae that accomplished Wace's primary aim of establishing the primacy of Helladic culture on the mainland during the Mycenaean era.

In the meantime K. Müller, who in 1911 had inherited from Dörpfeld the excavations at Tiryns and the responsibility for their publication, continued his study of the maze of walls and fortifications uncovered there. His publication in 1930 of the results of the excavations still forms the core for the study of the architecture at Tiryns and of Mycenaean architecture in general.[4] It discusses all of the architectural elements of the citadel in terms of their architectural and, when possible, their stratigraphic relation to each other. Planning and construction were also considered with discussions of masonry styles, materials and techniques, drainage and function.

More recent studies have centered on problems at individual sites. Thus Blegen's invaluable detailed discussion of the architecture of the Palace of Nestor,[5] and Mylonas' illuminating account of his investigations of the walls, gates and ramps of Mycenae.[6] These studies have added a wealth of detailed information to the field. Moreover, they illustrate the state of current knowledge: so much architecture has been excavated from this and earlier periods that it has not yet been fully digested by synthetic studies of Mycenaean architecture.

Recent work has focused either on the military or the palatial architecture of the Mycenaean citadels with some attention directed towards the domestic architecture.[7] Of the studies of military architecture, Scoufopoulos' Mycenaean Citadels is useful not only for the detailed bibliography and discussion of fortifications from all sites, but also for the occasional observations about planning and construction in the circuit walls. Iakovides recent publication of pre-Mycenaean and Mycenaean defensive architecture is the most useful sythesis that has appeared to date, for it presents this most important facet of the architecture as it develops from Middle Helladic through Late Helladic times. As is to be expected there are gaps for the early Mycenaean period: crucial sites such as Teichos of the Dymaians and Midea cannot be accurately dated and Argos is still not well enough known to be included. But the framework is sound and provides a base for further studies.

Mylonas' treatment of the palaces and of the general architecture of the citadels in Mycenae and the Mycenaean Age is at present the most thorough and useful account. On the one hand it constitutes an updating of Wace's guide to Mycenae, and on the other hand it presents much new information based on Mylonas' excavations as well as separate discussions of the architecture from the other citadels.

In the area of domestic architecture Sinos' compilation of pre-classical house forms in the Aegean is a welcome publication, especially for the mainland. He comprehensively brings together the evidence for Middle and early Late Helladic dwellings, and for the palatial period presents an analysis of Mycenaean house types and their relation to the palaces. A lack of good illustrations and of a discussion of techniques and practices, however, compromises the organization of the text.[8] A yet more detailed study of Mycenaean houses, Shear's dissertation, Mycenaean Domestic Architecture,[9] is a thorough presentation of nearly all of the houses on the mainland. Especially valuable is the discussion of house types. A final publication of this study, however, is still awaited.

A thorough and complete presentation of Mycenaean architecture dealing with all of these facets - military, palatial and domestic - has not yet appeared. The lack of such a comprehensive study is understandable in light of the state of the remains. Many of the excavations of the last century are ruins again today. Other sites have been filled in or are overgrown and inaccessible. Furthermore, important material remains unpublished. But with the increasing publication of well dated destruction and construction contexts for buildings and sites, ever so much more information is available about the architecture of the different periods of the Mycenaean era.[10] Although there are still considerable gaps in the record, especially for settlement and defensive architecture of LH I and LH II times, there is still enough information to make a fairly detailed sketch along a number of different lines, namely, settlement and building plan, elevation, materials and techniques.

Sinos' and Shear's classifications of house types taken in conjunction with Iakovides summary of defensive architecture provide a useful starting point for a comprehensive survey. Their examinations of the development of Mycenaean architectural forms during the Middle and early Late Helladic periods are rewarding in view of the radical changes of the Shaft Grave period. Likewise is their importance for pointing in the direction for further research into the origins of the palatial architecture. Any conclusions that might be drawn from

Thus the major and primary elements of Mycenaean construction are examined here: Foundations, Terraces and Walls, the last of which includes a long discussion of Cyclopean masonry and its relation to military architecture. Though detailed, the presentation of many aspects is not covered. Some of them, e.g. materials, have been dealt with before, and detailed study would not at this point be rewarding. Others, such as tools and the traces of tools require a separate study.

This work intends primarily to introduce the basic practices employed in Mycenaean architecture of all forms, excluding the funeral, and to sketch their development where possible. Problems in the nature of the evidence and its interpretation are raised and discussed in hopes of bringing to scholarly attention the need to focus on such questions as how things were built, not just when, and, also, why they were built in the manner that they were. The conclusions will summarize these practices, discuss their importance as manifestations of the culture of the mainland of Greece, and contrast them to contemporaneous architectural practices in the Aegean area.

Notes

[1] E. Dodwell, A Classical and Topographical Tour through Greece, 2 vols. (London: 1819); Views and Descriptions of Cyclopean or Pelasgian Remains in Greece and Italy (London: 1834); W. H. Leake, Travels in the Morea, 3 vols. (London: 1830); Travels in Northern Greece, 4 vols. (1835; rpt. Amsterdam: Hakkert, 1967); Peloponnesiaca (1846; rpt. Amsterdam: Hakkert, 1967).

[2] Mycenae, pp. 26-36 et passim.

[3] A reworked version appeared in English in 1897 and has popularly substituted for Tsountas' original volume: C. Tsountas and I. Manatt, The Mycenaean Age (Boston: 1897).

[4] K. Müller, Die Architektur der Burg und des Palastes, Tiryns, vol. 3 (Augsburg: 1930).

[5] C. W. Blegen and M. Rawson, The Buildings and Their Contents, The Palace of Nestor at Pylos in Western Messenia, vol. 1 (Princeton: 1966); C. W. Blegen, "Architectural Notes from Pylos", Charisterion eis A. K. Orlandos, vol. 1 (Athens: 1965) pp. 117-125.

[6] G. Mylonas, "He Akropolis ton Mykenon, meros deuteron: Oi Periboloi Ai Pylai kai Ai Anodoi", ArchEph (1962),

[7] N. Scoufopoulos, Mycenaean Citadels, SIMA, 22 (Göteborg: 1971); S. Iakovides, "Vormykenische und mykenische Wehrbauten", Archaeologia Homerica E,1 (1977) pp. 161-221; "Cyclopean Walls", AAA, 2 (1969) pp. 463-468; J. W. Graham, "Mycenaean Architecture", Archaeology, 13 (1960) pp. 46-54; G. Mylonas, Mycenae and the Mycenaean Age (Princeton: 1966); S. Sinos, Die vorklassischen Hausformen in der Ägäis (Mainz am Rhein: 1971).

[8] J. Shaw, rev. of Sinos, vorklassischen Hausformen, AJA, 76 (1972) pp. 442-443; J. E. Jones, rev. of same, JHS, 95 (1975), p. 280.

[9] I. M. Shear, "Mycenaean Domestic Architecture", University Microfilms (1968), Bryn Mawr College.

[10] See E. French's articles in BSA, 58 (1963), 59 (1964), 60 (1965), 61 (1966), 62 (1967), 64 (1969); and those of K. Wardle, BSA, 64 (1969), 68 (1973); also, Mylonas' publication, AE, 1962 and reports in Praktika; at Tiryns reports from P. Gercke and G. Hiesel, P. Grossmann and J. Schäfer in Tiryns, V, VIII. Also of value are W. McDonald's reports on Nichoria, Hesperia, 61 (1972), 64 (1975) and H. Catling on the Menelaion, below, nt. 17.

[11] A. Rapoport, House Form and Culture, (Englewood Cliffs: Prentice Hall, 1969) Chapters 1, 2, esp. 5.

II. FOUNDATIONS

When beginning work on their buildings the Mycenaeans did not deposit votives, plaques or other ritual devices into the foundations as was common in the Near East. At least there is no archaeological nor literary evidence that any special emphasis was placed upon laying a foundation either as a significant event or to insure the stability of the building. There is in fact no part of nor place in any building that might be construed as an expression of ritual concern for the building , such as the Pillar Crypts which are found in basements and ground floor rooms of houses and palaces in Minoan Crete. As with so many aspects of Mycenaean life, religion and ritual were apparently not mixed with practical activities like building.

But the Mycenaeans exercised considerable ingenuity when creating foundations for their buildings. A review of the different practices employed to make foundations will show the development of their skills of building and of planning. As is often the case with things Mycenaean, however, there are gaps for the early years of LH I and II, but a development can be sketched. The diversity of practices in LH III can be readily understood in the light of the demands placed on the builders to erect complicated circuit walls, many-roomed and many-storeyed palaces, complexes of houses, storage buildings and other structures and their appurtenances.

Foundation Trenches:

The first aim of the builder was to secure his building. This usually required the excavation of a foundation trench to find stable ground - bedrock, virgin soil, packed debris or earlier walls - and to form a level base on which to build. Commonly trenches were cut into the soil to lay out the plan of the building and to create a base to receive the walls. Such trenches are not always discoverable by excavation and may not as a rule have always been dug. For standard house plans from Middle through Late Helladic times the practice of digging foundation trenches did not change, probably because the foundations actually only formed socles for mudbrick or pise superstructures. Thus at Korakou in Middle Helladic times the rubble foundations were only about 0.30 m. wide and projected only about 0.20 m. above floor level, i.e. they probably were set in trenches from 0.10 m. to 0.30 m. or more deep.[13] This practice was continued in the LH III houses which were slightly larger and required, consequently, sturdier foundations. These walls averaged 0.48 m. thickness and projected from 0.15 m. to 0.50 m. above the floor level.[14] The same description of wall foundations is given for the MH and LH settlements at Eutresis in Boeotia and at other sites with unpretentious private architecture.[15]

At Nichoria in southwestern Messenia, however, one structure of LH IIIA:2-B:1 date was not founded in a trench: the floor was level with the bottom of the wall.[16] This was not the usual case. Most of the buildings at this site were founded in trenches cut into the native sandy hardpan, for example an LH II retaining wall at the mouth of a spring, Fig. 1.

At sites which had little or no sign of previous occupation, trenches were cut into the virgin soil. Recent excavations at the Menelaion, east of Sparta, have completely exposed a mansion of LH II date.[17] Here trenches were cut into the dense, sandy soil for every wall. The trenches vary from 1.00 m. to 1.10 m. in width, about 0.30 m. wider than the walls, Fig. 2.[18] The trenches clearly were used to lay out the plan of the building for they do not break for doorways.

Foundation trenches pre-dating the LH IIIA:2 period were found below Petsas' House at Mycenae; they constitute the earliest occupation in that area.[19] The early LH IIIB buildings of West House, House of the Sphinxes and House of the Oil Merchant were set in trenches wider than the walls (ca. 1.00-1.30 m. to a wall width of 0.80-0.90 m.) and about 0.10-0.30 m. deep, Figs. 3, P1. These, too, ran the length of the walls and did not break for doorways.[20]

Preparatory Cuttings:

Often when there was little or no previous occupation and the site was set on a slope, a cutting would be made to level an area large enough for the entire building or for some of its rooms. An early instance of this practice is seen in the small rectangular structure south of the West House at Mycenae dated to the transition period between MH and LH, Fig.157.[21] The rock here is hard conglomerate and was only partially worked back: the west wall was apparently founded atop the western ledge of rock.[22]

A more ambitious project of this variety is the Period I (LH IIB) complex at the Menelaion. There the conglomerate caprock and underlying sandy hardpan were cut away at the southeastern area of the site to receive the entire early mansion, an area approximately 15 m. by 19 m. Fig. P2. At the southwestern corner the excavation of the rock and soil proceeded as deeply as 1.65 m. below the original ground level, Fig. 4. Once this great cutting had been made, the level surface attained was treated as a primary surface into which further digging produced the foundation trenches discussed above, p. 12.[23]

A later example is the basement of the House of the Sphinxes. Here, loosely consolidated conglomerate bedrock was cut back to form a shelf over 13 m. long and about 3.5 m. deep into which was placed the entire eastern half of the building, Fig.158. The foundation trenches mentioned above, p. 13, were then cut into the floor for the walls.[24]

A contemporary building, House 1 in the Panagia complex, was set into a cutting in the slope that is only 0.80 m. to 1.50 m. deep, 8 m. wide and 18 m. long.[25] To the west the bedrock rises and there the western wall was placed up against it. No great effort was necessary to make this cutting, for the soil and conglomerate were easily cut away. The northern and western rooms of West House were formed in exactly the same manner. The topsoil and loose conglomerate were cleared away and levelled to form floors for the rooms and raised socles for the walls (see below, pp. 15 - 17).[26]

In general levelling of terrain was not extensively practiced, especially where the overburden of earlier occupation with its walls and other debris would have hindered such an effort. Such work was also discouraged wherever outcrops of hard limestone occurred, for the work required to cut through them was great. Nonetheless, examples are found. The northern side of the floor of the Megaron at Mycenae was hewn from the limestone bedrock. Also the floors of the western rooms of the House of Columns were formed by levelled limestone bedrock, Fig. 5. But these were exceptions due to requirements of space and were actually part of the plan of a more common means of providing level space, the built terrace, which will be discussed in Chapter III.

Shelf-like Cuttings

An alternative solution to levelling a hillside for a building was to cut shelf-like trenches for the walls. This practice was very common at Mycenae where so many of the buildings were placed on slopes. A good example can be seen in the eastern wall of the House of the Warrior Vase where the cutting shows in section in the side of a well over which the wall was placed, Fig.159. A series of parallel trenches, stepped up the hillside, anchored the walls of the building and laid out its plan. Other examples are House II on the Panagia slope of LH IIIB date, Fig.160, and the split level arrangement of the House of the Oil Merchant, Fig.161.[27]

This practice was obviously widespread, but certifiable examples are not so common, primarily because the floors of these buildings have not often been dug through. The series of rooms along the southeastern slope of the citadel of Mycenae, Fig. P3 , undoubtedly rested in such trenches. So, too, the houses on the slopes of the acropolis of Asine were probably founded, Fig. 162.[28]

Raised Bedrock Socles:

Often these shelf-like trenches for walls were made where the bedrock had been cut back for the floor of a room. Thus the bedrock formed the lowest portion of the wall like a socle. Examples of this practice are ubiquitous. An LH II wall fragment at the Menelaion, dubbed "The Castle in the Air" is set in a cutting in the soft conglomerate, but one face of the wall is formed by bedrock which was incorporated into it. Many of the walls of buildings in the Panagia complex were set in such cuttings, Fig.160.[29] An excellent example is found in the northern wall of the Megaron at Mycenae; it is perched upon a shelf cut into the hard limestone bedrock.[30] Another can be seen in the House of the Columns, Fig. 5. At other times, however, the rock was left unworked and the wall was built against and over it. The northern wall of the Ramp House literally clings to the steeply rising bedrock seeking purchase, Fig. 6. The western wall of the MH-LH house south of West House was also built over rising bedrock, Fig.157. Other examples are the long north-south walls of the House of the Artists and Artisans, Fig.163, and many of the walls in the Panagia Quarter, Fig.160.[31]

Foundations in Sites with Earlier Habitation:

In areas where earlier habitation was extensive, trenches were cut into the debris, sometimes only shallowly to provide a levelled base for a light building, at other times deeply reaching down to an earlier wall or solid floor, or even cutting away everything to find bedrock or virgin soil. Thus light buildings, particularly the private dwellings at sites such as Aghios Kosmas, Eutresis, Krisa and Korakou, which date from LH I through LH IIIC, rested directly on previous habitation deposits.[32] A good example is House S at Aghios Kosmas, dated to LH IIIC. The walls are built over the Houses E, F and I and the Street A of the Early Helladic period. The foundations start only slightly below floor level.[33] The discussion of the walls of the Lower City at Asine and the illustration of their foundations in section, Fig.162, show this trust in settled occupation debris for foundations. The situation was the same for Korakou, especially houses H, L, M, and O, and caused

Blegen to remark:

> A very great number of foundation walls belonging to the Third Late Helladic Period were revealed, running in all directions and forming a complex and puzzling maze. It is just such a maze as one might expect on a closely inhabited site, where many small houses are constantly being repaired, enlarged and rebuilt. [34]

Although the house S at Aghios Kosmas was founded atop walls of earlier structures, it did not follow their orientation. The Period III (LH IIIB:2) walls at the Menelaion were founded on the remains of the Period II walls and show how earlier walls can be used as foundations for later one. We do not know how much of the Period II settlement was preserved when the next mansion was erected; we only know that it was constructed about 125 years before the construction of Period III. Presumably, however, the later inhabitants levelled whatever remains there were at the same time preserving the wall stubs of the previous structure. Atop these stubs they placed their walls and stepped them in 0.05-0.10 m. from the faces, Fig. 7. Thus the Period III building mimicked the plan of that of Period II.

At Tiryns some walls were not only founded atop earlier ones, but also followed their direction, even to the extent of creating an oblique orientation to other walls and structures of the same period. This happened because the walls, such as those north of room X, performed the same function as their predecessors and, presumably, were built soon after the others were dismantled.[35] In the southern citadel the same situation obtained: immediately successive occupation afforded the builders ready-made foundations set in a grid that determined the orientation, Fig.P15, walls a,k,s.[36] Outside the citadel in Trench F, in the area of the present agricultural prison, a large, free-standing building 13.50 m. by 5.40 m. was uncovered in 1929. Apparently it was built in its entirely atop an earlier structure. The foundation walls varied from 0.80 m. to 1.00 m. thick, slightly wider than the superstructure.[37]

At Pylos the interior walls of the palace were set in trenches varying in depth from 0.65 m. to 1.10 m. below floor level and in width from 1.25 m. to 1.50 m. These cut through earlier habitation debris, either to sandy virgin soil or to earlier walls or levels.[38]

The Period II (LH IIIA:1) construction of the mansion at the Menelaion well documents the complete distrust of using earlier occupation debris for founding a building. The trenches for the walls of this period were not only cut through the destruction debris of the immediately preceding period, but also through the solid rubble walls of the earlier structures until they came down upon the original rammed pebble floors of the first mansion, which were formed from the hardpan of the ridge, Fig.P2 . So, too, were the walls of the rooms of Petsas' House at Mycenae set in trenches that in most places were cut through earlier debris to bedrock.[39]

This examination of the diversity of practices employed by the Mycenaeans to create a level and solid base for their buildings has centered primarily upon the excavation of trenches and the levelling of terrain for buildings. Similar practices for the founding of heavy walls such as fortification and massive terrace walls will be discussed separately below, pp. 29-37. Our next concern is to discuss how the walls of buildings were placed in these levelled areas and trenches.

Beddings:

The excavation of a foundation trench was adequate preparation for the stability of the walls of small structures. The trenches prevented the walls from shifting about and provided a relatively level surface on which to lay the walls. Anomalies in level were easily enough taken up in the rubble coursing. Large buildings were often considered to require a consistently level surface for the base of a wall, and in such cases a secondary preparation, called a bedding, was laid in the foundation trench. Beddings were especially common in carefully planned and built structures, particularly those with coursed rubble or ashlar walls.

The simplest bedding is a layer of mud mortar in a foundation trench. As with simple foundation trenches, these are not always perceptible and it is not known if this practice was common in early times or was introduced late.[40] At any rate it should be viewed in conjunction with the use of mortar for laying rubble walls (see below, pp.126-133).

Although the existence of thick beds of mortar has not been reported, I have seen telltale traces underneath the lowest course of masonry in walls of the House of the Shields and the assorted walls behind it.[41] A yellowish layer from 0.05-0.08 m. in thickness can be distinguished between the stones and the crumbly decomposed conglomerate hardpan. A clay bedding in a foundation trench has been recognized underlying a wall of LH IIIC date in the Sanctuary of Demeter on the slopes of Acrocorinth. The bedding is 0.05-0.10 m. thick and appears to be mixed with the local limey marl, <u>asprochoma</u>, Figs. 8,164.[42]

More formal wall beddings were made by laying stones, usually slab-like, in a foundation trench. Often they were packed in mud mortar. In the trenches of the Period I building at the Menelaion were laid unworked, flattish or rounded river or field stones of limestone (ave. 0.15-0.20 m. by 0.20-0.25 m. Fig. 9). These beddings were set in two or three neatly aligned and tightly packed courses set in mortar; the total width averaged 0.80 m. The wall was constructed atop these courses and a wooden beam was placed along the outside just at or slightly below floor level, Fig.165. The top level of the bedding regularly formed the base of the thresholds of doorways. Thus the bedding, like the foundation trenches, was laid continuously along the line of the wall.

Slabbed rubble beddings were employed at Mycenae in the House of the Oil Merchant, the House of the Sphinxes, the West House and the basement rooms of the House of the Columns to mention a few.[43] Judging from the descriptions of wall foundations at Tiryns given by Müller,[44] we should expect similar beddings there, but unfortunately, restorations have covered over the evidence.

Somewhat more elaborate beddings were constructed for the Palace of Nestor. Small limestone slabs or very flat cobbles were tightly packed in the foundation trenches, which varied from 0.80 to 1.50 m. in width, so that the stone bedding extended beyond the width of the wall.[45] Atop these beddings was set one course of cut poros blocks which formed a plinth for the ashlar facade and rubble backing of the walls (see below, pp. 134ff). In the earlier, Southwestern Building the same technique was employed: large, flat slabs were set in the trench and provided a level base for the exterior terrace wall. This practice was apparently employed for the foundations of the earlier palace or palaces, the remains of which were found beneath rooms 7 and 57 along the southeastern side of the last palace.[46]

All of the examples just discussed are from well planned, carefully built structures of more than one set of rooms. It is remarkable that the first appearance of these beddings of stones occurs in the LH II mansion at the Menelaion, the plan of which anticipates the palaces and may be considered as "protopalatial". The likelihood is good that this kind of bedding was introduced about this time and was limited to buildings of the stature of mansions and palaces.[47]

Footings:

Wall footings occur when the courses of the foundation are stepped out from the face(s) in order to distribute the load over a greater area; such footings are often encountered in rubble walls. In fact, Mylonas considered them to be characteristic of Mycenaean building.[48]

Footings are not found in buildings with shallow foundations, such as those just discussed with a slabbed bedding, for the bedding adequately distributed the weight of the wall over the ground. Where the foundations ran deeply, however, footings were usually created by erecting a foundation wall wider than the wall it was to bear. Usually these foundations walls were either built in a deep trench or built as retaining walls and subsequently filled on the inside face, unless they were placed within the area to be filled, in which case they were buried in fill and often have, as a result, rough faces. A good example is the north wall of the corridor north of the Megaron at Tiryns, Fig.166. Other examples are seen in the terrace wall west of the House of the Shields, Fig.P1 , and the southeastern foundation of the Wine Magazine at Pylos which projects 0.06-0.08 m. from the wall face for a depth of 0.50-0.75 m. below the floor level.[49]

Walls set in trenches cut into hillsides were often based on footings which afforded them better purchase. Particularly noticeable are the projecting courses of heavy rubble blocks at the base of the Great Ramp at Mycenae, Fig. 10, which will be discussed in detail below, p. 40 . Smaller structures in the same area of the citadel show footings on the downslope side of the wall base, for example the interior base of the north wall of the House of the Warrior Vase, Figs. 11,159.[50]

Buildings earlier than LH III seem not to have been based on walls with footings. A probable explanation is that most of these buildings were light and small and were not founded over deep fill. Furthermore, as we have observed earlier, pp. 13-15, many of these structures were based on levelled cuttings in the hillside and had no need of such a device regardless of size.

Foundation Walls:

As indicated above a footing was often created by building a foundation wall wider than the wall it was to support. Foundation walls were built in deep trenches cut through soil or debris or were built up from the ground and subsequently filled: on the inside if they formed the exterior wall of a building resting on a terrace, e.g. the House of the Oil Merchant, Fig.161, or on both sides if they were placed inside a terrace or an area that was filled in such as the artificial ground level created within the West Cyclopean wall at Mycenae, Fig. P4.

At most early and non-palatial sites neither the depth of earlier occupation debris nor the size of the structure to be constructed were so great that foundation walls were needed. Thus at Malthi the walls of the MH and LH buildings did not rest on foundations, instead they were simply set in trenches deeply enough into the ground to insure their stability, on bedrock if convenient, otherwise on earlier levels.[51] Likewise, the walls of the MH and LH buildings in the Lower Town at Asine, Fig.162, were set on bedrock when close to the surface, otherwise on earlier levels, even though they often retained fill to form small terraces for the buildings.[52]

At the Menelaion after the destruction of the first period mansion, work began on the construction of a new mansion (LH IIB-LH IIIA:1). The occupation area was cleaned up and trenches were cut about 0.40 m. through previous debris and walls to hardpan for the new building. Foundation walls about 0.80 m. wide were built in the trenches and were subsequently packed in artificial fill retained by an exterior terrace wall to the level of the floor of the second mansion.

This concern to base the walls of large buildings on foundations that reached down to bedrock or virgin soil can also be seen at Thebes. There the remains of a building "C" that S. Symeonoglou attributed to the palace complex destroyed late in LH IIIB:1 rested on a heavy foundation that extended 2.15 m. to bedrock.[53] Similar deep foundations can be observed at Gla in the building at the east of the so-called agora. Though they are only partially excavated and unpublished, one exposed trench shows a wall running about two meters deep through earthen fill. At Tiryns the northern wall of corridor XV north of the Great Megaron well documents this kind of foundation, Fig.166. The section shows how the wall is built of large rough rubble blocks forming a wall 1.85 m. thick and about 2.50 m. high. It supports a wall 1.10 m. wide. As the foundation rose in height fill was added on the inside to form the level of the corridor floor.[54] In the southern part of the citadel a maze of foundation walls were uncovered within the circuit wall. Although they were not excavated to bedrock, apparently they were based on it.[55] One of these walls, "k", was about 4.5 m. thick, the others were between 1.50 and 2.00 m. thick. They may have extended in some places as deeply as 6 m. to bedrock. Around the walls and against the circuit wall artifical fill was added to raise the ground level to that of the Great Propylon.

When building on hillsides the Mycenaeans often created terraces on which to base their buildings. Foundation walls were set in trenches and built up from base level. As they rose, artificial fill retained by a terrace wall was dumped around them until the desired floor level was achieved. Then the superstructure was erected.

This method was simple but appeared only in rudimentary form in early periods. Not until the palatial period was it practised on a wide scale. At Mycenae almost all of the buildings on the western slope of the citadel were so founded, Fig. 24. A good example of the use of foundation walls is the Granary. Heavy, deep foundation walls were built for the building; those at the western end where the bedrock fell away most abruptly were thickest. The exterior western wall was 1.70 m. thick and rested on a massive rubble footing, Fig.167. The middle wall was 4.00 m. high and 3.00 m. thick and supported two walls and a corridor. These foundations also formed the basement. The northeastern foundation on the west side of corridor 12 was 1.20 m. thick and extended about 3.00 m. to bedrock. It was buried in fill. Atop it was built the corridor wall, 0.85 m. thick, Fig.167.[56]

The House of the Oil Merchant is founded on an upper and a lower terrace. The foundation walls were set in shelf-like trenches cut in the bedrock, Fig.161. The exterior foundation walls of each terrace are massive cyclopean walls over 2 m. thick, Fig. 12, and retain the fill of the terraces. Interior foundation walls ca. 1.30-1.50 m. high were buried in the fill, Fig.161.

Megaron "W" in the lower city at Tiryns, dated to LH IIIC:1, rests at the east on a foundation wall 1.20 m. high and on bedrock at the west.[57] The foundation is constructed of large rubble blocks set in mortar. The eastern facade was exposed above ground level and was covered with a smooth yellow clay mortar. The superstructure wall was 0.80 m. thick and rested atop two levelling courses of small stones. The interior of the megaron was filled and the original floor can still be seen in the position of the interior column supports and the central hearth. Gercke and Hiesel aptly point out that the reason for this high foundation was to raise the floor level in order to avoid cutting into the bedrock on the west side.[58]

Foundation walls satisfied the desire of builders to anchor buildings firmly, and as we have observed, this solution was especially common for large dwellings and when building on slopes. Some of these foundation walls, such as the outer terrace wall of the House of the Oil Merchant, were actually massive terrace walls. By virtue of size alone the founding of these walls required different approaches than with smaller walls.

<u>Massive Wall Foundations</u>:

This category of foundations comprises those of massive retaining-terrace walls, fortification walls and other heavy, thick walls. These large walls were not built in Middle Helladic or even much in early Mycenaean times. The biggest walls are the enceintes of the early fortified sites, for example Malthi and Argos.[59] These circuit walls are founded on bedrock; the wall at Malthi varies from 1.60m. to 3.55 m. in thickness and the rubble construction of its face and core does not allow good comparison with the later cyclopean circuit walls of LH III times (see below, p. 157f.). Concerning the foundations of a similar early wall at Peristeria, we have no information.[60] At Pylos the traces of the LH I circuit wall are scant and have been doubted.[61] The wall northwest of the gateway achieved a thickness of only 1.40 m. and was built in a levelled cutting in the hardpan of the slope.[62] Elsewhere the traces of the possible circuit were founded in trenches cut into the virgin soil of the ridge.[63]

The first massive wall to appear on the mainland is the fortification wall at Teichos of the Dymaians in northwestern Achaia, Fig. P8. Unfortunately the wall is not dated, but it must be early Mycenaean if not Middle Helladic.[64] The wall averages 4.50-5.00 m. in thickness. Its exterior face is built of massive cyclopean blocks, while the interior is built of large slabs of limestone set in mortar. The foundations were investigated and a foundation trench was found that cut through Early Helladic levels and part of an Early Helladic house. Presumably the trench continued to bedrock and cleared away all the soil downslope so that the entire defensive wall was founded on bedrock. Against the wall the trench was found filled with stones and EH debris.[65]

This practice of excavating to bedrock and clearing a broad area for the placement of the wall was common. At Tiryns early in LH IIIA a cut was taken through earlier levels to bedrock along the eastern side of the Upper Citadel for the foundation of the retaining wall of the palatial platform, Fig.168.[66] This was not a trench, however, for the bedrock falls steeply away to the east. Müller argued that a Middle Helladic terrace wall originally retained the strata here, but it is just as likely that the cut taken in Mycenaean times removed all evidence of earlier occupation to the east.

Certainly at a later period, during LH IIIB, a great portion of the earlier occupation in the Lower Citadel was removed wholesale. Dragendorff excavated an east-west trench through the Lower Citadel that showed that a great cut seeking the bedrock had been made along the east side.[67] The cutting removed over 4 m. of accumulated Early Helladic levels, about one third of the original mound according to the estimate of the present excavator, K. Kilian. The foundation trench alongside the wall is about 0.70 m. wide; Dragendorff did not report what kind of fill it contained. Along the western side of the Lower Citadel a broad swath was cut through the earth to bedrock. From the foot of the outcrop of the citadel at the west to a distance about 8 m. east of the inside face of the citadel bedrock was exposed, Fig.169.[68] Here the earlier inhabitation was slight and less soil had to be removed.

Along the northern side of the northern terrace wall of the Upper Citadel, Fig. 13, was found a foundation trench that had sliced through earlier structures in the area of the Middle and Upper Citadels, Fig.170.[69] The width of the trench beyond the north face of the wall varied between 0.60 m. and 1.60 m.; it was filled with stones and contained Mycenaean pottery.[70]

At Pylos the exterior terrace wall of the Southwestern Building was built in a broad trench cut into the hardpan. Along the northwestern side the trench cut through earlier structures and extended 0.70-0.80 m. beyond the wall face.[71]

At Mycenae the circuit walls of the original enceinte were founded on bedrock. The bedrock along the brow of the citadel had been exposed, but whether it had been cleared for a great width behind the interior line of the wall, we do not know. Mylonas reported, however, that the wall was built on bedrock and retained for some height behind its interior face a fill of large stones.[72] Surely, the stone fill behind the wall filled the area that had been prepared for receiving the wall. Thus by initially clearing a broad area the workmen gained space for maneuvering the cyclopean blocks, and as the wall rose in height, the placement of a stone packing behind it gave them not only a working platform but also a passageway. Later, as they laid the upper courses of the wall, the stone platform would support the embankment of earth necessary to raise the blocks to the upper courses.

This practice of clearing to bedrock and depositing a stone fill behind the wall was observed at Midea in two test trenches behind the circuit wall. Persson reported that "Close to the great fortress wall (1) [Fig.171] a stone filling was found (2) about 2 m. broad, the purpose of which was probably to form a terrace on the sloping rock inside the wall."[73] In this instance, too, it is likely that a broad strip of soil had been cut away to expose the bedrock.

Another instance of this kind of preparation can be cited from the first circuit wall at Tiryns, just south of the original gate. There Müller discovered a packing of stones behind the interior wall face. As he pursued the packing into lower levels he observed that the stones increased in size and merged with the interior face of the circuit wall.[74] Here, too, the bedrock must have been cleared for some distance behind the wall.

The same description is offered by Mylonas of the reconstructed area of the North Cyclopean wall from the entrance to the Perseia cistern westwards about 42 m.[75] The wall rested on a stone fill, and we may expect that the fill rested on bedrock.

Worth remarking on is Mylonas' demonstration that this stone fill formed a terrace that supported the interior face of the cyclopean wall. He sees the creation of a terraced platform foundation for the wall as different from the procedure described above for the earlier circuits where the wall was built from ground up and a fill was thrown in from behind. It would appear that the former was a later, the latter an earlier practice. But if Müller's report of the placement of the stone fill behind the first circuit at Tiryns is accurate, and there is no evidence to believe otherwise, then the platform construction was in use at Tiryns at least as early as LH IIIA.

For the later walls at Mycenae, i.e. the western circuit, a cutting was made not just to clear down to bedrock, but also to level the conglomerate bedrock, Wace discovered that the rock had been levelled for a distance of about 2.80 m. inside the interior face of the wall just west of the Grave Circle A, Fig.172. Into this cutting was placed a stone bedding that will be discussed below, p. 38.[76] The area cleared for the wall extended at the most 4.50 m. within the interior wall face. It constituted a trench through the prehistoric cemetery and, therefore, did not have to remove much overlying earth.[77]

Once the bedrock was cleared to receive a massive wall, the builders had to concern themselves with the actual placement of the blocks of the wall. As we have just seen in the West Cyclopean wall at Mycenae, if the bedrock was soft, it could be levelled for the wall. Usually, however, it was hard limestone and the work involved to level for the width of the wall was excessive: The Mycenaeans avoided working hard limestone whenever possible.

Bedrock Cuttings:

One of the most immediate concerns in the construction of a circuit wall, especially along the brow of a hill, was to gain purchase for the lowest blocks of the wall. A few traces identified by Iakovides in the course of the circuit wall around the acropolis of Athens document the means of working the bedrock to receive the wall.[78] First is the stacked group of five blocks (to the left in Fig. 14) which are wedged into a natural crevice and created a kind of miniature terrace. To their left, at the same top elevation, is a smoothed rounded area some 2 m. long and 1.5 m. wide. This hammered cutting was no doubt made to facilitate the placement of large cyclopean blocks for the circuit wall. A second instance of this preparation is observed behind the poros anta of the building often identified as "B" under the Pinakotheke (at elev. 138.77 m., Fig.173). Here, too, the rock was smoothed, apparently by stone hammers, and would have received large blocks for the terrace wall.[79] One other area identified by Iakovides exists along the east end of the acropolis in selected areas where the rock has been prepared to receive wall blocks. Yet clearer evidence of this practice has been exposed by Mylonas and Iakovides at Mycenae.

The early circuit on the acropolis of Mycenae followed the crest of the citadel, and its walls were founded directly on the bedrock.[80] In order to provide a firm footing, small areas of bedrock were worked away so as not to impede the placement of individual blocks of the lowest course and thereby hinder the laying of subsequent blocks in more or less level courses. This working of the bedrock was fully exposed along the original circuit wall at its eastern and northern sides. At the northeast, where the wall was removed in antiquity, two blocks are preserved resting on the crest of the bedrock, and the smoothing of the bedrock to receive them can still be seen.[81]

Only for the later, west cyclopean wall was the bedrock worked back the full width of the planned wall, and there it was possible because of the soft conglomerate.[82] Actually, there was little need to work more than the outer area because the interior and exterior blocks were so irregular in shape that they easily adjusted to anomalies in the surface.[83] The rock was not worked to receive the individual form of the blocks in the sense that we think of for classical Greek masonry, but merely to help the seating and adjust the relation of one block to another. Because the cyclopean blocks themselves were not worked, they were secured in place by small wedges set under and around them.[84]

Beddings:

The placement of small stone wedges around the cyclopean blocks, though it provided an adequately sound base, was laborious, and with experience came experiment. In the later walls at Mycenae, dating from the middle of the LH IIIB phase (see below, pp. 183-193) a thick layer of mud mortar mixed with a local limey marl, _asprochoma_, was laid upon the bedrock. This practice was originally observed by Wace who discussed it in his 1954 season's work in Citadel House.[85] He noted that the lowest wall course was based on roughly levelled bedrock which had a thick bed of clay mixed with small stones, and he described the procedure of setting the blocks as it was understood by the local residents of Mycenae as "swimming" (_kolymbytos_) in the clay, that is, having been "rocked until they settled comfortably into the clay".[86]

Mylonas' investigations found evidence of this procedure throughout the course of the West Cyclopean wall and around the Lion Gate.[87] The stone and clay bedding extended well beyond the interior face of the wall and formed a kind of passageway. This technique was not employed around the North Postern gate, even though it was contemporary with the major renovations and additions to the circuit wall. It was, however, used for the walls of the Northeastern Extension.[88]

Evidence for when this technique was introduced at Tiryns is lacking. Müller's report only indicated that _plesia_, the local yellow marl used for mortar, was used in the wall coursing, not as a bedding.[89] Verdelis, however, while cleaning out the syringes in 1962, found that they did not rest on bedrock but on a thick layer of mud and yellow <u>plesia</u>. The syringes date towards the middle of the LH IIIB period in construction, contemporary with the Lower Citadel circuit wall which, on the contrary, was apparently not based on a packing of mortar.[90]

Clay and Rubble Beddings:

Clay and mud were combined with stone blocks to form level beddings. Mylonas' excavations around the Lion Gate's east flanking wall shows clearly how mud and clay mixed with rubble was used, Fig.~~226~~.[91] Wherever the rising rock prohibited the continuation of the levelling course of rectangular rubble blocks visible to the north in Fig.174, rubble and mortar were laid down. This practice may also be observed, I believe, in the gate of the First Citadel at Tiryns along the west side, Fig.175.[92] On the Athenian acropolis the west cyclopean wall still preserves rubble wedges and blocks used without mortar to level the first course, Fig. 15. As a general rule dry stone fillers of this sort were used whenever the direct placement of blocks was prevented by an irregular bedrock surface. At Eutresis the circuit wall, which was not very wide, was laid on a bedding of small stones. Unfortunately, nothing is preserved to be seen today and nothing further was reported in the

/174

excavation report.[93]

Footings:

Large walls often rested on footings which distributed their weight over a broad area and, also, would act as a levelling course.

A clear instance of the use of footings is found in the southern retaining wall of the Great Ramp at Mycenae. The lowest courses step out progressively from the wall face, Fig. 9. Another example is the massive southwestern foundation of the Granary which is based on a platform that projects from the foundation wall, Figs. 16, 167. This platform was built perpendicular to the fortification wall and even placed in a special cutting in the hard limestone bedrock.[94] A similar footing was constructed at the southern base of the so-called "tower" of the Southern Citadel of Tiryns, Fig. 17. In this example and the preceding ones the hard limestone bedrock falls abruptly away from the wall. The addition of a footing gave more purchase for the wall on the slope. The principle is the same as that of the wedged blocks above the postern stairway at Athens mentioned above, p. 36, Fig. 14.

The circuit and terrace walls at Tiryns often rested on footings. Fig.176 shows a section through the southern circuit wall of the first period.[95] The wall rests on a footing that projects about 0.70 m. beyond the southern face of the wall and is two courses high. The lowest course of the circuit wall of the Lower Citadel occasionally extends beyond the exterior wall face.[96]

At Mycenae none of the circuit walls investigated has been reported to have a footing; rather the walls usually proceeded without change in thickness to the bedrock. This is also the case in the walls on the acropolis of Athens.

Walls Founded on Soil:

Almost invariably massive walls were founded on bedrock. Of course there are exceptions. The great terrace wall of the Cyclopean Terrace Building, dating in construction early in LH IIIB, was built in a trench cut into but not through earlier levels, Fig. 178. The lowest course of the wall formed a footing.[97] The circuit wall at Tiryns at the west side of room XLI has a thickness of about 8 m. Although the exterior of the wall was founded on bedrock, the interior was discovered to rest on fill. Probably the builders recognized that the great thickness of the wall obviated the need for all of it to rest on bedrock. This is, however, a curious circumstance when considered in the light of the earlier discussion of the extent to which the builders were concerned to clear the bedrock of soil in the area where the wall was to be placed (above pp. 31-35).[98]

Discussion:

Although for the purpose of this analysis foundations have been broken down into numerous components, it is clear that in the act of preparing foundations Mycenaean builders mixed these many practices. This was especially true in LH IIIB times, as Shear observed in her discussion of House II in the Panagia complex which employed every kind of foundation we have just discussed: bedrock socles, trenches, levelled bedrock, foundation walls, earlier occupation levels and so on.[99] Nonetheless, a certain progression in the employment of these practices has been recorded.

The Mycenaeans from early on were concerned to place their buildings on or as close to stable ground as possible. For small dwellings a shallow trench or even none at all was sufficient foundation, whether placing the building on bedrock, soil or earlier levels, e.g. Malthi, Korakou, Eutresis. With the development of well-planned architecture, exemplified by the LH II mansion at the Menelaion, this concern for stability was refined and combined with the process of design as seen in the excavation of wall trenches, which laid out the plan, and in the placement of stone beddings, which provided an euthynteria. This practice we saw to continue through the palatial period and become diversified as the placement of buildings was ordered by general considerations of planning inside and outside the citadels. At this point the builders were called upon to utilize every means of founding buildings, from digging trenches to building foundation walls in deep fill to cutting back the hard bedrock when necessary. The difference between foundations for palaces and for large dwellings was only one of degree.

What distinguished the later from the earlier periods in terms of development is the means of founding the circuit walls. Yet here, too, the difference is largely one of degree, for the massive walls were built in trenches, on beddings and footings. They were only larger.

The approach taken to clearing the bedrock for circuit walls, however, is a striking factor in the development of foundation practices. It is not the act of clearing that is so significant, rather the decision of where and how much to clear. At every citadel the fortification wall was built along the brow of the outcropping rock,[100] which formed before the wall a natural _glacis_. Usually this location was apparent. But at

Tiryns the depth of earlier strata was so great as to hide the outcrop; indeed, the earlier occupation area appears in the course of time to have accumulated eastwards of the center of the ridge. The drastic measures taken to locate, not just the bedrock, but the point where it begins to fall away in order to place the circuit wall there document the degree of importance attached to this practice by the Mycenaeans.

One other characteristic emerges from this study: the avoidance of cutting hard limestone bedrock. The next chapter examines retaining walls and terraces and will show to what extents the Mycenaeans would go to avoid cutting away bedrock when constructing buildings and such elements as passages and stairways.

Notes

[13] Korakou, p. 76.

[14] Korakou, pp. 80, 83, 98.

[15] Eutresis, pp. 33, 64, 66; Kirrha, p. 36, pl. XIV; Aghios Kosmas, pp. 48-49, 52-53, 58.

[16] W. Coulsen in McDonald, Hesperia, 44 (1975) p. 93, Unit IV-3.

[17] H. Catling, AR, 1973-1974, pp. 14-15; 1974-1975, pp. 12-15; 1975-1976, pp. 13-15.

[18] These trenches were filled with sandy yellow soil and decayed conglomerate.

[19] I. Papademetriou and P. Petsas, Praktika, 1951, p. 193; E. French, BSA, 58 (1963) pp. 46-47.

[20] Wace, BSA, 48 (1953) p. 14; 49 (1954) p. 239; MycTabs, II, p. 9; E. French, BSA, 62 (1967) pp. 149-193.

[21] N. Verdelis, Praktika, 1961, pp. 161-166.

[22] Cf. the house east of the Southwestern Building at the Argive Heraeum: Prosymna, p. 12; Argive Heraeum, I, pp. 108-109.

[23] The deepest sides of this cutting were left open, and the walls of the Period I building were built about 1 m. distant from the cutting, presumably to keep the walls from absorbing moisture from the hardpan; cf. a house at

Avdeli, Naxos, and one at Paroikia, Paros: C. Doumas, "Notes on Early Cycladic Architecture", AA, 87 (1972) p. 15.

[24] The levelling of the bedrock may have preceded the erection of the House of the Sphinxes: Wace commented in MycTabs, II, p. 10 that "when it was eventually possible to excavate as far as the west terrace wall in the basement, it was discovered that this heavy terrace wall is not in alignment with the other walls of the building which are themselves remarkably regular. It is possible that the west terrace wall was already in existence when the house was built. [Hence the basement, too, would be earlier.] Certainly it rests on a shelf of rock which rises about 0.60 m. above the carefully levelled rock of the floor."

[25] Mylonas, Praktika, 1965, pp. 94-95; 1966, p. 111; Domestic Architecture, p. 6, pls. II, III.

[26] Verdelis, MycTabs, III, pp. 13, 20, 23.

[27] Panagia House: Domestic Architecture, p. 21, pl. III, section D-D; House of the Oil Merchant: MycTabs, III, plan IV, where the unexcavated bedrock is shown as gently sloping; I have changed this in Fig.161 in order to conform with my observations at the north end that the bedrock is cut in shelf-like trenches, see Fig.178.

[28] Mylonas, Praktika, 1971, pp. 123-124; 1972, pp. 146-156; 1973, pp. 103-107; Asine, figs. 70, 77.

[29] Domestic Architecture, pp. 20-65, 437.

[30] Wace, BSA, 25, p. 246.

[31] Mylonas, Hesperia, 35 (1966), fig. 2; Domestic Architecture, pp. 435-440.

[32] Eutresis, House B, p. 64; Aghios Kosmas, House R, pp. 48-51; Asine, Houses F, G, H, pp. 63, 64 (walls 89-93, 97-100; Krisa, Houses G, F, pp. 318, 323.

[33] Aghios Kosmas, pp. 52-53, drawing, 14, fig. 31.

[34] Korakou, p. 79.

[35] Tiryns, III, pp. 154-156.

[36] Tiryns, III, pp. 119-127; cf. the area around the Small Propylon, pp. 130-134, pl. 9.

[37] P. Gercke and G. Hiesel, Tiryns, V, pp. 7-8, pl.13:2, plan, Beilage 6. The question of whether or not the structure was built atop an earlier one is important because the later building dates to LH I/II, and thus the earlier building would presumably be of earlier date, perhaps terminal MH.

[38] Pylos, I, pp. 44-46; at the northwest along the corridor 26 a trench wascut to a depth of 1.10 m. to an earlier wall, p. 145.

[39] I, Papademetriou and P. Petsas, Praktika, 1951, p. 193, pl. A'; 1950, p. 212.

[40] The introduction of a thick bedding of mud and clay mortar with asprochoma for fortification walls at Mycenae has been documented to the mid LH III B period,

41 Wace, BSA, 51 (1956) pp. 107-109.

42 I wish to thank N. Bookidis for permission to mention this structure and to draw and photograph it and J. Rutter for drawing it to my attention. The pottery and architecture will be published by Prof. Rútter in a forthcoming article.

43 House of the Oil Merchant: Wace, BSA, 48 (1953) p. 14; MycTabs, II, p. 9; these are reported to have projected as much as 0.15 m. from the wall face. House of the Sphinxes: Wace, BSA, 49 (1954), p. 239. West House: MycTabs, III, pp. 13, 20; Praktika, 1958, p. 161. House of the Columns: BSA, 25, pp. 87-88.

44 Tiryns III, pp. 154-156.

45 Pylos, I, pp. 35, 45, 46, figs. 13, 17, 19-21.

46 Southwestern Building: Pylos, I, p. 278, fig. 203; earlier foundation remains, pp. 44, 226-227, figs. 13, 15, 424.

47 Although the foundations of the palaces of Minoan Crete were usually deep and built of massive blocks, it is remarkable that some foundations consisted of rubble and stone slabs that often projected beyond the line of the wall, cf. Shaw, Minoan Architecture, pp. 76-77, 83 and figs. 86, 88 (Phaistos, early palace).

48 AE, 1962, pp. 116-117.

49 Pylos, I, p. 342.

[50] The top of the footing indicates the probable floor level if the room had a basement; however, there is no door at basement level.

[51] SME, pp. 77-84, 95, 173-174 et passim, pls. VI-VIII.

[52] Asine, pp. 59-64, figs. 43, 47; e.g. House B, figs. 47-48, House G, figs. 53-54.

[53] S. Symeonoglou, Kadmeia, I, SIMA, 35, p. 15, figs. 24-25.

[54] Tiryns, III, p. 147.

[55] Tiryns, III, pp. 121-127, pls. 7, 8; trenches were opened in rooms XLI-XLII, pl. 8, and south of the Great Propylon between the circuit and the back wall of the portico XXXIX, pp. 10-11.

[56] BSA, 25, pp. 49-50.

[57] P. Gercke and G. Hiesel, Tiryns, VII, pp 12-14.

[58] The west wall, perched on the bedrock, may have been buttressed on the interior by small stone bases according to the excavators, pp. 13-14.

[59] SME, pp. 16-20.

[60] Marinatos, Praktika, 1964, pp. 93-94; Ergon, 1962, p. 110.

[61] J. Shaw, rev. Pylos, III, Archaeology, 27 (1974) pp. 141-143.

[62] Pylos, III, p. 6.

[63] Pylos, III, pp. 8-9 et passim.

[64] see below, pp. 166-168, nt. 237 for a complete bibliography and discussion.

[65] E. Mastrokostas, Praktika, 1965, p. 124, pl. 147b. Unfortunately the finds from the foundation trench were not published separately. However, Mastrokostas, Ergon, 1966, pp. 156-157, dated the wall construction to LH IIIA.

[66] A cup recovered from "unmittelbar neben den Füllsteinen und in Höhe einer rein mittelhelladischen Schicht", Tiryns, III, p. 16, fig. 13, has been dated by Ålin to LH IIIA:1, Fundstätten, p. 25, nt. 108.

[67] Dragendorff, AthMitt, 38 (1913) p. 343. The date of the cutting is based on the date of the construction of the wall established by recent excavations: P. Grossmann and G. Schäfer, Tiryns, VIII, pp. 94-96. The trench of Dragendorff was cleaned in the summer of 1977; I am grateful to the director of the excavations, K. Kilian, for showing me the excavation and discussing its fine points with me.

[68] Dragendorff's explanation of the creation of an artificial plateau within the circuit was not far from the truth, AthMitt, 38 (1913), p. 344; recent excavation has shown that habitation along the western side was on a series of terraces instead of higher up on the plateau as he had thought, cf. P. Grossmann and J. Schäfer, Tiryns, V, p. 44.

[69] Tiryns, III, pp. 5, 16-18, 113, fig. 2 at "r", pl. 12 (our Fig.170); Dragendorff, AthMitt, 38 (1913) p. 336.

[70] Tiryns, III, p. 17, nt. 1: "Die wichtigsten Scherben sind Phot. Tiryns 574 vereinigt. Wir hielten die Mauer anfänglich für frühmykenisch; daher erwägt Dragendorff, A.M. XXXVIII 1913, 337 eine spätmykenische Ausbesserung der Mauer, die ich für unwahrscheinlich halte."

[71] Pylos, I, p. 277, fig. 214

[72] AE, 1962, pp. 12-15, fig. 8.

[73] New Tombs, p. 13 (shaft III), p. 14 (shaft IV). Since Persson did not dig through this fill, I see no compelling reason that it should have rested on soil as he stated, rather than on bedrock.

[74] Tiryns, III, pp. 10-11.

[75] AE, 1962, p. 12, figs. 6, 7.

[76] BSA, 25, p. 105; cf. AE, 1962, p. 105, pl. 23b, bottom.

[77] AE, 1962, pp. 105-106, pl. 22; BSA, 25, p. 55; 45 (1950), p. 204; 52 (1957) p. 207.

[78] Iakovides, MAA, pp. 113-114, 121, 141, 148-149.

[79] This cutting and the other prehistoric material associated with it was first identified as a terrace by J.A. Bundgaard, Mnesicles, (Copenhagen: 1957) p. 47 and nt. 60.

[80] AE, 1962, pp. 6, 52, pl. 12a.

[81] AE, 1962, fig. 3 (blocks 5, 6), pl. 5b (#8, #9).

[82] The east terrace wall of the House of the Oil Merchant, a cyclopean wall, was also placed on a cutting in soft conglomerate, Fig.179.

[83] AE, 1962, p. 57; these outer blocks were set as stretcher and headers, figs. 31, 32.

[84] AE, 1962, pp. 9, 52-53; BSA, 25, pp. 105-107.

[85] Wace, BSA, 50 (1955) pp. 179-180; cf. BSA, 25, p. 20.

[86] see above note; for discussion of stones in clay see: BSA, 25, pp. 105-106.

[87] AE, 1962, pp. 53-55, 100-101, pl. 13; p. 105 and pl. 23; p. 107; p. 83 and pl. 20 b; p. 69 and pl. 16 a.

[88] AE, 1962, p. 12.

[89] Tiryns, III, pp. 178-179

[90] Verdelis, Deltion, 18 (1963) Chronika, pp. 66-73.

[91] AE, 1962, p. 69.

[92] Tiryns, III, p. 10, fig. 9 (our Fig.175).

[93] Eutresis, pp. 70, 72, fig. 85.

[94] BSA, 25, p. 61.

[95] Tiryns, III, p. 56, pl. 8.

[96] Grossmann, AA, 82 (1967), p. 98.

[97] E. Wace, BSA, 49 (1954) pp. 272-273, 291; 58 (1963) p. 47.

98 *Tiryns*, III, p. 120.

99 *Domestic Architecture*, p. 437.

100 Iakovides, *AAA*, 2 (1969) pp. 463-468.

III. TERRACES

Although the Mycenaean builders often made preparatory cuttings for the placement of their buildings, we have seen in the preceding chapter that they did not often level the terrain for a building. Instead, the characteristic means of creating a level surface for a building or a group of buildings was to construct a terrace.

Terraces were advantageous for two reasons: they required less effort than levelling and the extended the inhabitable area on hillsides. In conjunction with this latter advantage, the builder was able by their placement to locate his buildings according to considerations of access, strategy, monumentality or aesthetics. The Mycenaeans, who since Middle Helladic times had been living on citadels, understood these advantages, and as they developed their architecture the terrace became one of its principal elements.

A terrace in the Helladic world consisted of two parts, a retaining wall and a fill behind it. Within this simple definition there was much room for diversity. Depending upon the size and construction of a retaining wall and the fill behind it, the Mycenaeans created everything from simple walkways to great platforms or podia for a group of buildings. And the larger the terrace, the more complicated was its construction: slippage due to earth movement and water seepage had to be considered, and the type and density of the fill had to be determined. These considerations led to the inclusion of various details such as drains, interior cross walls, compartmentalized fills and hydraulic sealings of clay and limey marl mortar.

A study of the use of the terrace in Mycenaean architecture will be in large part concerned with the origin and development of the great palatial terraces of the LH III period. But also attention will need to be focused on the more mundane functions to which terraces were suited, from forming passageways to supporting individual buildings. These constructions often required no more than a small retaining wall, yet the resulting terraces were so variously applied that they formed an important accessory element in the architecture. Before proceeding to discuss the palatial terraces, then, we shall look at these diversified uses of retaining walls and small terraces.

Retaining Walls:

A retaining wall holds back earth, rock or artificial debris in order to protect an area below it. Such a definition does not properly allow them to form a terrace, but in some instances this is unavoidable. For example a series of retaining walls one above the other can form a series of terraced rampways, each protecting the passage below it. Wherever the distinction between retaining wall and terrace is not clear, I shall discuss it as a retaining wall unless it supports an independent architectural element.

Most retaining walls were constructed of rubble masonry. Sometimes the rubble size is immense and the resulting wall is classified as cyclopean. A few examples are faced with ashlar masonry in conglomerate or cut limestone.[101]

Retaining walls were not always founded on bedrock or virgin soil, though that was often the goal, especially for large walls. Wherever detectable they were placed in a foundation trench. Often the wall had an exterior face behind which was a rubble core. This core could be built, i.e. roughly coursed, packed in earth, or simply dumped. In the first instance the face could be merely a sheathing for a self-supporting wall behind, in the latter two the wall retained the core which usually leaned against the earth. In this regard retaining walls tended to thicken towards the top, the face and core forming contingent wedges. An exception is the retaining wall of Grave Circle A

An early retaining wall at Nichoria illustrates a common simple application: the retention of exposed rock or soil to protect a public area. The wall, of LH II date, is apparently completely preserved. It rests in a trench cut into the sandy hardpan on the west bank of a steep ravine, Fig. 1, and prevented the earth from collapsing into the spring which flowed out at the head of the ravine.[102] Flat chert and limestone slabs (0.10-0.15 m. by 0.30-0.50 m.) were used to construct the 1.5 m. high wall. The wall increases in thickness toward the top to form a kind of cap over the hardpan.

This use of retaining walls to secure loose bedrock and soil and, consequently, to formalize public areas was common at Mycenae where rock and soil were often exposed along the steep citadel slopes. A series of walls inside the Lion Gate cover a line of bedrock along the northeastern side of the passage from the gate up the Great Ramp, Fig. P4, walls 9, 25, 26. The first wall, #9, was faced with large coursed rubble blocks and is over 12 m. long (Fig. 18; the upper four courses are restored).[103] The undisturbed area of fill behind the wall was composed of a packing of rubble that rose 2.30 m. from the ground between the inside of the wall and the sloping bedrock. Above the packing a 0.10-0.25 m. thick layer of coarse sand and local limey marl, asprochoma, was laid down.[104] The fill reached a maximum width of 4 m. A drain, Fig. P4, "u", that runs out under the wall and extends up behind it along the rising bedrock may have carried off water from the fill as well as from the area above the Lion Gate. On the basis of pottery from the drain, Mylonas dated the construction of the wall to late LH IIIB.[105]

Next to wall 9 is another one, #26, much less well preserved but constructed with large, almost cyclopean rubble blocks. It appears to have been constructed at some other, perhaps, earlier time than wall 9. A drain runs out from under the north end of this wall.[106]

Beyond is wall 25, a facing of half-timbered rubble masonry that is backed by blocks of conglomerate at its base.[107] This wall completes the covering of the line of sloping bedrock in this area; altogether over 40 m. of rock were sheathed by these three walls.

At the northeastern extension of the citadel a retaining wall was built to shelter the entrance to the underground cistern. This well built rubble wall has a cyclopean flavor and provides and 11 m. flank to the cistern entrance, thus preventing water and loose debris from being swept into it and down the stairway.[108] At the same time the wall and the small terrace behind it adjust to a steep drop in the bedrock at this point. Here the original northeastern circuit wall had rested. With the extension of the circuit to the northeast, it became necessary to landscape the area to make it more suitable for habitation and circulation.[109] This wall provided a formal boundary of the area to the southeast and a tidy transition between the upper level of the original citadel and the lower area of the extension.

At Tiryns a group of retaining walls along the east side of the steps leading to the West Sally Port protected the stairway from the debris along the steep upper slope and formed in one area a terrace with plaster floors.[110] The lowest of these retaining walls is cyclopean and Müller placed it contemporary with the first citadel. The entire assemblage formalized the approach up the stairs and also provided a secondary defensive platform. This is a unique example of this use of the retaining wall at Tiryns, for it was only here on the west side that the Tirynthians were forced to build alongside the precipitous rock of the citadel; elsewhere the rock was hidden under massive terraces.

Ramps, Walkways and Stairs:

At Mycenae retaining walls supported ramps, walkways and stairs that provided access up and across the steep sides of the citadel and among the numerous buildings that crowded the slopes. Fewer examples of retaining walls employed for these constructions are known from other sites, partly owing to a lack of information, but primarily because most other sites, palatial and village, did not utilize hillsides for occupation to the degree that the inhabitants of Mycenae did.

The steep outcrop of bedrock discussed earlier that extended from the Lion Gate along the Great Ramp is merely one section of a long outcropping that begins at the northwestern corner of the circuit wall and continues to the southeast towards the Chaos ravine. Along this outcrop, starting with the Great Ramp, the local builders constructed a number of ramps and stairways that provided access from the lower citadel within the western and southern circuit wall up to the upper citadel. Retaining walls supported these passageways.

The first of these is the Great Ramp. Three earlier phases of this ramp were discovered by Mylonas.[111] The final ramp of the LH IIIB period was the largest. A cyclopean retaining wall, Fig. 19, supports a fill composed mostly of massive rubble blocks, Fig.180. The fill was only tested in a small area of the ramp, but the rubble composing it extended down as much as 1.50 m. and became progressively deeper to the southeast. A large drain opens out at the base of the cyclopean wall. Mylonas investigated this drain and found that it continued under the ramp upwards following the rising bedrock. It was blocked up a few meters in from the wall; nonetheless, it is likely that it drained the ramp as well as, perhaps, the area above.[112]

Directly below the Great Ramp begins the Little Ramp, Fig. P4. This ramp rises upslope towards the southeast. The ascent, though not well preserved, is supported by a retaining wall made from rubble blocks 0.30 m. by 0.60 m. on the average.[113] The next ramp that provides the primary access to the Cult Center begins below the Little Ramp in the north corridor of Citadel House and ascends over fifty meters to the southeast where it meets a landing at the foot of a poros-stepped stairway that leads uphill. Two long retaining walls support this complex: the upper one is over 52 m. long and supports the stairway at the southeast, Fig. P3; at the same time it retains the bedrock and accumulated debris along the long descending course of the ramp. The wall is built of one thickness of heavy rubble blocks carefully fitted and is over 2 m. high as preserved. The amount and consistency of the packing behind the wall has not been investigated, but it is unlikely that it is very thick since the bedrock is met less than three meters behind the wall. The second, lower wall is about 33 m. long and retains the ramp which is formed by the fill behind the wall. This wall also shelters the lower return of the ramp leading into the sacral area, Fig.P3.

These passageways followed the limestone outcrop for over one hundred meters. Taken together with the retaining walls 9, 26, 25 as well as with the ashlar conglomerate sheathing of the northwestern part of the circuit wall, nearly two hundred meters of this outcrop became the substantial core of different architectural elements of the citadel. This well illustrates how useful the retaining wall was in adjusting terrain for occupation with a minimal use of space and effort.

One other set of passageways at Mycenae bears discussion. This is the north entrance system to the palace area. Along the north slope of the citadel a walkway "A", Fig.181, leads to a stairway which led up in two flights to a ramp "D-E" that gives out onto a cobbled forecourt to the Northwest Propylon leading to the palace.

The walkway "A" is 17 m. long and 2 m. wide. It is supported entirely by a retaining wall. The filling is of rubble sealed in a 0.05 m. thick packing of watertight mortar. Above is a packing of soil, sand and pebbles that forms the walking surface. Beneath the walkway runs a drain.[114] Above the walkway the first flight of the stairway was wedged into a natural crevice in the rock, but the second, not preserved at all, must have climbed from the landing up the rock face to the ramp "D-E", since the rock elsewhere is nearly perpendicular, and the only likely destination of a stairway in the vicinity is the ramp "D-E", Fig.181. This second flight would have been supported by a retaining wall. The base of that wall, however, would have rested on the continuation of the large terrace "M-M" to the north.[115]

The ramp "D-E" was also supported by a retaining wall. This wall is still preserved and, like the missing stairway, is in its turn supported by the terrace "M-M". It is constructed in the same fashion as the walkway "A"; at the northwestern end it broadens to form a cobbled entrance court to the propylon.[116]

Thus the Mycenaeans utilized the retaining wall on the most precipitous ground. An even more precarious set of stairs is still preserved for inspection in the descent to the fountain on the North Slope of the acropolis of Athens.[117] Here the last four flights of the stairway into the fountain were supported by retaining walls. The first two of these are unique because of the combination of timber and rubblework; the timber was set into cuttings in the precipitous bedrock and shored up the rubble retaining wall, Fig.182. The last two flights, VII and VIII, were supported by pure mud and rubble retaining walls and are still intact today.

Roads:

The well preserved roadways in the environs of Mycenae were first mapped by Steffen and have been noted by later scholars, particularly Mylonas who has made preliminary studies of their course and probable date.[118] Those around Mycenae can still be walked in part and, where the undergrowth permits, studied.

The preserved sections of roadway are found on the mountain slopes behind Mycenae. One traverses the upland route to the Corinthia via the Tretos pass, and some traces of it are still visible on the western slopes of Mount Prophitis Ilias. The other skirts the upland hills east of Mycenae, heads north along the hills above Berbati and finally comes out of a defile near the modern Aghios Vasilios where lies the prehistoric site of Zygouries. The preserved sections of roadbed are all found on the hillsides; one of the longest proceeds from a ravine at the eastern side of

Mount Agrilovounaki and continues several hundred meters upslope before it gives out, Fig. 20. The gradient is slight, suitable for wheeled traffic, and the road attains a width of about 4.50 m.

The roadway is a wide retaining wall. Rough limestone blocks laid as stretchers form the width of the road. At the outside a rough face with a slight batter was created two to three courses high, Fig. 21. Atop this retaining wall of stones a paving was laid down. This consisted of cobbles overlaid by small stones and earth to form a smooth, hard surface, Fig. 22.[119]

The most remarkable feature of this retaining wall construction is the provision made for drainage through the roadbed. Bridges and large corbelled culverts, which are generally known and will be discussed below, pp. 223-224, were constructed to span ravines. But along the course of the road at intervals of two or more meters are small weepers that carried run-off from the slopes above the road underneath its surface, Fig. 183. These drains run through the thickness of the roadbed: here and there are still preserved the up-slope openings of these drains, Fig. 23. The drains are made by skipping a row of headers in the lowest course of the retaining wall of the road and then laying wide stones over the gap in the successive courses. This use of drains under the roadbed is the same as the provisions of drainage that were noted above in the retaining walls inside the Lion Gate and the one forming the Great Ramp.

This examination of retaining walls has shown their most characteristic function to be the organization of space on hillsides, particularly to form passageways or make area accessible. The majority of examples date to the period of the palaces when the citadels were expanding and space was at a premium. In earlier periods when the citadels were not crowded and the architecture was not subject to the restrictions of space, retaining walls were not so much needed. Thus, although they were not suddenly introduced into the architecture, retaining walls may be viewed primarily as an element of the later architecture of the citadels.

<u>Terraces</u>:

Terraces were built on citadels from Middle Helladic times onwards. Their basic purpose was to provide a platform for buildings and open areas. Their evolution is not complicated, but by the LH III period they had been adapted to perform more specific architectural functions than previously. For example they were essential to the successful layout of blocks of buildings at

Mycenae in the thirteenth century B.C. and elementary to the plan of the palaces.

The evidence for terraces in Middle Helladic and early Mycenaean times is neither abundant nor well preserved. At the major sites later occupation has obscured early remains. At lesser ones much of the evidence was only tested or left unexcavated by scholars. Nonetheless, enough remains to sketch a picture of the manner in which terraces were employed and the degree to which they evolved over the years.

There were two basic kinds of terrace: those that formed a broad level platform for a building or a group of buildings, and those that supported only the walls of a single structure. Originally the former kind was the easier to build for it did not have to conform to any specifications. The buildings that were placed on them were mostly small, light, one-storey structures with few requirements. The latter kind of terrace had, at the very least, to fit the plan of the building it supported. Often it was no more than a foundation. As the buildings placed on them grew in size and height, however, these foundation terraces, as we shall call them, became more complicated in arrangement and construction. The final stage of development resulted in the great palatial terraces of the thirteenth century. These were, in one sense, a combination of platform and foundation terrace, for at one and the same time they supported a group of buildings and acted as individual foundations for single structures.

Terraces were built on the slopes of citadels, commonly along or over natural outcroppings of rock. In plan they could meander along the hillside or consist of straight wall sections. Often they were retained by walls with only an exterior face; in other instances the wall had two faces. The former terrace wall commonly had a thick backing of rubble; indeed, the entire fill was sometimes of stone. In construction these walls are the same as retaining walls; the only difference is that the terrace they formed supported a structure of some sort. The two-faced terrace wall usually formed a shell. The fill placed within it was often loose and consisted of earth or a mixture of earth and stones. Generally this type of terrace did not retain a deep fill.

Platform Terraces:

Terraces of Middle Helladic sites have not been well preserved or much studied. At Malthi a large central platform on the citadel supported a group of structures dated to the Middle Helladic period.[120] The platform was supported by terrace walls that stood from 1 m. to

1.5 m. high and formed a low crown on the summit of the acropolis, Fig. P6.

These walls were built with inner and outer faces, and the fill was apparently earthen. In the southern area the terrace formed a trapezoid 15-20 m. by 25 m. and supported an entrance system to the east, a central core of rooms and a probable court at the south.[121] The southwestern corner was reinforced with a thicker wall than elsewhere, 1.25 m., and heavy slabs of limestone reinforced the corners.[122] Along the west side the terrace supported a row of structures whose back walls used the terrace wall as a foundation. Below was a lower terrace wallthat ran north to south on a meandering line; may have supported a rampway to the central platform. At the north the terrace was void of structures; there the excavator proposed the location of the principal court. He claimed that the entire complex formed an inner defense platform, but neither its height nor its form support this view, especially when one considers that the west side with rooms built upon it offered no defensive platform and the east side was completely open.[123]

The concept of this terrace was ambitious but as a construction it was not so impressive. With a maximum height of 1.5 m. it barely reached a man's chest and the simple earthen fill did not have to support much -

the rooms within it were founded on earlier levels not far above the bedrock, and the terrace served primarily to provide a level floor. But early terraces of this size elsewhere are lacking.

At Tiryns, however, Müller offered strong arguments for the existence of a large Middle Helladic terrace, mostly on the basis of negative evidence. He observed that the terrace walls of the first period citadel retained a great depth of earlier occupation debris, primarily Middle Helladic. The evidence for this was found along the east, north, and at great depth along the west side of the Upper Citadel, Fig. ~~25~~.[124] At the south the /P12 few areas where the fill in the Great Court was tes~~s~~ted indicated that it was of later date, hence the southern end of the Middle Helladic fill may have lain on a line between the Small and Great Propylaea[125] This earlier material, Müller reasoned, must have been retained by a terrace wall. Similarly, the area of the Middle Citadel disclosed Middle Helladic strata.[126] It, too, may have been retained by a terrace, which Müller thought could have been replaced piecemeal when the Mycenaean wall of the Middle Citadel was erected.[127] The resulting reconstruction of the citadel before the construction of the Mycenaean one presents us with the impression of an extensive inhabitation on two levels.[128]

The platform of this Middle Helladic terrace would have extended about 70 m. east to west and at least 60 m. north to south, and with the inclusion of the Middle Citadel about 85 m. A single terrace of this size may be difficult to conceive; perhaps a number of semi-independent terraces were ranged around the settlement mound. On the other hand there may have existed some form of massive terrace wall that ringed the settlement and formed a simple but effective fortification. This arrangment would provide a prototype for the first citadel of Tiryns in Mycenaean times.[129]

The terraced platform for the second mansion at the Menelaion, built during the period of transition between LH IIB and LH IIIA:1, is an important record of how the Mycenaeans could quickly and intelligently adapt their building practices to peculiar needs. The first mansion was destroyed at the end of LH IIB, apparently when a section of the hillside to the northeast slipped into the ravine below.[130] The experience of this destruction much affected the local occupants who promptly set about to rebuild and remedy the situation. This they accomplished by first rebuilding, as it were, the natural base of the building by creating a raised platform some 0.80 m. high retained by a terrace wall about 0.60 m. thick. Two buttresses along the south wall and two more along the east strengthened the wall. They were 0.90 m.

thick and projected 0.60 m. from the wall face, Fig. 25. The fill which this wall retained was not uniform but consisted of rubble debris from the ruins of the first mansion and earthen fill brought from nearby.[131] This fill was compartmentalized by the wall remains of the earlier settlement, which were retained for this purpose, and by the foundations of the second settlement, which cut through the debris and were based on the hardpan, Fig. P2. The terrace was made considerably larger than the mansion, thereby securing a greater portion of the ridge and providing a passage area around the outside of the building.

A curious and undated platform terrace crowns the Larissa of Argos.[132] At the peak of this citadel the bedrock is steeply inclined to the east. Here the Mycenaeans built a terrace of cyclopean masonry that is preserved about 4 m. high, Figs. 26,184. To the south are remnants of a gate; even a conglomerate threshold is built into the Turkish wall and provides comparative evidence for a late Mycenaean date (see below, p. 235).

At the southwest are visible traces of a cyclopean wall, perhaps part of a small circuit around the citadel. All of these elements appear to be linked together, but how and to what purpose has never been determined. It appears, however, that in late Mycenaean times the terrace supported or formed part of a small defensive keep and also provided a level area within. All traces of structures that might have rested on this platform have been removed by later occupation.

At Mycenae in LH IIIB times a number of platform terraces were constructed. Traces of one around the so-called House of Lead were found at the southwestern end of the Panagia ridge.[133] Another one has been recognized behind the excavated area of the Panagia complex of houses, Fig.185.[134] It is of interest because it caps a rise in the bedrock and is built in two straight sections, one 0.43 m. behind the other. The total length of the terrace as uncovered is 20.18 m. The face of the bedrock behind is irregular and was filled with small stones. As Shear observed, the terrace probably supported a house. Judging from its great size we might expect that the terrace was larger than the building it supported.

One of the more impressive platform terraces is the zig-zag terrace that supports the western approach to the palace at Mycenae from the Northwestern Propylon to the Grand Stairway, Fig.P17. The terrace wall is constructed of cyclopean blocks, Fig. 27, and rises from 2.30 m. in height at the northwest to 4.50 m. at the southwest. The north . end of the terrace rests upon the terrace "M-M", Fig.181, which in its turn is also a platform terrace supporting the northern ascent discussed above, p. 63.[135]

The western terrace of the palace is remarkable for the pronounced offsets in its course that give it a zig-zag plan, Fig.P17. Reasons for this are hard to adduce. The plan may be owing to the changing height of the bed-rock in the area and also, perhaps to considerations of defense within the citadel.

A large terrace constructed for Petsas' House on the slope northwest of the citadel is remarkable for its size and plan. After the palatial terraces of the Meg-aron and its court and of the House of Columns, this one is the largest at Mycenae, about 35 m. long and about 20 m. wide, Fig.186.[136]

The terrace was tested in room Δ and found to be built with an inner and an outer face and with straight wall sections offset one to another. The plan is poly-gonal. The terrace is unique in that the rooms of the building it helps support were apparently built out to the terrace wall thus creating irregular shapes for some of the rooms, Fig.186. Also the rooms were founded on bedrock and had basements. The terrace, therefore, did not support an artificial fill and provide a ground base for the building, a fact that compromises its classification as a platform. Owing to its great size and the complex of rooms upon it, this terrace was kin to those of the palatial structures within the citadel.

Foundation Terraces:

Independent structures were often based on terraces. These terraces adapted to the local terrain and supported only the building intended leaving no outside space around it.

A simple illustration of a foundation terrace is the cut-and-terrace platform of the Potter's Shop (house B) at Zygouries, Fig.187. Blegen's description clarifies how this foundation was made:

> a broad horizontal cutting [was made] into the sloping hillside and ... the earth thereby removed together with a mass of stones [was dumped] upon the lower ground to the east until a level platform was formed.[137]

A heavy exterior wall was set against the cutting and formed the up-slope outer wall of the house, while the earth and stone fill of the terrace was retained by a strong wall built downslope. Intermediate lateral walls were set on the bedrock as were the longitudinal ones. The point at which the bedrock falls away and the fill of the terrace begins was selected for placement of the main corridor of the building, Fig.187. A similar arrangement is found in an orderly complex of rooms at Kandia set half into a cutting in the hillside, half on a dense stone fill retained by a terrace, Fig. 188.[138]

In general the Mycenaeans preferred to build up a terrace for the entire building rather than employ the half-and-half arrangement of cut-and-terracing. Exception of note are the House of the Columns and the Megaron and its court at Mycenae that are partly based in preparatory cuttings in the hillside, above, p. 15. These are palatial type terraces, however, and will be discussed below, pp. 101-105.

Among the many houses at Mycenae the House of the Oil Merchant is an excellent example of the common use of terraces to support a typical Mycenaean house type. The House of the Oil Merchant is divided into two parts, the main room (megaron) and the storage rooms. An upper terrace supports the main room while the storage rooms are based on a lower terrace a storey below.

The lower terrace was retained at the east by a massive cyclopean wall about 2 m. thick, Fig. 161. The lower end of this wall has a poros ashlar facade. Behind the wall, stepped up-slope and parallel to it, are foundation walls for the interior walls of the basement. These, along with the great terrace wall retained the fill that was composed of earth and loose stones.[139] These interior walls also helped compartmentalize the fill. The top of the fill is the basement floor level which appears to have been determined by the desire to have a basement entrance at ground level at the southern end.[140]

The upper terrace is retained at the east by another massive wall. This wall is 2 m. thick and has two faces, the eastern of which forms the western wall of the basement corridor, Fig.11. The wall supports the fill of the upper terrace, Fig.161, but like the lower terrace the fill is compartmentalized by roughly built walls of no structural purpose that are set obliquely through the fill.[141]

The use of terraces for the erection of this house enabled the builders to achieve a number of objectives with a minimum of effort. The building was divided according to a standard plan without the necessity of adjusting the plan to the terrain. Each section had a separate entrance from ground level. Lastly, the builders created a multi-storied structure without having to excavate into the hillside to level.

On a well-organized scale a virtual town plan type of layout was possible using terraces. The best example is that of the so-called Priests' Quarters at Mycenae, Fig. P3. The area has only been published in preliminary reports and no detailed discussion is possible at this point.[142] As can be seen on the plan, Fig.P3 , a block of buildings B, Γ, Δ, E, Z is set on the slope more or less on axis and interconnected by stair and passageways. The rooms and corridors were stepped up-slope, one behind the other, by placing them on terraces, as rooms B:1, 2 and building E, or by filling in the interior of the room, as Γ:1, 2. A second block of buildings has been excavated northwest of these, Fig. P3,"A".[143] These, too, are terraced up-slope. To the northwest again are the buildings of the Cult Center area: Tsountas' House, the shrine room 1, Citadel and South House. A section through Tsountas' House, Fig. P3, shows how this building, much like the House of the Oil Merchant, was divided into main room and storage rooms by a terrace wall that runs the length of the basement corridor and supports the fill for the floor level of the main room. Across the way a similar arrangement exists. The west wall of Citadel House is a terrace wall retaining the fill of the shallow basement of the main room.[144] This wall then forms the east wall of the sanctuary rooms below.

Here the intelligent use of foundation terraces made maximal use of the hillside for occupation. It was here, too, that we earlier noted the formation of the various rampways along the northeastern slope. The organization of this area within the citadel was made possible by the extension of the citadel wall from the Lion Gate to the southeast after the mid-thirteenth century B.C.[145]

One isolated late example of the terraced foundation is megaron "W" in the Lower City at Tiryns, Fig. ~~189~~.[146] The building was built in LH IIIC on a terrace set against the rising ground of the southeastern slope of the citadel. A well-built two-faced foundation wall about 1.00 m. high supported the interior fill, which was retained at the sides by the end walls and two interior cross walls. The western wall was placed on the bedrock above the terrace at floor level.

Palatial Terraces:

Palatial terraces have been recognized at Tiryns, Gla, Pylos and Mycenae. Possible traces have been identified at Athens.[147] In keeping with the structures they supported these are all massive terraces, though they are not all the same in form and construction. They are similar in that they provided an elevated platform for the palace and for some if not all of its accessory rooms. The terraces at Tiryns, Gla and Pylos all provided compartmentalized foundations for the individual dwelling units of the complex. The terraces at Gla and Tiryns are remarkable for they formed podia which actually raised the palace above the ground. The terraces of the megaron and its court and of the House of the Columns at Mycenae are different. They were built as massive single unit platforms. But this difference was largely due to location, for a view of the palace from the Great Ramp presented the visitor with the high facade of the western zig-zag terrace which gave the appearance that the palace was elevated, cf. Fig. 124.

The differences among the terraces are best seen in their manner of construction. In order to understand that, we must examine each terrace in some detail This will also clarify the extent to which palatial terraces are related to the categories of platform and foundation terraces just discussed.

Tiryns-

At Tiryns in its first palatial period the palace area was supported by a terraced platform retained by cyclopean walls, Fig. 13. These walls retained previous occupation debris as well as some artificial fill which levelled the ground evenly on all sides over the rise of bedrock under the Great Megaron. The resulting platform eliminated the need to build on slopes and enabled the builders to lay out a unified group of buildings, entranceways and courts at the same level according to a single plan. Subsequent construction in later periods retained and enlarged this core for the palace area proper.

The exterior retaining walls of the first citadel extended on the east from the Great Gate north around the northeastern residential area, on the west from the area of the later West Sally Port to the Great Court, and on the south straight across the northern edge of the Great Court to the north side of the Great Gate, Fig. P5 . A gap exists between the northeastern residential area and the western area enclosed by the wall, that is, where in later times the Great Megaron was located.[148] The total area enclosed measures approximately 66 m. east to west by about 59 m. north to south. As is apparent from the plan, Fig. P5 , the platform falls into two parts, east and west.[149]

The reports of soundings made along the terrace walls present a picture of how the walls were constructed and of the material they retained. A section taken along the east terrace, Fig.168, shows the exterior vertical facade of cyclopean block behind which are placed large rubble blocks which do not form a wall face but retain a packing of rubble. This wall and packing are based on bedrock in the terrace cutting we examined in the previous chapter, p. 31. The packing stones were placed behind the retaining wall as it rose in height, and towards the top the packing thickened, probably because the terrace cutting was slightly inclined to keep the earth from falling in. As the wall reached the top of the strata to be retained, the stone packing spread over the earlier levels and formed a kind of cap.[150]

The same process occured along the north, Fig. P5. The terrace wall was built in the broad foundation trench that cut through the building "r" in the Middle Citadel and the structures "A"and "C" in room XXII, Fig.170. This wall, also, retained earlier occupation debris and fill. Cyclopean blocks form the outer face; behind them are smaller rubble blocks packed against the debris and fill. In the upper courses large blocks project towards the interior, particularly at the corners where in consequence their inner faces describe an arc, Fig.170.

This inward thickening of terrace retaining walls at corners, and sometimes at junctures with interior walls, is particularly common in the walls of these terraces. The thickening strengthened the bond at the corner andformed a heavy capping over the fill. Other instances of this technique are visible on the site today and in the plan in <u>Tiryns</u>, III, pl. 6: one is at the southeastern corner of the palace area, another at the first offset to the north, and two more at the northeast - one at the corner and another at the northeastern corner of room XXII, Fig.170. Not only were the corners and offsets thickened inwards, but also larger blocks of ashlar shape were placed at corners both to strengthen them and to determine and terminate massive rubble courses, Fig. 13. This technique will be further noted in terraces at Gla, Pylos and Mycenae and will also be discussed as a general practice of rubble masonry, Chapter IV.

Two other characteristic practices in the construction of this terrace are the consistent use of cyclopean masonry, which will be considered separately in Chapter V, and the frequent occurence of offsets in the exterior face of the wall. Dörpfeld observed that

> These many angles [offsets] are by no means capriciously arranged, but corresponded - as may be seen from the Plan [Fig. P5]- to the inner walls of the palace. <u>The circuit wall and the palace are consequently in close connection</u>; and in this we may recognize a further valuable proof of the thesis repeatedly mentioned before, that the construction of the palace and of the embattled walls took place simultaneously. It cannot be denied, it is true, that in some cases also the configuration of the rock on which the wall was to be built prescribed the erection of the projecting structures. But in Tiryns itself it can be clearly seen that in many places where the formation of the castle rock by no means required it, inverted angles were nevertheless arranged on account of the interior division of the palace. 151

Müller's principal concern when studying the architecture of the citadel was to discover the building history of the palace and the citadel walls. In this regard one of his concerns was to examine the offsets in the Upper Citadel wall and the other was to date its construction. The first effort proved to be of little value to him. He found that at three places offsets occured with vertical joints in the walls: at the east, at the north and at the west, Fig.P12, #1, #6, #10.[152] Only in the case of the northern joint where the north wall of the Megaron abutted the western corridor wall of the Small Megaron did he acknowledge a different period of construction.[153] The joint in the eastern face was reasonably attributed to construction - the large wall blocks laid as headers could only be placed to form a vertical joint, Fig.190- and at the west he stated that the placement of the wall blocks showed that neither wall section was independent of the other.

Behind the terrace walls at east and north Müller found ceramic material that satisfied his other concern by providing a date for the construction of the walls in the fourteenth cen ury B.C. (see above, pp. 31, nt. 66; 32, nt. 70). More important, later excavation in the area of the Small Megaron, in the rooms XXI-XXII east of it and in Court XXX disclosed recognizably earlier traces of floors and rooms within the terrace.[154] Hence, Müller was forced to conclude that the plan of the palace as preserved belonged to its latest period and bore no close relation to the original constructions of the Upper Citadel terrace.[155] Thus in the final analysis Dörpfeld's observations were not taken up and fully investigated.

Close observation of the Upper Citadel terrace reveals more vertical joints at offsets than Müller reported. They are found at #3 and #5, Fig.P12. Proceeding on the assumption that the explanation of these vertical joints is that the adjacent wall sections are abutted to each other, we must wonder if this was not a regularly applied system and true also at the remaining offsets. At #2 only one course is preserved, and it shows a bond between the wall sections. At #4 the upper two courses are bonded while the lower one shows the wall block of the eastern section abutted to the adjacent block of the projecting western section, Fig.P12. At the west #8, #9, #11, and #12 appear to be bonded.

When seeking an explanation of the reason for the offsets and the appearance of abutted wall sections, we must first consider the implications of the abutted wall sections. If one wall is built against another without a bond, a line of abutment will occur, Fig.191.

Müller's explanation that the vertical joint is not a line of abutment but is owing to the coursing of the wall blocks as headers is only satisfactory for joint #1, Fig. P12, since it does not explain the appearance of the vertical joints elsewhere in the wall - at #3, #5, and #9. A more satisfactory and standard explanation is that one wall was built before the other, perhaps only two days or two weeks before. Proceeding on this basis the Upper Citadel foundation plan appears as in the sketch, Fig. 192: a series of compartments divide the terrace fill. In every case but #2 the walls extending into the fill line up with the superstructure walls of the palace rooms at the northeast because they provide foundations for the walls of those rooms.

The offsets not accounted for - #2, #4 and those on the west side - need some explanation. That at #2 is preserved only in the upper course, which surely is part of later construction; only excavation will reveal its true state. The offset at #4 might be explainable as a rebuilding of the terrace wall in a later period, perhaps to be associated with the preserved final plan of the structures here. Those at the west can also only be understood by excavation within them. However, a likely explanation hinted at by Dörpfeld (above, p. 83) is that their step-like plan merely conforms to the westward extensionof the bedrock in this area. It is nonetheless remarkable that the structural walls of the rooms within the western terrace wall also align with the offsets, and for certain this southern section of the western terrace forms a large single unit, Fig.192.

Although this explanation is only an hypothesis and does not at present fit all the circumstances, it is possible on the basis of it to dissect the terrace and determine the order of its construction. We can presume that the terrace sections which project furthest from the wall face were probably built first, the others abutted against them. Taking just the northeastern section as an example, the primary elements would be the southeastern section bounding the area southeast of the court XXX and the foundations of the central megaron-like structure of rooms XXI and XXII (labelled "a" in Fig.193). Next, the builders added the section west of rooms XXI-XXII and the one north of the southeastern section (labelled "b" in Fig.193). One more section added north of that (labelled "c" in Fig.193) and, finally, the northeastern corner was built to fill out the entire arrangement ("d" in Fig.193).

In terms of construction the implications of this process of construction are important. According to such a system a number of workgangs could work simultaneously at different areas of the projected platform. Each gang could have been supervised by a master mason who determined the selection and order of the placement of wall blocks and the coursing within his unit. He easily coordinated his work with that of other groups working on the wall. The work could thus proceed according to a commonly conceived plan without the necessity of overall drawings and accurate measurements: the compartmentalized foundation terrace provided the unit of construction and their total assemblage created the palatial platform.

Furthermore, construction by sections would enable the builders to adjust each compartment to the terrain regardless of other compartments; only corridors would have to respond to this adjustment in order to provide access from unit to unit. Hence we would have a good explanation of the variance in the depth of the offsets, already exemplified by the explanation given above for the western walls of the palatial platform which enclose in a box-like manner the western projection of the bedrock of the citadel.

The validity of this hypothesis can only be ascertained by excavation. On the present evidence, however, it conforms to the principal that vertical joints in wall faces represent lines of abutment. Furthermore, it does not require any alteration of the chronological scheme proposed by Müller. This is a structurally sound method of building that, if employed, provides us with a means of gaining insight into the plan of the original palace at Tiryns as well as into palatial planning in general.

Gla-

Along the north side of the citadel of Gla is a cliff that falls between 35 and 40 m. to the lake bed below. Against the edge of the cliff about at mid-length is the summit of the citadel, a triangular area about 70 m. on a side. Here along the eastern and northern sides the Mycenaeans built their local palace, Fig.P11. The northern section of the L-shaped complex straddles a 1.5 m. drop from the summit to the cliff edge, and the eastern section, perpendicular to the northern, runs along the north-south ridge of the summit. The outside length is about 63.5 m. along the north and about 66 m. along the east. The palace is divided into three sections: The westernmost consists of the megaron and auxiliary rooms and is approximately 26 by 13.5 m. with a southwesterly to northeasterly orientation. Next is the central section oriented east to west with maximum dimensions of about 39 by 15 m.

Last is the lower, eastern wing oriented north to south with the north end attached to the central section and with maximum dimensions of about 49 by 16 m.

The entire palace is raised above ground level on a platform, Fig. 28. The platform is articulated to conform with the three principal sections of the palace. Within each section we note subdivisions of rooms marked by offsets in the platform facade. As at Tiryns each offset aligns with superstructure walls of the interior. Furthermore, each offset in the platform corresponds to a vertical joint in the wall face, e.g. Fig. 29. The recognition of this technique, which is characteristic of the citadel's circuit walls (see below, pp. 208-220) and which is analogous to the construction just examined at Tiryns, prompts an examination of the manner of the construction of the palace platform.

The excavations of Threpsiades did not test below the floor level of the palace.[156] There is, therefore, no excavated evidence for the construction of the platforms, especially for the make-up of their interior. Examination at various places on the platform shows that the platform is a large terrace retained by massive cyclopean walls. The most massive walls are those on the steepest gradient, i.e. the northern wall of the northern leg and the eastern wall of the eastern leg, Fig. 28.

The facade walls of the interior of each leg, which we will see later are probably walls closing the platform fill, are less massive and are situated for the most part on the highest points of the summit.

The retaining walls tend to be two blocks thick; the interior row of blocks does not form an inner face but is in direct contact with the fill of the platform Fig. 30. Because no excavation below floor level has been conducted, we do not know if the fill was of earth or of stone. By analogy with the terraces at Tiryns, a packing of fist-sized stones behind the wall may be expected, although it must be pointed out that the terrace is unlikely to have been built over previous habitation. At the corners and perhaps along the course of the wall itself, the fill appears to have been capped by a thickening of the terrace walls, most noticeable in the placement of massive limestone slabs at the northwestern corner of the megaron, Fig.194. Along the northern face of the north wing, where sections of the wall are in ruin, one can observe a backing row of cyclopean blocks in the top three courses (combined height ca. 1.5 m.) and in places traces of a third row behind the second. Of course, this third inner row may have formed a slabbed flooring, since it is only apparent in the uppermost course, but it does not continue further into the floor area of the rooms, Fig. 194.

The builders placed larger, more rectangular blocks at the corners, Fig. 31. The larger blocks aided the transition of the coursing around the corner and also strengthened the bond. This practice is also observable at the offset corners that occur in the course of the wall.

The attention to the corners of the wall is also characteristic of the terraces at Tiryns (above, p. 83). So, too, is the presence of offsets. The offsets in the terrace of the palace of Gla are of particular interest because the palace with its terrace foundation represents a single period of construction. In consequence any relation between terrace foundation and palatial superstructure is likely to have architectural meaning. As noted already the offsets in the terrace correspond to vertical joints between adjacent wall sections, and every offset corner aligns with an interior wall of the superstructure, Fig. 195. As at Tiryns, it appears that the foundation walls of the room walls which align with the offsets form compartments of the palace terrace. This assumption is the more likely because the terrace and palace at Gla are of the same period, and it is corroborated by the evidence of the circuit walls that have built wall faces that extend from exterior offset to interior offset, Fig. 32,118, below, pp. 181-183. The palace platform, then, like the circuit wall, must have been constructed in units: each aligned interior wall forms the inner leg of a terraced compartment as well as the foundation wall of an interior room wall. We may then attempt as we did with Tiryns to determine the order of construction of the palace terrace.

Working on the hypothesis as we did with our analysis at Tiryns, that the most projecting compartments were built first and others abutted to them subsequently, we may begin with the northern leg of the palace platform, Fig.195. The relation between the megaron and the central section of the platform is in general straightforward. The original element was the megaron foundation built in two parts (Fig.195:1): the base of the outer entrance chamber, Fig. 33, and the foundations of the main room, Fig. 34. These units were built up at the interior and filled with packing to floor level after which the north terrace wall of the vestibule was inserted and the southern terrace wall of the meagaron was completed if not previously accomplished (Fig.195:2 and compare to Key Plan). To the east the drain "α" was installed, and the trapezoidal unit "d", which changes the orientation of the north wing, was abutted to the megaron. At the same time the northeastern corner of the central section must have been constructed (Fig.195:2, "d") because the intermediate units "e" are abutted to it and to the trapezoidal unit (Figs. 35, 36,195:3). The eastern terrace wall of the northeastern corner was at its southern end built against the northern wall of the eastern wing of the platform (Fig.195: Key Plan "d" against "c"). This is primary evidence for the prior construction of the eastern wing of the palace, probably to be seen as simultaneous with the construction of the megaron. The construction of the eastern wing is discussed separately below.

With the construction of the symmetrically placed units "e" (Fig.195:3) may have come the installation of the drain "β", which has not been traced under the building. The next step would have been the filling of the interior of each unit along with the insertion of the northern terrace wall "f" between units "e". As the units were filled to floor level, they must have been closed along the south. We then have the entire terrace as a raised platform above the bedrock, even at the southern side.[157]

The next step was to construct the corridors. Their position appears to have been determined by two considerations: 1) the need of a stairway behind the megaron that connected to a private corridor lining rooms "d-e-f-e-d", and 2) the need for a corridor leading directly to the megaron complex.

The eastern wing, as has already been remarked, was built before the central section. In plan it does not reflect the symmetrical appearance of the central section, though in general it compares with the northern wing of the palace as a whole, for the largest, southern room reflects the megaron, and the grouping of the smaller rooms with vestibules and corridors is nearly the same as that of the central section, Fig.195:Key Plan. In terms of the order of construction, however, certain anomalies appear. Clearly the foundations of the main room of the large southern room "a" are the original unit of construction: The foundations of the smaller chamber "c" directly north are abutted against the north wall of the large room, Fig. 37; those of the square vestibule "b" are abutted to the south, Fig. 38. But the small chamber "c" to the north is abutted to the square room "b" north of it, which in its turn is set against the foundations of the two-roomed chamber "a" north of it.[158] North of the two-roomed chamber "a" is a room "b". The conclusion to be drawn is that the two-roomed chamber "a" and the megaron-like room, also "a", to the south were laid out first. Then the foundations of successive chambers were built around them.

Lastly, the room "c" was formed by building the terrace wall that forms its eastern foundation between rooms "a" and "b".

An immediate response to this scheme is to query how the builders determined the original location of the two-roomed chamber "a". Surely, the process of building the terrace compartments in from the sides as just seen in the central section is a simple and more accurate process? It may have been the case, however, that it made no difference whether one started construction from the corners and worked inwards (which for the central section wedged in between the other two may have been simply the most logical solution) or from the center outwards, because the principle of building units of terrace allowed considerable leeway in the addition of rooms to a plan. A study of the metrics of the palace would perhaps be the most fruitful means of tackling this problem, for the discovery of a module of measurement would be invaluable in coming to terms with the concepts of planning in Mycenaean architecture.

This analysis of the terraces of the palace at Gla has strayed a little from the discussion of terrace walls <u>per se</u>, but it shows how closely related in construction the terraces of Gla are to those of Tiryns and inparticular the question raised at Tiryns concerning the relation of the rooms of the northeastern residential quarter to the offsets in the terrace wall has received considerable illumination from the investigation of the palatial platform used at Gla. We have still not seen exposed evidence of the actual existence of these probable compartmentalized terraces. For these we must turn southwestward to Messenia to examine the foundation remains of the Southwestern Building at Pylos.

Pylos-

One other palatial terrace in this series is that of the Southwestern Building at Pylos. Unlike those of Tiryns and Gla, this terrace did not ring the summit of the citadel or form a raised platform; instead, it extended to the southwest the level area of the naturally flat ridge, Figs. 39, P18.

This terrace covered an area about 39 m. long and up to 11 m. in width with a maximum depth of over 2 m.[159] The southwestern terrace wall was traced another 16 m. to the southeast, but later activity in the area had removed most traces of the fill and the interior walls.[160]

Like the terraces at Tiryns and Gla that of the Southwestern Building is built in sections, each section defining a more or less square unit. There are seven units in the main part of the building and possibly more in the scanty remains to the southeast, Fig. P18.

The remains of the walls of these units are for the most part so poorly preserved that it is impossible to tell if all the offsets occured in conjunction with vertical joints, although that between rooms 80-81 is apparent, Fig. 41. The coincidence of offsets with interior walls, however, leads one to suspect that the unit system of construction was employed here. Only the southern wall of the megaron does not align with an offset; a reason for this is offered below.

The order of construction of the terrace is not entirely clear because in so many places the walls are only preserved in their foundation courses. There are a number of details, however, that clarify our understanding of construction already gained from the terraces at Tiryns and Gla.

The walls of the megaron, room 65, Fig.P18, were apparently built first, since the western wall face projects beyond the line of the other sections of the terrace. The northwestern wall of the room is remarkable for its form: from the corner of the terrace wall it rises up-slope tapering inwards, Fig.P18. The tapering stops at the break in the rise of the slope, i.e. near floor level, and from that point onwards the wall assumes the even normal thickness of an interior wall (0.85 m.). The apparent explanation of this taper is that the wall was given added thickness down-slope in order to better retain the greater fill and to better support the superstructure that would rise above it. For the same reason the southeastern wall of hall 65 that lies further downslope was given a greater than average thickness (1.25 m) because the direction of the weight of the fill was towards the south.[161] To insure the bond at the southern corner the southwestern wall was carried 1.5 m. beyond the line of the exterior face of the southeastern wall of hall 65, thus bringing the offset also that much farther southeast and strengthening the corner, Figs. 40, P18.

The entire southwestern terrace wall was a massive construction. As is clear from the plan, Fig. P18, the terrace northwest of the megaron was built in successive units. The first unit, the southwestern wall of hall 65 (Fig. P18: "a") has a preserved foundation 1.85 m. thick made of naturally flat limestone slabs, Fig. 40. Blegen thought that the outer face of this wall was originally built of squared blocks; the inner face was of rubble and probably formed an interior face for the height of the terrace wall.[162] The terrace continued to the northwest and was built of large naturally flat limestone slabs. These present an impressive face still preserved six courses high at the northwestern corner, Fig. 39. The configuration of the northwestern corner unit (room 81) is of interest for it shows how the unit was put together (Fig.P18: "d"). The southwestern wall of room 81 was set against the northwestern wall of room 80, Figs. 41,P18: "c". The northwestern wall of room 81 turns in a southeasterly direction into the terrace where it terminates abruptly about 0.80 m. from the southeastern corner of room 81. Throughout the wall thickness varies between 1.40 and 1.60 m. From that point on into rooms 79-80 the wall continues as an interior wall of normal foundation thickness, 0.85 m. Two explanations of this termination of the thicker wall can be given: First, the wall terminated short of the corner because its primary purpose was to retain the fill to be placed in it. Because the elevation at the point of termination was nearly the same as floor level, there was no need to continue the wall with this thickness beyond that point. Second, the gap was left at the corner in order to provide passage for the workmen carrying in the fill of the terrace compartment. Once the fill was completed the wall was extended as a normal interior foundation wall. Subsequently the terrace was continued to the northeast.

As at Tiryns and Gla these interior walls broke up the 39 m. terrace into compartments. By design or by accident these compartments insured the stability of the entire platform because they prevented the fill from shifting about due to earth movement and water seepage.

Differences have been observed in the application and construction of the terraces at these three sites. At each of them, however, basically the same system of construction appears to have been employed. Our investigation of these terraces at Tiryns, Gla and Pylos gives a detailed working hypothesis of their construction. The system of building in terraced compartments to form individual foundations for dwelling units and to form a massive platform for palatial structures can be considered as characteristic of Mycenaean construction practice.[163] Moreover, it is fundamentally related to Mycenaean concepts of planning and design. Two procedures may be pursued to clarify and correct this presentation: a study of the metrics of Mycenaean architecture and cleaning and re-excavation at these and other sites.

Mycenae -

Construction of terraces by compartments for palaces was not universal on the mainland. As might be expected Mycenae for reasons of location and internal growth had different though nonetheless massive platforms for its palatial structures. For the palace at Mycenae three principal terraces were built: (1) the western zig-zag terrace supporting the northwest propylon and western passageway to the megaron court discussed above, pp. 73-74,(2) a straight terrace wall, not well preserved, along the precipitous north side of the palace area, and(3) the terrace of the Megaron and its court, which is of primary interest at this point, Fig.P17.

The palace of Mycenae, as is often remarked, is not located at the top of the citadel but at the southern side along the precipice over the Chaos ravine. This area did not naturally offer room for the palace. The bedrock, as determined by Wace's excavations,[164] rises steeply to the north; the gradient varies between 1:4 at the west to about 1:2 under the Megaron. Two terrace walls were constructed to support the complex, one for the court and another for the Megaron. In the area of the court there existed over 4 m. of structural debris dating from Middle through Late Helladic III times, Fig.196. When the decision was made to build the final palace here, this earlier material formed the basis of the fill of the terrace erected for the court and rooms west of it.[165]

The wall of this terrace extended from the west end of the Grand Staircase east to the Megaron, Fig.P17.

It was preserved to a height just over 4m. and for a distance of about 18 m.; a later Greek wall obscures the northern end of the terrace wall. The terrace wall is built of cyclopean masonry with large rubble blocks set behind. The fill extended behind the wall from 15 m. to 17 m. towards the north wall of the court, which is based on a cutting in the bedrock.[166] The fill was primarily a stone packing, but the upper surface was a mixture of earth and limestone chips. The floor of stucco in combination with the layer of chips sealed the top of the fill and prevented water seepage into the terrace core. A number of drains were installed below floor level.[167]

The other terrace wall supporting the fill along the south side of the Megaron had slipped along with most of the Megaron into the ravine in antiquity. We can see exactly how much of the great room rested on terrace fill by looking at the preserved line of the floor plan, Fig.P 17. Wace had conjectured that the wall supporting this fill was probably a continuation of the circuit wall. Aside from indications on Steffen's plan of the site, there are no reasons to believe that this was the case or that a defensive wall was necessary at this point.[168] A more likely arrangement, to my mind, would be a second terrace wall forming the southern foundation wall of the

Megaron and joined to that of the court by a jog. The combination of these two terraces would have created an area over 45 m, long with an average width of 15 m. and a height from 5 to 6 m.

A more detailed idea of the construction of the palace terrace can be gained by turning to the House of the Columns, where excavations by Mylonas recently investigated a similar large terraced platform.

The central unit of the House of the Columns rested on a great terraced platform 27 m. long northeast to southwest and 20.50 m. wide southeast to northwest, Fig. 197. This platform was retained by a wall ("R" in the plan) preserved today for a length of 5.50 m. The investigation of this wall and other results of Mylonas' excavations showed that the terrace fill reached a maximum depth of about 5 m.[169]

The fill consisted entirely of medium size rubble tightly packed with earth. Over this was laid a ca. 0.10 m. thick packing of <u>plesia</u>, a local hydraulic marl, which served to seal the fill. Atop this was laid a layer of hard decomposed conglomerate earth about 0.70 m. thick, and finally the lime cement floors of the court of the House of the Columns were put down.[170] North and west of this terrace the bedrock had been cut back to level space for remaining rooms of the complex, Fig. 5, above,

p. 15

Mylonas believes that the great size and careful construction of this terrace characterize it as an element of palatial architecture. Naturally, he compares the terrace with that of the Megaron and its court and uses the comparison to propose that the House of the Columns is actually the eastern extension of the palace.[171] Whether or not the appellation "palace" is appropriate for the House of the Columns, Mylonas' observations of the character of the terrace are most apt. For the terraces of the palace and its court including the western zig-zag terrace and that of the House of the Columns all stand apart in form and construction from the other terraces of the citadel. And the very fact that a terrace can be used to identify the presence of a palatial-type structure bespeaks their importance as an element of Mycenaean architecture.

Discussion:

As we have seen there is some evidence that the source of the palatial terraces is to be sought in the earlier platform terraces of Malthi, Tiryns and the Menelaion. Of these, however, only the Menelaion provides an intermediate step between the earliest terraces and the palatial ones. Comparisons between the two groups still leave unanswered questions. Nothing substantial exists for the early Mycenaean period (LH I-II) that represents a recognizable prototype for the palatial terraces and few details of construction are the same. In particular, working on the assumption that the analysis of compartmentalized construction is basically correct, there is no evidence indicating how and when this method of building and planning was developed or introduced.

Turning to the foundation terraces we find either shallow, small terraced foundations, as in House F at Krisa of LH I-II date, Fig.198, of dubious value, or fully developed foundations as in the House of the Oil Merchant, whose construction is contemporary with, if not later than, the palaces. At best we can observe that the palatial platforms at Tiryns, Gla and Pylos are no more than a combination of numerous foundation terraces supporting more or less independent units of rooms. This may be the best answer, however, for it is likely that no intermediate structure either in time or degree of complexity will be found, since there may have been no architectural need for such a structure. In this case, then, the Mycenaean builders simply put together from the existing grab-bag of architectural practices used for vernacular architecture a monumental architectural form.

Some of the practices employed in building these monumental terraces can be recognized in earlier and less significant constructions and lend force to this view. For example the practice of building retaining walls with increased thickness towards the top was observed in the LH II retaining wall at Nichoria, Fig. 1, and the placement of a stone packing behind the terrace wall has been recognized widely, while the sealing of these packings and of the terrace fill in hydraulic mortar is known from the retaining wall #9 inside the Lion Gate and also from the tholoi, notably that of Klytemnestra.[172] Last is the appearance of offsets in the upper terrace wall of the Panagia complex, Fig.185, the terrace of Petsas' House, Fig.186, and in the walls of Tiryns and Gla (below, pp. 180,199).

Most of these examples, of course, are of palatial date, and it can be countered that they argue only for a unity of palatial architectural practice, which is certainly true. But since the need for larger architectural forms was lacking in the earlier periods, that might also be considered a narrow view. If nothing more than the plan of the LH IIB mansion at the Menelaion and the complexity of its reconstruction in early LH IIIA:1 is used, they at least demonstrate the ability of the Mycenaeans to create new and effective techniques of construction as required by circumstance and situation.

Thus the palatial terraces of the Mycenaean citadels leave us with us with unanswered questions - How were they built? How did they develop? But in view of the common and diverse use of terraces from Middle through Late Helladic times, we are justified in considering their development and use as a natural and indigenous response to the demands of the more highly organized social and economic world of late Mycenaean times.

Addendum: The Terrace at the Argive Heraeum

The great terrace at the Argive Heraeum upon which was placed the first Hera temple has not yet found its resting place in the architecture of the Argolid, Fig. 43-44. When first studied by Tilton at the turn of the century, it was quite naturally presented as a cyclopean construction of Mycenaean date.[173] This remained the orthodox view until Blegen's publication of the results of his investigations of the prehistoric remains at the site. He made a special point to probe around the terrace wall in hopes of establishing its date. Most of his attempts proved fruitless, but

> our fourth and fifth holes, however, yielded some Geometric fragments at so great a depth from the face of the terrace that it seemed to me impossible to believe that they could have reached their place after the building of the wall.[174]

Thus, he concluded that the wall was constructed in the Geometric period.

This view was questioned by Drerup in his volume of Archaeologia Homerica, Griechische Baukunst in geometrischer Zeit, pp. 57-59, because the monumentality of the terrace was foreign not only to the Geometric period but also to the locale. Thus he concluded that the Geometric pottery from within the terrace only provided a *terminus post quem* and that actually the terrace was constructed at the time of the erection of the old Hera temple, late in the seventh century B.C.[175]

Recently, Plommer has questioned both Drerup's interpretation and Blegen's evidence.[176] He believes, contrary to Blegen's statements that demonstrate the care of his investigation, that the Geometric pottery recovered by Blegen inside the terrace "must have dropped through its chinks" (p. 76). Furthermore, he compares the masonry to the "wide jointing of the Bronze Age" (p. 76) even though Blegen had pointed out that the

> jointing is loose and open ... very different from that of the compactly articulated Tirynthian and Mycenaean structures, such as the ramp wall above the Grave Circle, with its close jointing and the meticulous packing of small stones in the interstices (p. 20).

The terrace is 55.80 m. by 34.40 m. In plan it is built as a long rectangle with projecting wings at the ends that continue the line of the sides into the slope of the acropolis, Fig. 199. The terrace wall blocks are megalithic slabs of conglomerate ranging in size from 3.20 x 2.80 m. to 5.20 x 3.00 m. Massive blocks of this type are still to be found split away from the northeastern end of the acropolis, no more than 50 m. from the terrace. These blocks are of irregular shape, but their top surfaces were sometimes worked, perhaps to receive the hard limestone flagging that forms the surface of the terrace.

The flagstones are 0.30 m. to 0.50 m. thick and average 1.00 m. x 1.00 m. ± 0.25 m. Two layers can be identified, though west of the western corner of the temple stylobate at least three layers are observable, some being only 0.20 m. thick and generally smaller in dimension, ca. 0.60 m. x 0. 60 m. All of the limestone slabs are of extremely irregular shape and only the top and bottom surfaces are parallel, Fig. 199.

Atop this flagging rests the archaic temple. Its stylobate of poros blocks is dressed for a distance of about 0.20 m. from the top surface. The remaining 0.25-0.30 m. to the terrace paving was left rough. Presumably this indicates that only the dressed surface was exposed and, therefore, at the time of the construction of the temple the flagging was covered.[177]

The face of the terrace shows the open joints between the blocks, Fig. 42. The blocks are uncoursed, in fact, they often appear to be stacked one upon the other, Figs. 43-44. As Blegen remarked, this masonry in unlike the careful rubblework of the cyclopean walls of Mycenaean times (see below, pp. 159-161, 228-236).

Nothing about this terrace is comparable to those of Mycenaean date, especially to the great palatial terraces discussed above. One of the more conspicuous non-Mycenaean features of this terrace is the limestone flagging, which is unparalleled in Mycenaean architecture.[178] It is important to observe that because the flagging extends down two and three courses to the terrace and because some of the conglomerate terrace blocks are worked to receive the flagging, it is best to consider the flagging as a part of the construction of the terrace. From the evidence of the stylobate of the Hera temple that it was placed in a level of earth that lay over the flagstones at the time of construction, it becomes reasonable to conclude that the terrace preceeded the temple in construction. In light of its lack of relation to the Mycenaean terraces, there seems, contrary to Plommer, no reason to doubt Blegen's testimony that the terrace was a Geometric construction (see below, pp. 228-236).

Notes

101 All the lined dromoi of tholos tombs are retaining wall constructions for they hold back the earth of the hillside and do not form a terrace; especially remarkable are those examples where the bedrock forms the lower half of the dromos and the upper part on the line of the natural topsoil is built as a retaining wall, e.g. the Aegisthus tholos, BSA, 25, pl. XLVI. Many of the dromos retaining walls are built of poros limestone or conglomerate ashlar blocks.

102 R. Howell in McDonald, Hesperia, 44 (1975) p. 105, fig. 5 (wall in L23-Pfg).

103 AE, 1962, pp. 88-99; BSA, 25, p. 62. The restoration has been identified by Mylonas, p. 89. It runs 1 m. back from the wall and extends 1.5 m. deeply into the core. At the end of his investigations, Mylonas rebuilt the southern end of the wall and added a rubble staircase that gives access to the top of 9.

104 AE, 1962, p. 90.

105 AE, 1962, p. 99.

106 Mylonas, AE, 1962, pp. 92-93, states that this drain replaced "u" to the north ("a" on his plan facing p. 128). This drain he claims went out of use when wall

9 was constructed. I would rather urge that both drains are contemporary, the northern one draining the extensive area above the Lion Gate and the fill of wall 9, the southern one draining the area above wall 26. His arguments on the basis of his investigation of drain "u", pp. 97-99, figs. 58-59, do not prove that the northern drain went out of use when wall 9 was constructed.

[107] AE, 1962, p. 133. The conglomerate blocks were thought by Wace to represent an earlier wall, BSA, 25, p. 66, wall 27. Mylonas showed they were only part of the fill behind wall 25.

[108] AE, 1962, pp. 17-21. Mylonas records modern restoration of the wall at the south; the terrace fill is dated to early LH IIIC.

[109] AE, 1962, p. 23.

[110] Excavation of this area was conducted in 1910: AthMitt, 36 (1911) p. 198; many fresco fragments were found here: Tiryns, II, pp. 66-67. The terrace and retaining walls are discussed by Müller, Tiryns, III, pp. 45-46, figs. 27-29, pls. 37-38.

[111] AE, 1962, pp. 132-133, 138-139, fig. 81.

[112] The ramp at Tiryns that leads from the Lower Citadel up through the Great Gate (Steintor) was also a retaining wall construction with an interior stone packing and the surface was sealed with mortar, Tiryns, III, pp. 26-31. Müller places it in the phase Ib.

[113] Wace, BSA, 25, pp. 71-74, understood the Little Ramp to consist of a single ascent that terminated east of the Grave Circle. Mylonas, MMA, p. 80, pointed out that a large drain opens out of the Great Ramp terrace wall onto the Little Ramp at this point.

[114] Mylonas, Praktika, 1961, pp. 155-156, pl. 104a.

[115] MMA, pp. 75-77, fig. 18, p. 71. Mylonas states, p. 75, that the "cuttings on the rock on which the walls [of the stairway] were based give us proof of their existence." Yet the cuttings he refers to a "C" (Fig.181 and his fig. 62) do not correspond to the projected line from the upper landing of the first flight to the corner of "D-E". Furthermore, as Mylonas later pointed out, p. 75, the terrace wall "M-M" "terminates at the north staircase". By this he must mean that "M-M" continued north on the line of the two bedrock cuttings indicated on his plan by hatching (at #1 and #2, Fig.181). "M-M", therefore, would have provided a foundation for the retaining wall supporting the stairway. If this is true, then no trace of the retaining wall of the stairway could be preserved today.

[116] Mylonas, Praktika, 1961, p. 157; Wace, BSA, 25, p. 210.

[117] O. Broneer, Hesperia, 8 (1939), pp. 333-342, figs. 8, 15, 19, pls. XII, XIII.

[118] Steffen, Karten, pp. 8-11; MMA, pp. 86-88. See also: McDonald in E.L. Bennett, Jr., Ed., Third International Colloquim on Mycenaean Studies (Madison: 1964) pp. 217-240; Heurtley, BSA, 26 (1923-1925) pp. 38-45.

[119] MMA, p. 86.

[120] SME, pp. 69, 78, 80-83. I cannot comprehend why the date of the main room (A1) was determined on the basis of the pottery from below the walls (third and successive strata); presumably the walls were set in some kind of a trench, and apparently the strata were arbitrarily changed every 0.05 m. Valmin must, therefore, have assumed that the Late Helladic inhabitants removed most traces of MH occupation. All other remains in the room, i.e. hearth and column base are LH III.

[121] The excavator reports the presence of a doorway to a height of about 1.15 m. in the southern terrace wall, SME, p. 70. How then could the southern area (A17) have formed a terrace 1.50 m. high?

[122] SME, p 95.

[123] SME, p. 108

[124] Tiryns, III, pp. 15 (east), 11, 16, 18-20 (north and west) 103, 109-110.

[125] Tiryns, III, pp. 11-12.

[126] Tiryns, III, pp. 113-114.

[127] Tiryns, III, pp. 38-39.

[128] Müller offered no evidence for the basis of his contention that the wall "A" in the sounding in room XXII, Fig.170, was contemporary with the structure 1.55 m. lower cut by the foundation trench of the northern palace retaining wall. Furthermore, he did not discuss the wall "C" which lies at the same level as the structure "r" in the Middle Citadel, also cut by the foundation trench (cf. Tiryns, III, fig. 2, pl. 12 and p. 164; elevations are 24.19 and 24.20 m.). Dragendorff, AthMitt, 36 (1913) p. 336, believed there was never a terrace here between the Upper and Lower Citadel areas until one was created in LH III times.

[129] Tiryns, III, p. 118 and Dragendorff, preceding note.

[130] The most probable cause of this event was a mudslide, perhaps caused by some earth movement; it appears that water seeping beneath the conglomerate caprock also undermined the caprock and when the destructive event occured, the rock fell away into the the southern corner of the first mansion. This rock was left in situ and incorporated into the second mansion.

[131] In some area more stone was found than earth, in others the fill was an even mixture. The excavator,

Dr. H. Catling, observes (personal communication) that the stone fill is entirely tumble, often left in situ from the Period I walls, whereas much of the earth was brought from a nearby hill and from excavation on the site where new structures of the Second Period were being prepared.

132 G. Vollgraff, Mnemosyne, 56 (1928) pl. IX.

133 Wace, BSA, 51 (1956) pp. 119-122, fig. 2.

134 Domestic Architecture, pp. 93-94.

135 K. Rowe, BSA, 49 (1954) pp. 254-257, thought the wall might have been an MH fortification wall, but Mylonas, MMA, pp. 15-16; Praktika, 1961, pp. 157-158, showed that the wall was actually LH IIIB in date.

136 I. Papademetriou and P. Petsas, Praktika, 1950, pp. 203-233; 1961, pp. 192-196; E. French, BSA, 58 (1963) pp. 46-47 dated the pottery of the principal storeroom to LH IIIA:2.

137 Zygouries, p. 30.

138 K. Gebauer, AA, 54 (1939) cols. 268-294.

139 Wace, BSA, 48 (1953) p. 9; E. French, MycTabs, III, plans III, IV; Wace, MycTabs, II, pp. 6-7.

140 Domestic Architecture, pp. 158-159 and nt. 214; Shear cogently argues that the room 9 (E. French's "X") provided a passageway from the roadway to the west to the basement corridor.

141 So also the Cyclopean Terrace Building where the stone fill was compartmentalized: E. French, BSA, 49 (1953), p. 269.

142 Mylonas, Praktika, 1970, pp. 118-124; 1971, pp. 146-156; 1972, pp. 114-126; 1973, pp. 103-107; 1974, pp. 89-92.

143 Ibid.

144 Evidence for this basement under the "megaron" of Citadel House will be presented by Lord William Taylour, who has kindly discussed it with me and allowed me to mention it here.

145 For the date of the West Cyclopean wall in mid LH IIIB see, AE, 1962, p. 109 et passim. This date is in conflict with the published date of Citadel House (LH IIIB:1 early) if one assumes that the structures within the western extension of the circuit were built afterwards, though that need not be the case; see: Wardle, BSA, 64 (1969) pp. 261-264. LH IIIC structures at the far eastern area were uncovered recently by Mylonas, Praktika, 1974, pp. 89-92.

146 P. Gercke and G. Hiesel, Tiryns, V, pp. 10-15, Beilage, 1, 7, pl. 15.

147 Stevens, Hesperia, 5 (1936) pp. 500-504, figs. 42, 44, 51, 52; Iakovides, MAA, pp. 82-97. Although I subscribe to the necessity of a Mycenaean terrace with

walls west and north of the Old Athena Temple (cf. Dinsmoor, AJA, 51 (1947) p. 122 and nt. 69), the arguments put forth by Stevens and followed by Iakovides do not convince me of the position of this terrace.

First, Stevens' argument (p. 501) is circular: He postulates the existence of a terrace wall "b" (see his fig. 1, p. 445) between the foundation wall "e" of the southern colonnade of the Old Athena Temple and the reconstructed line of the wall "d" alongside the northern flank of the Parthenon. He then states that it is "highly probable" that all three walls were parallel for which he can offer neither evidence nor reason. The existence of three parallel walls explains, he believed, why the reconstructed line of the wall "d", which was later than the OAT wall "e" and the postulated wall "b", was not parallel to the Parthenon, because "it was wall 'b' which dictated the direction of wall 'd'"(p. 501) even though wall "b" does not exist and there is no evidence for its existence.

Leaving this argument aside we turn to the remains that Stevens proposed to represent the foundation trench of the west retaining wall of the Mycenaean terrace. He believed that he identified a shallow foundation trench cut in the hard limestone bedrock that represented the line of the west Mycenaean terrace wall

(p. 500, fig. 51, our Fig. 45-46). In this he was followed by Iakovides, who adduced evidecne of a stairway leading up to the terrace (MMA, pp. 82-88, figs. 9, 10).

First we might observe that bedrock cuttings of this kind do not exist in Mycenaean architecture, even for circuit walls (above, pp. 35-37, 44). Thus, we begin to question this trench. As Iakovided observed, the line of the cutting is marred by the rectangular bedrock cutting of a Turkish cistern, Fig. 45. From the bed of the cistern we can follow the trench to the south, but it does not stop where the Panathenaic pathway rounded its corner, as Stevens believed (fig. 52, p. 501); instead it continues on to the south into the area of the court west of the Parthenon, Fig. 46 (so I. Beyer, AA, 92(1977) p. 50, fig. 5) and upon inspection is revealed as nothing more than a natural bedding line in the bedrock which, filled with calcite originally, has eroded.

[148] Tiryns, III, pp 5-6.

[149] Tiryns, III, pp. 167-171

[150] Tiryns, III, pp. 15-16, cf. Room XXXVIII, p. 19, pl. 16.

[151] Dörpfeld in Schliemann, Tiryns, p. 315.

[152] Tiryns, III, pp. 4-5, 7-8.

[153] Tiryns, III, pp. 5-6.

[154] Tiryns, III, pp. 161-166.

[155] Tiryns, III, p. 206.

[156] J. Threpsiades, Praktika, 1955, pp. 121-124; 1957, pp. 90-93; 1957, pp. 48-53; 1959, pp. 11-15; Deltion, 17 (1961-1962) pp. 132-137; Ergon, 1960, p. 47. It is generally assumed that the structures of the site were built during LH IIIB (Ergon, p. 47) and that the site as preserved represents a single period of occupation. Further references, below, nt. 251.

[157] The wall forming the southern foundation of the rooms along the central corridor is set slightly north of the southern wall of the trapezoidal unit. There are no apparent reasons for changing the wall unless the number of steps needed for the proposed stairway demanded that the corridor wall be moved back.

[158] De Ridder, BCH, 18 (1894), pl. XI, shows a jog in the exterior wall of the two chambers at "a" while Travlos, Ergon, 1960, p. 4 , shows the walls as abutted. Unfortunately my notes are incomplete at this point and I have no photograph of this juncture in the wall. I have, therefore, for the sake of argument and until I can return to the site to re-inspect the foundations, followed de Ridder's plan as being the most likely state of affairs, particularly because his plan records his field measurements of the walls.

[159] The beginning of the drop off to the southwest is marked by the sudden increase in the thickness of the

northwestern wall of room 65, Fig.P18.

[160] Pylos, I, p. 280.

[161] Curiously the upper foundation of this wall turns northwestward into the megaron itself, some 0.80 m. before meeting the southwestern face of the partition wall between rooms 64 and 65, Pylos, I, p. 256. This may represent an error in calculation of the planned line of the cross wall between rooms 65 and 64.

[162] Pylos, I, p. 255, fig. 203.

[163] The casemate system of building fortification walls in Anatolia, especially at Hittite sites appears similar to this method of compartmentalizing terraces, see: Naumann, pp. 251-258; the best comparison is the city wall of Alişar Hüyük (OIP, 29, figs. 20, 43, 51, pp. 4-11) where the wall was built against a steep drop in the bedrock and retaining walls formed box-like foundations that were set back ca. 0.30 m. from each other; it is possible to conceive of the foundations having been built in the shape of a Γ, each successive one abutted against the other - ΓΓΓ.

[164] BSA, 25, pls. XXIV, Fig. 98.

[165] BSA, 25, pp. 179-188; Mycenae, pp. 70, 75, 133-134.

[166] At the northwestern corner of the court the rising bedrock was cut to form the lower steps of the stairway there.

[167] BSA, 25, pp. 188-204.

[168] Wace, Mycenae, pp. 77-78; Steffen, Karten, pl. 2.

[169] Mylonas, Praktika, 1967, pp. 7-14; LCG, p. 14, fig. 2

[170] LCG, pp. 15-17.

[171] LCG, pp. 14-19; Mylonas' argument is not based solely on the terrace construction, but also on numerous details such as court, columns and corridors.

[172] Wace, BSA, 50 (1955), p. 196; Taylour, BSA, 50 (1955), pp. 207-209, 217-220.

[173] Tilton in Waldstein, Argive Heraeum, p. 110.

[174] Prosymna, p. 20.

H Drerup, Griechische Baukunst in geometrischer Zeit, *Archaeologia Homerica,* II.O, pp. 57-59.

[175] Tomlinson, Argos and the Argolid, pp. 233-236 for the relation of the temple to the terrace and the problems of dating the temple, cf. B. Bergquist, The Archaic Greek Temenos, OpAth, 13 (1967) pp. 19-22.

[176] H. Plommer, JHS, 97 (1977) p. 76.

[177] Hence an answer to Bergquist's question about the contemporaneity of terrace and temple (p. 19); Tilton observed " a layer of harder earth similar in texture and appearance to caked limestone was found in various places 0.30 m. above the pavement, while beneath this layer lay a stratum of black burnt earth matter and charcoal" (Argive Heraeum, p. 110); cf. P. Amandry, Hesperia, 21 (1952) pp. 223, 225.

[178] contra Tilton, Argive Heraeum, p. 110, " the pavement resembles the oldest paving in a courtyard at Tiryns"; it does not even resemble the slabs that extend into the vestibule area of the megaron at Gla, Fig. 194, which in any case are a functional part of the terrace wall.

IV. MASONRY

Rubble Masonry:

The most abundant building material of the mainland of Greece is rubble. For the Mycenaeans it constituted the structural core of most buildings. They used rubble for benches, altars, stairs, retaining walls, and house walls, and in the special form of cyclopean masonry, for circuit walls and corbelled vaults. Our principal concern in this section will be with rubble walls and socles. Special uses of rubble will be discussed separately; cyclopean masonry and corbelling form the subject of Chapter V.

Rubblework is built of unworked stone usually bonded together with mud mortar often mixed with local limey marl. The stone was collected from fields and river beds or pried away from loosely bedded outcrops. Because the stone was gathered from the locale of the building site, the type used varied from region to region and site to site. Sometimes, even rubble and shaped stone from earlier structures were re-employed. These variations in source affected building styles.

But the difference in material made little difference in finished appearance, for rubble walls, benches, and other rubblework were invariably plastered with [illegible] or lime plaster. In many of the fancier establishments, the plaster was painted. In a few instances a dado was placed along a wall base.

Walls:

Rubble walls were used for foundations and socles, for ground floor and sometimes for upper storey walls. They were built by selecting suitable blocks, often wedge or rectangular shaped, and constructing the two wall faces by setting the stones with a flat surface to the outside, Fig. 47. Often a gap remained between facing blocks and small stones and mortar filled it, Fig. 47. Headers, stretchers and large blocks were normally placed at intervals along the wall, especially in the lower courses. They bonded the faces, set the height of the coursing and acted as a simple control over wall width, Fig. 48.[179] They were especially employed at corners to reinforce and carry the coursing around them, Fig. 49.

At sites along the western and southern Peloponnesos, such as Teichos of the Dymaians, Pylos and Nichoria, naturally flat building slabs could be obtained by breaking them away from thinly bedded outcrops of limestone, sandstone and chert. Walls made of such slabs were easily built in roughly horizontal courses, Figs. 47, 50. In such cases mortar was mostly confined to the core of the wall. Examples of massive rubblework built of large slabs are the terrace wall of the Southwestern Building at Pylos, Fig. 41, the retaining wall Elleniko at Mouriatada, Fig. 68, and the tholos at Nichoria, Fig. 51.[180]

At sites like the Menelaion, Peristeria and Kandia, where the nearest abundant source of stone was from alluvium, walls were not so easily built. Rounded river stone was set in combination with rough field stone in a thick bed of mortar.[181] Gaps were filled by the insertion of smaller stones or by fitting in other large stones, Fig. 52. Some of these walls have so much mortar that they appear to be set in a matrix of mud, Fig. 52. Clearly, however, they were built in rough courses,[182] Fig. 53. One interesting example of the Period III (LH IIIB:2) building at the Menelaion shows that only every third row of blocks was coursed, Fig. 7. Another instance can be seen in the basement of the House of the Sphinxes, Fig. 54. This technique is commonly found in modern walls.

At sites located on hillsides or ridges of hard limestone, such as most sites in the Argolid, Attica, Thessaly and Phokis, rougher, multi-faceted blocks of hard limestone were available in abundance in fields

and on hillsides. This stone does not always lend it-
self to coursing. A common technique was to build the
wall of very irregular small stones (max. 0.20 x 0.30 m.,
ave. 0.20 x 0.15-0.20 m.) packing them close together in
/11 mud mortar, Fig. //10.[183] This practice is often found in /11
half-timbered walls because the transverse beams inter-
rupted the coursing, Fig. 55. Sometimes walls were
built of narrow, pointed stones set beside each other as
headers, Fig. 56. Normally regular sized stones (0.20 x
0.20 to 0.40 x 0.40 m.) were laid on mortar in rough
courses; smaller stones and wedges were used as chink-
ing, Fig. 69. This technique reached monumental pro-
portions in the terrace wall of the Larissa at Argos,
26/ Fig. 24, the retaining wall 9 inside the Lion Gate at 26
Mycenae, Fig. 18, and the western zig-zag terrace of the
palace at Mycenae, Fig. 27, all of which are considered
as cyclopean in style, below, pp.159-160.

Previous occupation provided at some sites an abundance of shaped and worked blocks as well as loose rubble for re-use. At Nichoria a difference in rubble size in the earliest (LH II) to the latest (LH IIIB and Dark Age) walls may be partly attributed to re-use of previous occupation debris. The earlier walls are constructed of larger, more carefully selected stones, Fig. 1; those dated to the LH IIIA phase are still well built, but include more irregular and broken stones, Figs. 57, 58.

The walls of the last period of Mycenaean occupation (LH IIIB) are constructed of yet more irregular stones; querns and grinders can be detected built into some of the walls, Fig. 59. At the Menelaion some of the Period II walls (LH IIIA:1) no doubt employed material from the Period I settlement, Fig. 52. At Mycenae querns, slabs of poros and schist and occasional lumps of conglomerate built into the walls of the House of the Sphinxes, the House of the Oil Merchant and the House of the Shields attest the presence of earlier structures in the area.

At Pylos all varieties of worked and unworked stone were re-used in the palace walls, but especially worked poros blocks. One example is the enclosure wall of courts 42 and 47, Fig. 60. The wall is built of rubble and re-used squared poros blocks set in mortar. Apparently its faces were plastered so that its patchwork appearance did not show.[184] Another example is the northeastern wall of the megaron behind the throne, where poros blocks are used. Lastly is the northwestern wall of the stairwell in room 15, but here the poros blocks may have been designed to support the stairway.[185]

Squared poros blocks are found rebuilt into walls of the Period II mansion at the Menelaion, Figs. 61, 62, in the rubble walls of the palace at Tiryns,[186] and in a few instances at Mycenae. Generally, re-used material was not employed as frequently as in the Minoan palaces which had a much longer period of occupation with many more phases of re-building than did the Mycenaean.[187]

Standing walls of pure rubble, i.e. withouth half-timbering or mudbrick, are rare in Mycenaean architecture. The highest pure rubble walls are preserved in basement rooms, such as those of the House of the Warrior Vase at Mycenae that extend over 3 m. up to the line of the wall ~~//////~~ plate/ of the first floor, Fig. 69. Other examples at Mycenae are the walls of the house above the Lion Gate excavated by Tsountas, the basement of the structure Delta northeast of the House of the Columns, Fig. 63, and the basement of the House of the Sphinxes, Fig. 54.[188] The corridor romms 18-22 at Pylos, Fig. P18, may have been entirely rubble in the first storey, for unlike the other walls of the palace, these held no timber/ ~~//////////~~.[189] A few other such sites as the Menelaion have probable rubble walls of one storey or more in height.[190] In general, however, the Mycenaeans preferred that walls above ground were built of mudbrick or pise or of rubble with half-timbering. Of course the deep foundation walls discussed in Chapter II were often 2 or more meters deep and built entirely of rubble.

Socles:

Rubble masonry, then, most commonly formed socles for mudbrick or half-timbered walls. The numerous humble one-storey buildings of mudbrick at village sites almost universally rested on simple stone socles of two to three courses that averaged 0.40 m. to 0.65 m. width,[191] Excellent examples of such are the socles of the transitional period Ia-b at the Menelaion (LH IIB to LH IIIA:1). Small potato size stones are set on the larger rubble blocks and provide a level purchase for the mudbrick coursing, Fig. 61. The north corridor wall of Citadel House at Mycenae also shows a stone socle with the mudbrick preserved on it. This socle extends three courses deep below floor level and is 0. 57 m. wide.

At Eutresis and Krisa and to a certain extent at Nichoria socles were in the main built of large stones from 0.50 m. to 0.80 m. in length and width with smaller ones set atop and between to level the socle, Fig. 48, Big buildings such as the two megara at Tiryns, Fig. 65, commonly rested on socles of large blocks. Smaller flat slabs and chinking stones levelled the surface for reception of the horizontal beams of the timbered rubble wall above. At Gla large irregular shaped slabs (0.30-0.50 m. H. and from 0.60m. to 1.10 m. in L. and W.) were set opposing each other in one or two courses to form the socle, Figs. 66, 67. Almost no mortar or filling stone was used to bond or level these naturally flat slabs. Similar socle construction is found in the remains of the so-called megaron at Mouriatada.[192]

The highest socles were built for half-timbered walls. Those of the basement walls of the House of the Columns are 1.10 m. to 1.40 m. high, Fig.200. They are the same as those of the South House, Fig. 201. Yet the half-timbered walls of the Palace of Nestor do not rest on a raised socle, but begin at floor level. When timbering was to be laid on the socle, the builders were careful to level the surface: the socle of the west wall of the small megaron at Tiryns has a thin course of flat slabs atop the larger rubble of the socle, Fig. 70, and the socle of the wall 25 along the Great Ramp at Mycenae was even built in stepped levels to receive the timbering, Fig.202.

Ashlar Masonry:

In terms of Mycenaean architecture ashlar masonry is made of cut poros blocks of stone with adjacent rectangular faces. The top and bottom surfaces of the blocks are parallel, but the sides are oblique and at most the back was only roughly worked, so that in plan these blocks often have a trapezoidal shape, Fig.204. As is often remarked, this was a simple method of cutting blocks to have close, straight joints, but in contrast to later Greek ashlar, this created only one face of coursed masonry. For the Mycenaeans, however, this was of no concern, for their ashlar masonry was not structural but decorative; it was employed only for facades. No walls were ever built solely of ashlar blocks, rather they were always backed by rubblework.

Mycenaean ashlar takes two forms, that constructed of cut blocks of poros limestone or sandstone and that constructed of worked conglomerate. The latter is a monumental style intimately related to cyclopean masonry and confined to Mycenae and its environs; it is discussed below after cyclopean masonry (pp. 228-236) although its development is linked to the more traditional ashlar masonry of poros and sandstone with which we are now concerned.

Ashlar masonry of any kind in the Mycenaean world first appeared in the cut poros blocks forming the facades of Mycenaean tholos tombs. The earliest examples are the tholos #1 of Peristeria, dated LH II; the tholoi of Aegisthus, Panagia, Kato Phournos, the Lion Tomb, and of the Argive Heraeum, all no later than LH IIA; and the tholos #1 at Tragana, no later than LH IIIA:1.[193] Later examples are found in the retaining and blocking walls of the Atreus and Klytemnestra tholoi dated to LH IIIB.[194]

During the early period of the use of poros ashlar for tomb facades and dromos walls, it was not used for buildings. The only early examples are eight cut poros blocks re-used in the Period I and II mansions at the Menelaion, Figs. 7, 61, 62, 71. These blocks must be earlier than the construction of the first mansion, which was destroyed at the end of LH IIB. They are, however, few in number and may not have belonged to a wall. Their square shape is unusual and it may be that they were employed as column bases, anta ends, altar bases or some other such function.

Elsewhere little evidence is preserved to show a wider geography for this early usage. At Tiryns ashlar blocks were apparently used in an early palatial phase, perhaps as early as the LH IIIA palace of the first period since many blocks are now found in the northeastern residential quarter walls where the first palace was evidently situated, above, pp. 83-89. A standing section of wall from the first palace at Thebes, Fig. 83, documents the use of ashlar facades in that palace which was destroyed sometime in LH IIIA:2 and according to Keramopoulos was built even as early as LH II.[195]

Later palaces at Pylos and at Mycenae preserve remains of ashlar facades. The remains at Mycenae, according to Wace, would date late in LH IIIA; those at Pylos in LH IIIB, although the scanty remains of the earlier palace(s) might have been earlier.[196]

Ashlar was laid on well prepared foundations. At Pylos slabbed footings supported a cut poros euthynteria on which the facade rested.[197] Similar foundations must exist at the other palaces though they are not visible.

The blocks were cut with smooth outer faces and tapered sides. The cutting was accomplished with small bronze chisels. The breadth of the chisel heads can sometimes be measured from the blocks: they average 0.007-0.012 m., Figs. 71, 84, though sometimes the chisel appears to have had a face as wide as 0.03 m.[198] At Thebes and at Pylos the blocks appear to have been finished and fine, rasp-like striations can be detected on many of the blocks, Fig. 83 85.

Dove-tail mortises are found in the back upper edge of some ashlar blocks. Thick tenons of wood (dim. in section from 0.11 x 0.11 m. to 0.10 x 0.18 m.) rested in these and anchored the blocks to the rubble core of the wall, Figs. 72, 73. At Mycenae the north wall of the court of the Megaron preserves three such mortised blocks; one of the blocks also has a dowel cutting to hold a horizontal beam and the other two mortises are in the next lower course, which did not hold a horizontal beam, Fig. 203. At Pylos none of the preserved blocks with dowel cuttings also has a mortise, although a number of the blocks from the walls (especially Court 47, Pylos, I, fig. 28) were mortised. Perhaps the mortises were used to secure the masonry of the upper courses, particularly those that were not secured by (and securing) a horizontal beam. The rubble backing of the ashlar facades was itself secured by a web of wooden beams.

The facades were always timbered. In every instance preserved are found traces of a horizontal beam that was secured to the first course of blocks above the floor. The beams were dowelled to the blocks. They were large: at Mycenae a beam in the megaron, Fig. 74, must have been about 0.39 m. by 0.26 m. in section; another in the court measured over 0.30 m. in height. At Pylos a beam impression on the southwestern wall of the main court 3 measures 0.23 m. deep by 0.45 m. high, Fig. 75.[199]

The placement of these beams was very exactly determined. All along the northeastern palace facade at Pylos can be distinguished setting lines.[200] They are consistently placed in from the edge of the blocks between 0.015 and 0.02 m. and behind at 0.165 and 0.17 m. respectively. Thereby they framed the timber whose thickness was 0.15 m., Figs. 76-78,204. Moreover, incised lines were used to mark the positions of dowel holes in the individual blocks. Dowels placed in the blocks secured the horizontal timbers. The distance of the dowels from the exterior setting line is the same for a series of three to four blocks and, then, it changes for another series, Figs. 79,204. The change is most easily explained as a change of beam: The setting and dowel placement lines were keyed to individual beams to insure accurate cutting of the corresponding dowel holes in the underside of the beam in order that the beam rested exactly within the setting line and a specified distance from the face of the block.[201] This explanation enables us to calculate beam lengths. As indicated in the plans, Figs. 204-205, they can have minimum lengths of 2.50 m. (#1), 3.04 m. (#2), 3.16 m. (#3), and 3.66 m. (#4).

Maximum lengths are respectively 2.80 m., 3.30 m., and 3.42 m. (the length of #4 is fixed).

These timbers at Pylos may have been fastened to transverse beams extending into the rubble core. Areas where such a joint is possible are the north and south corners of the north pier of the facade of room 40, Fig. 204, where a dove-tailed and a recessed cutting behind the pier block may indicate the position of transverse tie beams as shown in Fig. 204b. Three ties are possible in the orthostates of the southeastern wall of the court 3, Fig. 205.

As Blegen observed, often the transverse beams were set into the wedge between two blocks. Instances where this could be ascertained with a fair degree of certainty are indicated in Figs. 204-205. Because the system of timbering employed in these walls used stacked columns of beams, we should not imagine that the beams were always deliberately placed in these wedges, for in the next course of ashlar blocks they would fall in the middle, more or less, of the back face of the wall blocks.

At Mycenae the only preserved evidence for transverse beams tied to the horizontal is in the orthostate courses of the Grand Stairway and the west wall of the court of the megaron, Figs. 206, P17. Here some of the upper faces of the wall blocks are dressed back perpendicular to the wall face to receive cross beams. In this manner the ashlar facade was easily linked with the half-timbered construction of the rubble core. In conjunction with the irregular use of mortises and tenons the blocks were well secured to the wall core.

In the west wall of the megaron court at Mycenae, Tsountas found a horizontal beam slot above the first course of blocks, and in the top face of the blocks of the fifth course were dowel cuttings.[202] Thus the large beams were set in the face at 0.52 m. and at 2.53 m. above the floor. If the higher beam corresponded to another in the west wall, they would admirably provide a lintel for the door to the southwestern corridor and stairway.[203] Presumably this northern wall rose another 3.5 m. to provide a southern wall for the ground floor and for the second floor of the southern passageway behind it (Fig. P17 with the top. pres. elev. of the passageway at 74.21 m. compared to the top of the wall next to it at 74.56 m.).

The east wall that forms the interior wall of the Megaron porch also had two horizontal beams but was much grander in scale and pretentious in arrangement. Instead of four courses of slightly uneven blocks between the wooden beams as in the northern wall just described, the facade consisted of an alternation of masonry course and horizontal timber. The base of the wall is composed of five large ashlar blocks 0.60 m. high, Figs. 80, 207. Atop them rested a beam about 0.39 m. high. The overlying course of ashlar blocks is even higher than the lower one - 0.68 m. Atop this last preserved upper course (at 1.67 m. above the floor) rested yet another beam with a corresponding one on the inside wall face, Fig. 207. Presumably this arrangement continued with yet one more course of blocks crowned by a final timber which formed the door lintel at an estimated 2.56-2.66 m. above the floor, Fig. 208. The beam may have rested below the ceiling which would be about 3 m. or more above the floor.[204] The ends of the walls at the north and south were sheathed in timber; at the south end the door jamb was attached to the heavy horizontal beams, Fig. 208. The masonry in between formed panels, as shown in the reconstruction, but it is likely that the wall face was all stuccoed and frescoed as remains of a painted metope-triglyph dado were found running all along the base of the court and Megaron porch.[205] There exist, nonetheless, examples of exposed timbering in conjunction with wall frescoes, and if this were the case here, the panels could have borne painted scenes.[206]

The southwestern wall section of the Southwestern Building at Pylos rests on an irregular ground surface so that the ashlar coursing of the wall steps down-slope when necessary, Fig. 81. Dowel holes preserve the position of a horizontal beam that rested between the courses. Even one of the blocks that originally rested atop the beam is still preserved in situ (on the right in Fig. 81).[207] This masonry must have continued northwestwards and risen above the rubble ashlar-like coursing of the great terrace foundation wall as Blegen thought. It would have made a splendid contrast to the poros ashlar (cf. Fig. 39). The northeastern face of the Southwestern Building along rooms 64, 67, 68, and 72 had at least orthostates of poros ashlar, Fig. 209. The arrangement of blocks with dowels for horizontal timbers is the same here as it is in the main palace building, and the end block (at "a" in Fig. 209) even preserves a resting surface for the position of the interior horizontal beam that was set into the rubble face. As at Mycenae, the walls of the Southwestern Building were also bonded with mortise and tenon into the rubble core. A block, tumbled from its position and now resting with others at the southwestern corner of the site, preserves a large dove-tailed cutting 0.10 m. wide and 0.14 m. deep and set 0.27 m. from the face, Fig. 73. Contemporary or earlier than this building must go the wall section under the southern corner of the main palace (rooms 7, 57) that bears the block with the incised double ax sign.[208]

The most abundant remains of an ashlar wall at Pylos are the great tumble of blocks from the north-eastern wall of the palace. It is a misfortune that these blocks were never inspected for mortise cuttings and dowel holes and that they were not all measured. Now it is impossible to do so, but by poking around, the impression is gained that the original position of the blocks and disposition of the coursing could be learned by recording their fallen position, measuring their heights and inspecting them for dowel cuttings. As preserved three course heights are ascertainable - 0.39 m., 0.41 m., 0.43 m.[209] Whether or not these were the same for the length of a course, we cannot tell, although it is most likely. Elsewhere block height varied only slightly within a course because it was necessary to have a level base for the horizontal timbers.

One other thing we cannot now learn from these blocks is if there is any evidence for windows in the lower storey. Any attempts at guessing the arrangement of courses, intervening timbers and possible windows would be hazardous at this stage and I have refrained from doing so.[210]

Among the facade walls built in ashlar the height of blocks within a course and the height of the courses themselves do not vary greatly. Thus the course heights in the north wall of the porch of the megaron at Mycenae are 0.60 m. for the lower and 0.68 m. for the upper. Those of the adjacent west wall are from bottom to top: 0.52 m., then a beam ca. 0.35 m., 0.41 m., 0.43 m., 0.39 m., and 0.35 m. The small fragment of wall at Thebes has a similar order of courses: 0.58 m., then a beam no less than 0.17 m., 0.45 m., 0.36 m.

At Pylos the dimensions of the northeastern wall were recorded by Blegen (see chart next page).[211] The lowest course, i.e. the orthostates resting on the foundation slabs, varies in height between 0.435 m. to 0.515 m. As Blegen observed, the variation was necessary in order to adjust the blocks to the irregular height of the stone foundation bedding, Fig. 82.[212] On the average, however, the blocks stood between 0.34 m. and 0.43 m. above the pavement (where measured in course 42 and 47). This height corresponds well with the average course height in the wall. The second course is from 0.43 m. to 0.44 m. in height. Above that rested the first horizontal timber, perhaps as high as 0.30 m. Thereafter followed the ashlar coursing, the blocks of which are tumbled on the ground be-

Dimensions of blocks, beginning at corner of Corridor 26 and Room 32: Nos. 1-39 in lowest course meant to be visible, nos. 40-57 in upper course. (From Pylos, I, p. 49)

Block No.	L.	H.	Max. Th.
1.	0.98	0.49	0.415
2.	0.98	0.515	0.425
3.	1.03	0.51	0.455
4.	0.96	0.51	
5.	0.84	0.465	
6.	1.05	0.465	
7.	1.12	0.485	
8.	0.91	0.495	
9.	0.72	0.50	
10.	0.83	0.47	
11.	0.92	0.465	
12.	0.98	0.465	
13.	0.96	0.49	
14.	1.11	0.48	
15.	0.83	0.475	
16.	0.87	0.47	0.38
17.	0.47	0.46	0.60
18.	1.52	0.435	
19.	0.64	0.435	
20.	0.87	0.60	1.05
21.	0.84		0.49
22.	0.89		0.66
23.	0.49		0.55
24.	0.97		0.75
25.	0.95		1.00
26.	0.70	0.40	1.00
27.	1.00		0.55
28.	0.70		0.45
29.	0.84		0.31
30.	0.70		0.90
31.	0.72	0.43	0.49
32.	0.70	0.43	0.54
33.	0.78	0.43	0.43
34.	0.99	0.43	0.42
35.	0.81	0.43	0.55
36.	0.81	0.43	0.38
37.	0.37	0.43	0.42
38.	0.82		1.03
39.	0.92		0.54

Block No.	L.	H.	Max. Th.
40.	0.54	0.44	0.98
41.	1.08	0.44	0.98
42.	0.69	0.44	0.445
43.	0.86	0.44	0.51
44.	0.83	0.44	0.46
45.	0.47	0.44	1.15
46.	1.20	0.44	0.40
47.	0.77	0.44	0.54
48.	0.68	0.44	0.50
49.	1.03	0.44	0.42
50.	0.75	0.44	0.53
51.	0.97	0.44	0.47
52.	1.16	0.44	0.40
53.	1.07	0.44	0.35
54.	1.05	0.44	0.51
55.	1.25	0.44	0.45
56.	1.02	0.44	0.44
57.	1.03	0.44	0.51

fore the wall. They vary in height from 0.44 m. to 0.37 m. and, as Blegen observed, it is likely that the course height diminished in the upper courses.[213]

The relative consistency of course height and of diminishing course height in the palace walls just discussed is surely not due to chance. In this connection it is significant that a reconstruction of the megaron facade at Mycenae, Fig. 208, is rather easy to make given the preserved three courses and an approximate height of the second storey floor. In like manner it is tempting to attempt such a reconstruction at Pylos, but, as pointed out earlier, such an attempt is pointless until the preserved blocks can be lifted, studied and drawn.

In his discussion of Minoan ashlar work, Shaw concluded that the builders of the walls established the height of the walls before they were built.[214] He made this observation because he noted that at three different walls at Tylissos the measured distance from the topmost block to the top of the krepidoma was 1.66 m. $\pm$ 0.01 m. even though the number and height of courses varied greatly among the walls. On the basis of the measurements from the above-cited Mycenaean walls, we may also conclude that the height of a wall was predetermined before construction. Furthermore, the number of courses, of timbers, and the placement of windows was probably also predetermined if not subject to a canon. Therefore, the course heights are all nearly the same, even in the order of succession, at the different palace sites. The small variation can be accounted for by differences in the height of the timbers and by the occasional use of mortar.

This masonry has strong Minoan affinities. The occurrence of Linear A 'mason's marks' on some of the blocks is an immediate indication of Minoan influence. At Peristeria the upper left door jamb has an incised double ax and a branch sign. Two of the blocks on the retaining wall of the tholos of Atreus have lightly incised branch signs. One block of the earlier palace of Pylos has a double ax sign on its outer face.[215] Furthermore, the employment of heavy horizontal beams between courses of masonry is familiar from Crete, though more regularly and extensively used in Mycenaean architecture.[216] The details of square dowels, dove-tailed mortises and wedge-shaped blocks are all elements of the more ancient and refined craft of the Minoan mason.[217] Also, occasionally mortar was laid between courses of ashlar blocks. This is another recognizable Minoan technique that was used to facilitate the easy and accurate placement of the blocks. The instances of mortar in ashlar walls are limited and, perhaps, questionable. One is found in the wall section at Thebes, Figs. 83, 210, where the second and third courses of masonry are separated by a bed of yellowish mortar 0.05 m. thick. This seems to be unusually thick and is not in a good state of preservation, Fig. 83, but no other likely explanation offers itself. Another instance is found in the blocks of the retaining wall of the House of the Oil Merchant. The ashlar blocks appear to have been set in a thin, 0.005 - 0.010 m., bed of yellow clay mortar. This is observable between the courses and also between the vertical joints. One last possible example is the second course of the porch facade of the megaron at Mycenae, Fig. 207. The vertical joint between each block is separated by a gap of 0.05 m. that may have held mortar.[218]

In the ashlar work of the tholos tombs there is also slight evidence of mortar having been used. Only the facade blocks of the Tomb of Aegisthus actually preserved mortar between the joints, 0.005 - 0.010 m. thick. Other tombs such as that at the Argive Heraeum, the Kato Phournos tomb, the one at Berbati and #1 at Peristeria have stucco pointing over the joints which masks them, but it seems not improbable that some of them may also have been mortared.[219]

As Shaw demonstrated, the presence or absence of mortar and its thickness is not an indication of chronological value.[220] The importance of our few examples, then, lies in the addition of yet one more indication of the technical debt of the Mycenaean mason to his Minoan counterpart. Yet it was only a debt, for at Mycenae we can observe how the Mycenaean mason adopted ashlar masonry to his own needs, so that in spite of continuing technical similarities to Minoan masonry, the practice of building in ashlar became a wholly local one.

This is witnessed in the use of poros ashlar in the tholoi at Mycenae. Over a period of time poros ashlar was superseded by conglomerate. In the early tombs it was employed for stomion facades and in dromoi, but over the course of time was transferred, first to the dromoi alone, then to the retaining walls over the tumulus and to the blocking walls of the dromos. Although it was replaced in the interior of the tomb by conglomerate ashlar masonry, poros ashlar retained its importance in the late period (LH IIIB) by forming the retaining and blocking walls of the tholoi of Klytemnestra and Atreus.[221] Its employment in this context would have drawn attention to the tomb when the dromos was filled in, especially to the tumulus of earth over the tomb of Klytemnestra, Fig. 84.

Thus more than demonstrating the technical heritage of Mycenaean ashlar work, this discussion has sketched a technical and chronological framework for the development of a strictly Mycenaean masonry practice. The assumption of the techniques of ashlar masonry by the Mycenaeans really occurs with the construction of the palaces. Yet for the other half of this development, the rise of an ashlar style of conglomerate, we must turn our attention to the one wholly Mycenaean masonry style and architectural form, cyclopean masonry.

Notes

[179] Modern masons use string to set the line of a wall and plumbs to keep it vertical. When building a wall with a batter, boards are set against the wall face to set the angle. The wall is built in sections about 5 m. long, usually only for two or three courses before moving on. Large blocks are placed at intervals in the wall and the work tends to proceed from large block to large block.

[180] See below, p. 165 , nt. 235.

[181] At the Menelaion, as also at Nichoria, where the ridge of the site was capped by a bed of loosely consolidated conglomerate, excavated chunks of the conglomerate were often used in the base of the walls.

[182] No examples of 'pudding' walls are known to me like those at Mallia (Minoan Architecture, pp. 78-79, figs. 70-71) and, possibly, in the West House at Thera between rooms 1 and 2 (personal observation). These walls are constructed by pouring a mixture of mud, small stones and rubble into a form and letting it set. As Shaw demonstrated, these walls were constructed in units. Citadel House at Mycenae, however, has an excellent example of a pise wall constructed in much the same manner.

[183] The stones in Fig. 10 are now set in cement which has replaced the mortar.

[184] Pylos, I, pp. 181-184, figs. 28, 136.

[185] A similar stairwell at Thera in Xeste 3 has poros blocks beneath vertical beam slots in the walls, Excavations at Thera, VII, p. 23, pl. 32, b. It is not known to me if this feature is canonical in half-timbered construction at Thera or is a special support because of the stairway.

[186] Most of these blocks are found rebuilt into walls of the northeastern residential quarter; perhaps remnants of the first palace, below, pp.

[187] Minoan Architecture, p. 83.

[188] Building Delta: Mylonas, Praktika, 1967, pp. 14-19. The basement walls of the House of the Sphinxes are, also, partly half-timbered.

[189] Pylos, I, pp. 121-133.

[190] The Period I walls of the Menelaion are not preserved over 0.80 m. high; a few of them had timber which, it would seem to me, extended to all of the walls of the ground floor up to the ceiling. Dr. Catling, however, has told me in conversation that he believes the timbering was confined to a few walls.

[191] The study of these socles is not particularly rewarding, partly because they are only cursorily or

spottily described in publication, and mainly because these walls are not well preserved and do not lend themselves to description. Useful information that all excavators should record (or note as lacking) is wall width and height, height above ground and above floor, distance of interior span, type and average size of stone, an accurate assessment of the material of the superstructure (not "dissolved mudbrick" which could just as well be pise). The attempt at a descriptive catalogue of walls given by Westholm in the Asine publication (pp. 63-64, fig, 43) has the proper format for such a presentation, unfortunately the information is inconsistent and incomplete. The student of the architecture must be able to determine what walls were abutted to each other and what the foundation depths of the walls are relative to each other.

[192] Ergon, 1960, pp. 149-152.

[193] Peristeria: Marinatos, Praktika, 1960, pp. 206, 209; 1961, pp. 169-170; 1965, pp. 109-113; Dickinson, Origins, p. 62 and nt. 20, declares the LH I phase pottery as intrusive; Bridges, Tombs, p. 70.

Mycenae and Argive Heraeum: Wace, BSA, 25, pp. 316-338; Mycenae, pp. 16-18; Dickinson, Origins, pp. 62-63, believes the first two groups of Wace's seriation date no later than the phase LH IIA; Bridges, Tombs, pp. 7-11.

[194] Wace, BSA, 25, pp. 338-376; Mycenae, pp. 28, 27, 119-131; BSA, 50 (1955) pp. 194-197, 209-236; see also, E. French, BSA, 64 (1969) pp. 71-93.

[195] Keramopoullos, ArchEph, 1909, col. 106; Ålin, Fundstätten, pp. 118-119; Furumark, CMP, p. 52: these three presented the evidence for a destruction date of the first palace in LH IIIA:1; Raison, Les vases à inscriptions peintes del'âge mycénien et leur contexte archéologique, Incunabula Graecae, XIX (1968) pp. 46-53, dated the destruction to LH IIIB; Symeonoglou, Kadmeia, I, SIMA, 35 (1969) pp. 22, 72-76, presented evidence of two palaces with the first destroyed in LH IIIA:2 and summarizes all arguments and evidence to date; see also the review of Symeonoglou by J. Rutter, AJA, 78 (1974) pp. 88-89.

[196] Pylos, I, pp. 44, 226-227, figs. 13, 15, 424.

[197] The euthynteria blocks at Pylos were stepped out 0.02 m. from the ashlar wall block in the northeastern exterior palace wall, Fig. 204. Elsewhere in the palace they supported a superstructure of half-timbered rubble.

[198] Cf. J. Deshayes, Les outils de bronze, de l'Indus au Danube (Paris: 1960), nos. 718, 872, 874, 925, 956, pp. 88-89, 93, 96, 98; Shaw, Minoan Architecture, pp. 70-75, figs. 47-48, 64-65; H. Catling, Cypriot Bronzework

in the Mycenaean World (Oxford: 1954), p. 106, pl. 11, i.

199 Blegen, Pylos, I, p. 63, saw a different arrangement: "Impressed on the clay of the rubble backing above the dado course appears the graining of wood in two horizontal strips, the lower 0.20 m. high, the upper 0.10 m., with an intervening space 0.15 m. wide that shows no imprint of the wood. Consequently it looks as if horizontal beams alternating with bands of other material, presumably stone, decorated the face of the wal." I could find no trace of where the timber graining stopped and, therefore, concluded that it did not, but was continuous making a heavy beam here just as that in the court at Mycenae.

200 These were not reported in any of the excavation reports.

201 Blegen suspected that the interval between the dowel holes might indicate the beam length, Pylos, I, p. 48.

202 Wace, BSA, 25, p. 190; Mycenae, p. 72.

203 Wace's reconstruction in Mycenae, fig, 30, much exaggerated the height of the wall and doorway: the wall is restored a total of 10 m. from the court floor, the doorway lintel rests almost 3.5 m. from the floor.

204 A probable second floor level is established by the in situ threshold at the east end of corridor 35 (BSA, 25, p. 207, fig. 38) at elev. 75.50 m. -about 3.50 m. above the court floor. The floor would be be-

tween 0.50 m. and 0.30 m. thick. Such floor thicknesses are known from Thera, see J. Shaw, AJA, 81 (1977) pp. 229-233.

[205] BSA, 25, pp. 235-237, fig. 46, pl. 35a.

[206] G. Rodenwaldt, Tiryns, II, p. 167, figs. 71-72, discusses an example in the Queen's Megaron at Tiyrns where the upper surface of the painted dado preserved an edge that corresponded to the bottom of a squared horizontal timber; cf. Lang, Pylos, II, pp. 17-20 (esp. Hall 64).

[207] Pylos, I, pp. 279-280, fig. 216.

[208] Pylos, I, pp. 44, 94.

[209] Blegen, Pylos, I, p. 50, said that the height of these blocks varied between 0.37 m. and 0.44 m.

[210] Blegen, Pylos, I, p. 50, suggested eight courses of masonry for a height of 3.20 m. and two intervening timbers for a total wall height of 3.70 m.; this arrangement, however, leaves no place for windows in the facade.

[211] Pylos, I, pp. 48-49.

[212] Pylos, I, p. 50

[213] Pylos, I, p. 50

[214] Minoan Architecture, pp. 94-95.

[215] Peristeria: Marinatos, Praktika, 1960, pl. 159a; Atreus tholos: ILN, 23 Dec. 1939, col. 942; Pylos: Pylos, I, pp. 44, 94; Minoan Architecture, pp. 109-111.

[216] Shaw, Minoan Architecture, p. 104, points out that

the practice was more frequent in Mycenaean architecture.

[217] Minoan Architecture, pp. 157-185.

[218] It may also have held a vertical timber.

[219] Bridges, Tombs, pp. 10, 19, 21, 70.

[220] Minoan Architecture, pp. 98-99.

[221] Taylour, BSA, 50 (1955) pp. 209-236.

V. CYCLOPEAN MASONRY AND CIRCUIT WALLS

Introduction:

Whatever the Mycenaeans thought about their great circuit walls, they did not think they had been built by the Cyclopes. Even Homer never connected the race of Cyclopes in the Odyssey with the walling of the Mycenaean cities. Yet the walls of Tiryns were still famous in his time, and the city was given the epithet πόλις τειχιόεσσα (Il. II, 559).

The tradition of assigning the construction of the walls of Tiryns, and also those of Argos and Mycenae, to men known as the Cyclopes is later, perhaps beginning in the fifth century B.C. with Bacchylides, who mentions them as having built the walls of Tiryns.[222] Euripides often referred to the works of the Cyclopes: Mycenae was κυκλωπία πόλις (Herakles Mainomenos, 15), Argos was τείχη κυκλωπία (Iphig. Aulis, 534), and the Argolid was known as γᾶ κυκλωπία (Orestes, 965).

Strabo, VIII, 373, related how when Proitos came to Tiryns it was walled by the Cyclopes whom he had summoned from Lycia (ἥκειν δὲ μεταπέμπτους ἐκ Λυκίας) where he had resided in exile. Pausanias knew that the walls of Tiryns had been built by the Cyclopes (II, 16,6), and his description stands as the first definition of Cyclopean masonry:

> ...the wall, which is a work of the Cyclopes, and is made of unwrought stones, each so large that a pair of mules could not even stir the smallest of them. In ancient times small stones have been fitted in so as to bind together the large stones. (II, 25, 8; trans. Frazer)

Pausanias' description has stood the test of time, for modern definitions are essentially the same.[223] But the thrust of modern usage has been to call Cyclopean the massive masonry of almost every Late Helladic site on the Greek mainland.[224] Although it is a descriptive sobriquet, we must attempt to discover how valid is this broad geographic and stylistic application of the term in relation to its original restriction to only the major sites of the Argolid.

This chapter, therefore, is a study of the original Cyclopean masonry and its characteristics. We will be concerned with discovering its origins and tracing its development within the broad geography of the mainland Mycenaean sites and with an analysis of its final appearance and development in the Argolid. In order to talk about Cyclopean masonry as an element of wall construction, we will have to place a good deal of emphasis on its appearance in fortification walls.[225]

Cyclopean masonry is massive rubble masonry.[226] The stones employed most frequently are the hard blue to white and pink limestones that make the bulk of the rock formation of the mainland, most notably in the mountains and outcrops of the Argolid, Attica, Boeotia, Phokis, Thessaly and Achaia. Sometimes conglomerate is found in the walls. These stones are always available in the outcrops in the immediate vicinity of a site and were easily extracted from the tilted, parallel beds, Figs. 86 (Midea), 87 (Gla). Quarrying and transport, therefore, were not exceptionally difficult tasks and little trace of them is left today.[227]

The blocks were not shaped, even for special work such as corbelling (below, pp. 220-228). At corners and entranceways, and even sometimes in the wall face, the surfaces were hammered more or less smooth, Fig. 88 (Tiryns). In rare instances the upper surface of a block was worked to flatten it in order to better receive the block of the next course, Fig. 89 (Gla). Block size varied only in extremes from site to site. In the main at the larger, more important citadels the builders were prone to utilize immense blocks for effect. The usual block size at all sites, however, ranged between 0.70 m. and 1.20-1.50 m. in length and between 0.60 m. and 1.00 m. in height (average course height from 0.60 m. to 0.80 m.). Most blocks are 0.80-1.00 m. thick; headers, however, often exceed 1.00 m. Blocks employed as upright slabs average 0.40 m. to 0.60 m. thickness. Much cyclopean masonry is dry stone technique. Small slabs or rubble stones were set to chink interstices and adjust the level of the top and bottom of the blocks, Fig. 90 (Gla). More commonly, however, the blocks were set on a bed of mortar made from mud and the local limey clay called <u>aspróchoma</u>, <u>aspropouliá</u> and <u>aspriá</u>, which is found throughout Greece. Small stone wedges and slabs were also combined with mortar, Fig. 91 (Tiryns). These practices, aimed specifically at keeping an elementary level of coursing, have already been noticed and justify our characterization of cyclopean as rubblework.

Cyclopean walls often have visible, even pronounced courses, Fig. 19 (Mycenae). By carefully selecting blocks with flattish and near parallel top and bottom surfaces, the builders created formally coursed walls, Figs. 19, 92 (Mycenae). Near-isodomic masonry appears at sites where the limestone is available in parallel, equally thick beds. The finest instances are found at Gla in the terrace foundations of the palace, Figs. 28, 33, 35. These walls must be included within the category of cyclopean because, though the blocks are ashlar-like, they are built primarily of rubble and they represent a formal extension of normal cyclopean masonry. Aside from the palace terrace of Gla, excellent examples are found in the flanking walls of the Great Gate at Tiryns (below, pp. 201-203, Fig. 94) and the north cyclopean wall at Mycenae, Fig. 92. The conglomerate ashlar work of the Postern and Lion Gates of Mycenae, although not strictly massive rubble masonry, is the culmination of this formalizing tendency in cyclopean masonry.[228]

In its latest stage cyclopean masonry is strongly influenced by the desire to build monumental structures. Its appearance in the formation of circuit walls at this time is often deliberately monumental, as noted in the tendency to formalize coursing and to build the more formal and monumental work in prominent locations: where roads lead up to or pass alongside walls, in entranceways and in principal buildings. At Mycenae this tendency is pronounced around the Lion and Postern Gates and in the terrace of the palace, Fig. 27, and the Great Ramp, Fig. 19; at Tiryns at the Great Ramp, Fig. 93, and the flanking walls of the main gate, Fig. 94; at Gla around all the gateways and the terrace of the palace, Fig. 28. This monumental aspect of the cyclopean style is also manifested in such diverse constructions as the bridges at Aghios Georgios, Fig. 95, and Kazarma, Fig. 219, the wall or causeway at the Isthmus and the terrace of the Atreus tholos, Fig. 96. But these monuments represent the culmination of a long development of defensive architecture and cyclopean masonry. The beginnings were much more humble.

Origins:

The origins of cyclopean masonry are to be sought in the early defensive architecture of the Middle and beginning Late Helladic periods. The sites of these periods are scattered across the mainland. The information they provide only gives a sketch of the actual development. Two stages in the rise of cyclopean masonry and fortification architecture can be generally discerned. The first appears to correspond to the Middle Helladic and Late Helladic I and II periods. It is principally represented by the sites of Messenia.[229] The second stage corresponds generally to Late Helladic II and IIIA and is more widespread, though still imperfectly represented. The most typical examples of this period are Teichos of the Dymaians, Krisa and Midea.

Iakovides has recently studied this evidence from the point of view of the development of defensive architecture.[230] Certain features that he discusses are characteristic of this early architecture: The circuit wall was placed along the crest of the citadel, the slopes of which often formed a kind of glacis. The wall curved in plan and usually had no straight sections or offsets or bastions. The outer face of the wall was often built of large unworked cyclopean blocks. In the second stage at least the exterior face often had a batter. Notable details of construction are the absence of mortar in the cyclopean face and the composition of the core - loose rubble and some earth. Of course not all early fortified citadels meet these requirements, especially the earliest ones.

First and earliest are the sites of Messenia. The earliest circuit wall is that of Malthi. It was built in the Middle Helladic period and remodelled somewhat in Mycenaean times.[231] The course of the wall describes an ellipse around the edge of the steep-sloped acropolis, The wall curves and its course is not interrupted by angles, offsets or bastions. It varies in thickness between 1.60 m. and 3.55 m. Two faces retain a rubble core. Typically, large slabs of unworked limestone, sometimes in excess of 1 m. long, were set without mortar to form the exterior face.

Five gates were identified by the excavators. They are not preserved adequately for study today. One cannot discern whether or not the masonry was strengthened by the placement of larger, more regular stones around them. In plan almost every gate is created by a gap in the wall and approached perpendicularly to it, but each has a different interior arrangement of flanking walls and buildings which protected the entry, Fig. P6 .[232]

A similar circuit wall is found at Peristeria a few kilometers down the river. The wall has not been fully excavated; it has been cleared for a length of over 30m. along the southwestern side of the site, Fig. P7. It continues to the east and curves to the north enclosing the southern part of the site that was exposed to the upland plateau. The northern half of the site is a promontory high above the river.

The wall is 2.80 m. thick. A gate is preserved at the southwestern corner where the two preserved sections of wall meet at an angle. The southern section is solid rubble with a face of slabs of sandstone and limestone. A small room is built against the interior of this section. The northern section of wall is solid at the gate but beyond is formed by two parallel walls. It is likely that the wall is earlier than the tholos tombs of the site dated LH I/II, since it encloses them.[233]

One remaining early fortified site in Messenia is Pylos. At the northeastern end of the site Blegen found remains of a gateway dated to LH I approached by a stone path and entered by a broad flight of stairs, Fig. 211. The stairs are flanked by walls that run their length, some 5 m. The gate is also flanked by walls, a long stretch to the northwest, Fig. 211. This section of wall is built of flattish stones set into a cutting in the virgin soil of the hillside. The wall has a minimum thickness of 1.40 m. at this point. Other traces of walling are found along the northwestern slope, though they were scant and elsewhere on the site, elusive.[234]

These initial attempts produced rudimentary but effective fortifications. Plan and gateways have a recognizable form. Wall construction is simple, but uniform. One generally unifying aspect of these walls is the employment of flattish slabs of sandstone and limestone. This is owing to the natural occurrence of beds of such stone all along the coast of the Peloponnese. These stones were used not just in these early circuit walls, but also in tholos tomb construction as at Nichoria, Fig. 51, at Pylos and elsewhere in the area.[235] Even in later times it was still used for strong heavy walls such as the retaining wall of the Southwestern Building at Pylos, Fig. 41, and the retaining wall Elleniko at Mouriatada, Fig. 68.

Although this masonry is the only expression of massive rubblework in this region owing to the availability of flat slabs of stone, it does not convey the impression of cyclopean masonry. And it is of interest that neither a cyclopean style nor a developed defensive architecture ever developed in Messenia. What we have just looked at brings us no further down in date than LH II. Thereafter, the sites, especially Pylos, remained unfortified.

Teichos of the Dymaians:

Further north, however, the site of Teichos of the Dymaians exemplifies the next stage of development of defensive architecture, and with it we see a style of masonry that is distinctly cyclopean in style and construction.

Excavations in the 1960's uncovered remains of the citadel. Of especial emportance was the discovery that the circuit wall was built early in the Mycenaean period.[236] The fortress lies on the southern end of a ridge that is part of the northwestern promontory of Achaia.[237] The walls begin at the southern end of the ridge and swing northwards a few hundred meters before turning west to end at the steep western cliff which is undefended, Fig. P8. Along the eastern side the ground falls steeply away before the wall and is not easily accessible. At the south, in the middle and at the north are gates. They are simple openings in the wall and the only element of sophistication is the bastion around the southern one. The northern gate has a rampway leading to it, probably a road leads out to the north and swings eastwards into the plain below.

The wall has a few straight sections in its southern half, but basically curves along the crest of the ridge, Fig. P8. Wall thickness varies between 4.50 m. and 5.00 + m. It is built of slabs of limestone pried away from the thick bedding of the limestone ridge. This stone was used to create two forms of masonry: a massive cyclopean form for the outer face of the circuit and a neater mortared masonry of the interior face (cf. Figs. 98, 99).

The outer face of the wall was apparently founded on bedrock while the inner face was set in a trench cut through Early Helladic habitation. The exterior face may have rested much lower than the interior, and has a pronounced batter, Fig. 100.

The masonry style of the exterior face has been called by Iakovides, "urkyklopisch", an apt term in view of the date and form of the wall.[238] Massive slabs are intermingled with large irregular limestone blocks 1.50 m. long and more and up to 1.00 m. high. These cyclopean blocks interrupt the natural coursing of the slabs and create gaps that are filled by chinking stones, Figs. 98, 101. Where the core is exposed it appears to be constituted of mostly a loose packing of small rubble stones and earth, Fig. 102. There is no evidence of mortar having been used in the core or the exterior face.

At the gate the masonry is better coursed and large slabs of regular shape form the interior and exterior corners, Figs. 103, 104. Even stackwork appears between some of the blocks of the gate, Figs. 105, and demonstrates the careful attention given to the wall at this point. From the gate to the interior face the masonry becomes more regular; smaller slabs of limestone are roughly coursed with large ones, and the blocks are neatly bedded in mortar, Fig. 99.

More than the earlier sites of Messenia, this circuit wall fits the characteristics of early circuits and early cyclopean masonry mentioned above, p. 162. Most remarkable is the construction of the wall: the increased wall thickness, the introduction of massive irregular rubble blocks, the battered face and the attention to the construction of the gates.

Krisa:

Two major sites that belong in this stage of development are Krisa and Midea. The fortifications at these sites are not dated. That at Krisa was considered by the excavators to be Mycenaean.[239] An early Mycenaean date can be argued on the basis of the type of site, the type of gate and the wall construction. Corroborative evidence is provided by the presence of early Mycenaean house remains on the acropolis.[240]

Like Teichos, and, as we shall see, like Midea, the citadel is situated on a high, relatively inaccessible spur of rock, the sides of which fall shear into the valley of the Pleistos below, Fig. P9. Krisa has by far the longest wall of this group of early citadels, ca. 1500 m. The western stretch of wall runs straight along the brow of the ridge and then dips slightly at the head of a ravine and, bending northwards, proceeds uphill to join the northern stretch alongside an ancient roadway, Fig. P9.[241] Midway along this eastern half of the wall is a gate. It is a simple opening in the wall as we have seen before. No other gate was found in the wall.

The wall varies in width from 4.50 m. to 6.50 m. It was formed by dumping loose fill of small rubble stone into a shell built of irregular uncoursed cyclopean blocks, Figs. 106, 107. They have a natural wedge shape. The blocks of the wall faces were chinked with smaller stones; no mortar was used.

As noted above, the northern half of the circuit follows the ancient roadway and breaks in mid course for the gate. The stretches of wall on either side of the gate were built of extremely large limestone slabs propped upright to expose their maximum dimensions (Fig. 108: blocks 2.40 m. L. x 1.30 m. H.; 2.20 m. L. x 1.20 m. H.; Fig. 109 shows a view from above: the slabs are 0.60 m. to 0.75 m. Th.). Behind these slabs was dumped the rubble core.

This northern stretch of wall is all facade. Flanking the gate it presented an impressive face. This is the first encounter with the monumentalizing tendency of cyclopean work discussed above, p. 161. At Midea, however, we shall see the first appearance of a developed style of cyclopean masonry. It will provide a good transition to the final development of the style in the citadels of the thirteenth century B.C.

Midea:

The site of Midea near Dendra at the northeastern end of the Argolid plain is the best example of this second stage of development. Iakovides has tentatively argued for a fourteenth century date for the citadel pointing out its similarity to the earliest phase of the walls at Mycenae (below, pp. 175-178) and noting the evidence provided by the tholos with a date of LH IIIA:1. The date of the earlier tombs and the relative lack of tombs later than LH IIIA tend to corroborate this view.[242]

As at Krisa the type of site, form of the wall and gate, and construction of the wall of Midea fit well into the second stage of development of cyclopean masonry and fortifications, Fig. P10. The circuit walls of the site rest rakishly upon the acropolis and enclose its uppermost slope along the northeastern, northwestern and southwestern sides. Most of the southern side extending to the west is a cliff and is undefended. The total extent of the wall, some 420 m., is not great, but the citadel may not have provided more than a large defensive keep for the local nobility. As preserved today only the eastern and western extremities of the wall are studiable: the northwestern stretch has been covered by soil and refaced to form a terrace for farming.

The course of the wall is determined by the contours of the rock. Along the north side it runs on top of a ridge up-slope; before it the rock falls steeply away forming a natural glacis. Along the northwestern and western sides the wall curves along the line of the contour of the lower citadel. Where the northern and northwestern sections meet a possible bastion was formed, Fig. **P10**.[243] Along the south the wall again runs up-slope along a ridge.

The northern wall has a slight batter, Fig. 110. It is impossible to detect this batter in other wall sections because so much of the outer face has crumbled away. The interior face is traceable in most areas, but often it is covered by alluvium. Certainly the exterior of the wall is founded on bedrock, apparently also the interior, though inside the northern stretch the excavators found evidence that a stone fill had been placed against the interior face of the wall, above, pp. 33-35. It may have been a working platform and later formed a terrace for a passageway or structures along the interior of the wall.

Midway along the northern wall opens a simple gate, Fig. P10. The gate is 2 m. wide at the outside and 2.30 m. at the inside. It is built of regular sized blocks with flattish top and bottom surfaces, Fig. 110. According to the excavator a wall running out from the southern inside corner of the gate may have formed part of a tower within the gate.[244] Another gate is found at the south. A bastion projects from the wall flanking the entrance, Fig. P10. It is abutted to the wall, and the masonry consists of larger blocks than are normally employed in the circuit, Fig. 111.[245]

The walls are 6.75 m. thick at the northern gate and vary from 6.30 m. to 6.50 m. elsewhere. They are built of hard blue limestone blocks which were easily obtained from the outcrop upon which the citadel rests, Fig. 86. The rock breaks naturally into oblong tapered polyhedrons of moderate size (L. 1.00 m, H. 0.80 m., Th. 0.80-1.00 m. ave.). They were set into the wall like wedges; the interstices were chinked with smaller stones (0.20 m. x 0.20 m. and larger, Fig. 112). Mortar appears not to have been used. The lower portion of the wall was made with larger blocks. The core of the wall is exposed in a few places. It consists of small rubble blocks and loose reddish earth, Fig. 113.

There is little sense of coursing in the wall. This is owing partly to the highly irregular shapes and sizes of the blocks and partly to the extreme slope of the land. The walls were constructed in crude courses which run into the slope. One section of the wall shows two different masonry faces that meet on a staggered vertical line (about where the scale is located in Fig. 112). The section to the right in the photograph is built of larger blocks with curved edges that did not require much chinking; that to the left is more typical of the angular, heavily chinked masonry of the walls. The line of meeting between these two sections probably represents a crude joint made when two sections under simultaneous construction were joined together. There is, however, no other indication- such as a running vertical joint or an offset, that the wall was built in separate sections. This is merely a reasonable presumption based on the difference in appearance of the wall face at this point and the knowledge that the builders did not select blocks with enough care to continue one series of coursing over a very long distance, hence the wall was built up in vertical units. Furthermore, the core of the wall shows several rows of heavy blocks running from face to face at intermittent intervals (unfortunately the upper surface of the wall at the point of the two wall sections in Fig. 112 is not visible). They appear to retain the mixture of predominantly rubble and sandy reddish earth that comprises the core, Fig. 113. The impression received is of a series of loosely sealed compartments, but this cannot be confirmed without dismantling part of the wall. Fortunately corroborative evidence for this technique exists in the more developed circuit walls of Tiryns and Gla.

In general the circuit wall of Midea is more complicated in design and construction than those of Teichos and Krisa. And the masonry in terms of block size and shape is much more cyclopean in flavor. Yet for all these differences the position of the wall on the acropolis, the simplicity of the gate design and the loose rubble core held by the shell of the cyclopean faces place the circuit of Midea alongside the others of this second stage.

Before passing on to consider the final stages in the development of cyclopean masonry and the construction of Mycenaean fortifications, we should take note of the early fortification remains at Mycenae and at Tiryns. They are both of interest because of their relation in certain respects to the circuit wall of Midea and to other early circuits just discussed. They, therefore, make the transition from the early stages to the final floruit of the thirteenth century citadels. Detailed discussion of these early remains will be given later in connection with our review of these sites.

Mycenae:

Iakovides has compared the masonry at Midea to that of the north cyclopean wall at Mycenae and remarked upon the early date of the walls at Mycenae, LH IIIA:2.[246] Without at this point discussing the date, we may observe that on the contrary the masonry of this period at Mycenae is more developed and more formal than that of Midea. Yet at the same time the plan and position of the wall at Mycenae bear comparison to that at Midea, Fig. P13.

The masonry at Midea we have observed to be roughly coursed if at all, and it retains a core of small rubble blocks. At Mycenae the north wall gives a much different impression: the cyclopean blocks were carefully selected and set in fairly regular courses, Fig. 92. Moreover, the interstices between these courses are filled with chinking stones set for the first time in mortar. Whether or not the appearance of well courses and mortared masonry is to be taken as a sign of later construction, however, remains to be demonstrated. The construction of the core also is different. Instead of the usual loose fill of smaller stones, larger blocks of rubble were set behind the cyclopean faces and roughly carry the coursing through the wall, Fig. 114. But certain other features of the north circuit wall are very similar to those of Midea.

First the wall is built in a continuous curving course that follows the upper contour of the acropolis before which the rock drops steeply away forming, as we have seen before, a natural <u>glacis</u>. This is especially evident where the wall has been built atop a steeply inclined outcrop of rock as is common along the northern side, Fig. 115. Furthermore, Mylonas has suggested that the southern continuation of the original circuit kept to this contour all the way around to the Chaos ravine. The evidence for his suggestion is twofold: 1) It is based on his discovery of an earlier ramp beneath the great ramp that runs from south to north up the northeastern side of the court within the Lion Gate, and 2) his belief that the remains of a cyclopean retaining wall (called TW) that extends eastwards along the contour of the north circuit wall to the Chaos ravine constitutes the vestiges of the original circuit in this area.[247]

One other observation is a detail of construction already discussed in Chapter II, pp. 32-35. This is the heavy fill of large rubble blocks that Mylonas discovered along the northeastern end of the original circuit; only above the top of this fill was the interior face defined as a smooth plane.[248] This is the clearest excavated evidence of a technique that appears to have been common during the early stages of fortification construction. Aside from the example at Mycenae is that of Midea already observed, above, p. 33, and yet another instance is found south of the first gate at Tiryns.[249] Müller reported that in the course of excavating behind the wall the stones of the interior face became more irregular and merged with a stone fill that was contemporary with the circuit wall; in the lowest parts of the fill were well laid large stones.

The occupation debris in the fill dated to the early Mycenaean period.

Later circuit walls with a stone fill behind the interior face are known, but the arrangement is different: Then the wall was actually based on a bedding of small rubble stones, often packed in clay (_aspróchoma_), above, pp. 37-39. In the earlier instances it appears that the stone fill was composed of larger rubble blocks (see _AE_, 1962, fig. 8) which were added at the time of construction. Fortification walls of the thirteenth century were in fact usually founded directly on bedrock and did not often retain a consciously placed fill of stones, above, pp. 37-39.

Tiryns:

The original Mycenaean citadel of Tiryns has been dated to LH IIIA:1 and consisted of a combination of defensive terraces at the north and a free-standing circuit wall at the south.[250]

Like the first enceinte at Mycenae, this one at Tiryns can be compared to those of the earlier stages yet has new features not seen before. In plan the first citadel bespeaks the early stages of defensive architecture: a small circuit rings the higher ground; a simple axial gate lies at the east protected by a small bastion at the south and later protected by an extension of the gateway to the interior of the wall, Fig. P12. In the Middle and Upper Citadels of Tiryns the concept of a defensive terrace was best exploited, and it was only at the south where the outcrop sloped away that a true wall was required. But unlike the earlier fortification systems, this one at Tiryns was built of straight wall sections, and both terrace and wall have a number of offsets which were in some cases defensive, in others constructional. Also, as at Mycenae, the cyclopean masonry was laid on beds of mortar and the blocks were selected with a view to coursing. This is especially true of the wall sections on either side of the gate where the coursing is formal. It reminds us of the monumental thrust of the wall sections flanking the gate at Krisa, Fig. 129.

With this new attention to well coursed masonry and to the construction of walls in sections offset one from the other, we arrive at the final stage of Mycenaean defensive architecture and the culmination of the cyclopean masonry style. To gain a view of some of the basic details of the construction of these walls, we should turn north to the citadel of Gla in the Kopaïs,

The Culmination in the Thirteenth Century:

Gla:

The cyclopean fortifications of Gla are the largest of the citadels on the mainland, about 3 kilometers in length, Fig. P11. They completely encompass the low-lying island of rock in the middle of the Kopaïc basin. The walls are pierced by four gates, one of which is double (to the southeast), one of which is approached by a ramp and flanked by bastions (the southern, main gate).[251] All of these gates are essentially only developed forms of the axial openings in the walls that we have witnessed in the earlier citadels. And even in their advanced development, these gates at Gla show their heritage in the addition of flanking walls and guard rooms inside the wall rather than outside, where only rudimentary bastions appear. Only the southern gate displays the kind of flanking approach that was favored in the latest approaches to the citadels of Mycenae and ~~Gla.~~ /Tiryns

The walls run so exactly along the brow of the rock that their course describes the contour of the outcrop. Only at the steepest northern side is the wall set back from the brow, sometimes as much as 5 m. Here space was necessary to provide a working area for construction. The wall rests directly on the bedrock.

The wall is built of rough unworked limestone blocks of wedge, slab, and irregular shape. They vary in size from 0.50 m. to 1.00 m. in length to 0.40 m. to 0.60 m. in height. Many are massive cubes or blunt wedges with dimensions of 1.00 m. x 1.20 m. x 1.40 m. or more. Others are long slabs of 1.50 m. to 2.00 m. in length with large flat, though rarely parallel, top and bottom surfaces. Usually these were set as stretchers, but sometimes as headers in the wall. Wherever they are employed fewer small stones were needed to chink the interstices or adjust one block to another, Figs. 90, 116. Elsewhere, however, the presence of many irregular blocks required more chinking, but in general it is seen less at Gla than the other sites we have examined.

The blocks were laid in rough courses that continued only as far as an offset corner, Figs. 90, 116. These corners were sometimes constructed of heavy rectangular blocks that resemble the offset corners of the palace terrace (above, pp. 92-97, Fig. 35). These offsets occur at more or less regular intervals. Among those I measured the variation was between 8.20 and 11.30 m. Between the north gate and the palace one stretch of wall, Fig. 117, had offsets at the folbwing intervals from east to west, Fig. 212: 9.10 m., 9.20 m., 9.60 m., 8.90 m., 9.60 m., 8.70 m., 9.00 m., 10.10 m. 9.20 m., 9.30 m., 9.40 m. The offsets are actually wall corners that indicate the termination of a wall section or compartment, Fig. 212. Close observation reveals in each case that the offset corner, which projects from 0.10 m. to 0.25 m. forms a vertical joint that continues through the all to the opposite face where a corresponding angle or offset indicates the other corner. At the northeastern corner of the citadel wall the abutting masonry faces of two adjacent compartments can be easily seen, Figs. 32, 118. Thus the wall was built in independent sections or casemates.[252] We have seen evidence of a similar, but cruder system at Midea without the offset corners and the terminal face of the cross wall; at Tiryns we shall examine another variation of this method of construction, below, pp. 214-220.

The consequent appearance of the wall is multifaceted; curved sections of the wall do not occur. The best sections in terms of appearance occur near gates and at the corners or natural bastions that exist in the circuit: On either side of the principal southern gate the fréquency of ashlar-like blocks in the wall is remarkable. Along the steep northern side, however, the roughest face of the wall presents itself. Other ashlar stretches can be seen at the bastion flanking the western gate and at the squared bastion at the ////theastern sou/ gate/ ////, Fig. 119. None of the masonry achieves the quality of the palace terrace, however.

With its ambitious encircling of an entire citadel and its offset compartments of masonry, the cyclopean work at Gla stands apart from that of Teichos, Krisa and Midea, and even from the early circuits at Mycenae and Tiryns. But taken together, the first citadels of Tiryns and Gla form a comprehensible unit of development of palatial architecture: Both have compartmentalized terraces for palatial structures. In each the wall is built of straight sections offset one to the other and, lastly, the plans of the gates are similar, Gla is, however, later in date and more advanced architecturally than the first citadel of Tiryns and an exception in any case, isolated on its island of rock and in close contact only with Orchomenos.[253]

To complete this investigation we must return to the Argolid coming, as it were, full circle to the type sites of Mycenae and Tiryns. Here in the floruit of the palaces at both sites is a wealth of evidence for different periods and uses of cyclopean masonry and fortification architecture.

Mycenae:

A discussion of the cyclopean masonry and circuit walls at Mycenae must begin with a review of the basic views on masonry styles and of the research conducted on the chronology of the walls of the citadel. The problem is complicated. The date of the walls and gates depends on architectural as well as ceramic criteria and comparative study of other sites, particularly Tiryns.

Schliemann observed three masonry styles at Mycenae and ordered them incorrectly from earliest to latest as cyclopean, polygonal and ashlar. Tsountas pointed out that the polygonal work was actually much later.[254] We now know it to be Hellenistic and the result of repairs of the circuit walls. Most notable is the so-called "Hellenistic tower" at the south, the southern flank of the Lion Gate and the northern corner of the northeast extension.[255] The cyclopean and ashlar work are contemporary Mycenaean; they have been distinguished chronologically by Mylonas following the lead of Tsountas who had recognized the architectural differences in the citadel walls.

Tsountas distinguished three periods of walls: (1) the north wall, (2) the Lion Gate and the extension to the west and south, and (3) the northeastern extension.[256] These distinctions, however, were not accepted by other scholars and no corroborative ceramic evidence was forthcoming, the study of Mycenaean pottery not then having recognized the fine distinctions of the LH III phase. With the resumption of excavations at the site by the British School of Archaeology in 1921, A. J. B. Wace was able to obtain stratified deposits of pottery from places along the walls and under the gates. His original study of the pottery, most of which was not published and was destroyed or lost during the occupation of World War II, prompted him to conclude that the entire circuit wall was built in the LH III phase, i.e. not "older than the beginning of the fourteenth century B.C."[257] A re-publication of the notes and material in 1949 in an appendix to <u>Mycenae</u>, <u>An Archaeological History and Guide</u> (pp. 132-134) sets forth the sequence in terms of the phases LH IIIA, B and C and gives equivalent dates in years B.C. This sequence is based on (1) the comparison of the architectural technique between the Atreus tholos and the Lion Gate and the date of the Atreus tholos construction ("after the middle of LH IIIA"), (2) the date of the construction of the Palace and the Pillar Basement (LH IIIA), which according to Wace were supported by the cyclopean wall (see above, p. 103, for a different view), and (3) the internal chronology of the Granary (two phases within LH IIIA-B and later revised to fall entirely within LH IIIB) whose position argues for a construction not soon after the circuit walls.

Wace's sequence is as follows:

1. Treasury of Atreus, Lion Gate, Cyclopean Walls
LH IIIA, late
2. (a) Palace, Megaron-Court-Throne Room-Pillar Basement
LH IIIA, late
(b) Granary, First Period LH IIIA, later
3. Palace, Grand Staircase, Northeastern Extension of the cyclopean walls; Granary, Second Period
LH IIIB
4. Palace, Destruction; Granary, Destruction
LH IIIC

This sequence was subjected to some revision by Wace before his death in light of the absolute chronology advanced by Furumark.[258] Wace's sequence was criticized in detail by Mylonas in 1958 (publication 1961) who concluded that the Lion Gate and the western cyclopean wall were to be dated to the phase LH IIIB, which he placed between 1300 and 1200-1190 B.C. following Furumark.[259] The north cyclopean wall on his analysis preceded them as the original circuit.

Subsequent studies have simplified and corrected some of these earlier statements. The first clarification came in E. French's study, "Pottery Groups from Mycenae: a summary" (BSA, 58 (1963) pp. 44-52). Her analysis of the pottery from the Atreus Bothros (pp. 45-46) provided a *terminus post quem* of LH IIIA:1 for the cutting of the dromos. But she was quick to point out that the pottery fromunder the threshold dated late in the phase LH IIIB and thus necessitates a probable range of construction between LH IIIA:2 and late LH IIIB.[260] The Lion Gate should by extension not be dated earlier than the deposition of the bothros. Mrs. French makes a further observation while discussing the destruction date of the houses outside the citadel walls (end of LH IIIB:1): "It appears that the vast fortification of the Greek mainland (at least in their final state which we now know) are the direct result of this disaster" (nt. 85).[261] This statement brought the views of the British working at Mycenae and of Professor Mylonas into closer alignment.

The most extensive and thorough study to date is Mylonas' publication of the results of his investigations of the walls, gates and ascents of the citadel in 1965.[262] Here he set forth in detail his architectural observations and ceramic evidence for the successive phases of the walls and gates. His conclusions, published in English in 1966 in Mycenae and the Mycenaean Age, are widely accepted today, but they need be viewed with some caution for the pottery as published - without profiles or scale - is not easily identifiable and of small quantity, and it may not always be datable with precision. The general dates, however, set between

LH IIIA:2 and the end of LH IIIB, will not be altered by later investigations.

Mylonas' interpretation is as follows: The first construction is the north cyclopean wall which he dates to the phase LH IIIA:2, but this actually is no more than a date _post quem_, since it cannot be proven that the ceramic material on which the date is based was actually in use at the time of deposition.[263] Subsequently in the mid LH IIIB phase Grave Circle A was refurbished and raised and the general program which included the construction of the Lion Gate, the western and southern extension of the circuit wall, and the Great Ramp was carried out.[264] Shortly thereafter the north Postern Gate was constructed and, then, the northeastern extension was created, below, pp. 194-197.[265]

These distinctions of phase based on ceramic evidence are corroborated on architectural grounds. As Mylonas points out certain differences are detectable in the wall construction of the different phases, most notably in the introduction of a heavy bed of mud plaster mixed with _aspróchoma_ and a bedding of small stones to create a level and adjustable base for the later cyclopean walls at south and west (above, pp. 37-38). The primary distinctions, however, were brought to light by his discoveryof the original northeastern end of the circuit wall and his analysis of the erection of the Lion Gate, its ashlar sheathing and the extension of the circuit to south and west.[266] These discoveries are further strengthened by observation of the masonry style and construction of the walls.[267]

The masonry of the north cyclopean wall is exemplified by the employment of carefully selected blocks of regular size (varying in length from 0.70 m. to 1.70 m. with an average of 1.00 m). These blocks usually have a more or less parallel top and bottom and were set in courses between 0.60 m. and 0.70 m. high. The surfaces were sometimes hammer dressed. The best stretches of this walling lie between the northeastern extension and the postern gate [(between Gamma and Delta on the plan,] Fig. P 13 and Figs. 92, 120)]. As can be seen in the photographs, chinking and levelling stones are not common in these walls; the well selected blocks fitted closely together without them. Likewise, very little mortar is visible in the masonry, though it can be observed at all joints and frequently as a thin layer between the blocks and the bedrock, Fig. 120.[268]

The core of the north cyclopean wall is composed of large cyclopean blocks set between the wall faces. In some areas there seem to be more large blocks than in others; perhaps re-investigation would disclose an arrangement similar to that predicted at Midea where the heavier, larger blocks retain the smaller rubble of the core. The wall faces are built of wedge shaped blocks. Sometimes long blocks run into the core as headers; other times heavy slabs are set upright in the face, Fig. 114.

The care displayed in this masonry is remarkable, especially because this face of the wall was not exposed to close scrutiny set as it was high on the northern slope of the citadel, nor is it in fact in proximity to the known major entrance of the first circuit.[269]

The important study of the north Postern Gate by Mylonas showed that it was inserted into a breach in the north wall.[270] He discovered the lowest course of the original wall in the path of the later gateway and determined the breach to have been made between points 'a' and 'b' on the plan, Fig. P13 .[271] The north cyclopean wall is preserved extending north of the gate to the point " I " on the plan, Fig. P13. The masonry of this stretch, Figs. 120, 121, reflects the careful construction typical of the north cyclopean wall. The blocks tend to be larger than in other sections (up to 1.70 m. long and 0.90 m. to 1.00 m. high). At the western corner, where the gateway begins, the masonry changes with much larger blocks, Fig. 122. This, of course, is natural at corners, but here it may be viewed as a reconstruction of the wall made when the gate was installed. No break occurs in the wall to indicate the line of this reconstruction and it is only because of Mylonas' investigations in the pathway that we can be certain of this reworking of this area. This is not the case for the northern flanking wall of the Postern Gate. This wall, which is built with conglomerate blocks forming a bastion at the north and of rough limestone blocks at the south, makes a clear joint with the section of wall at its southwest, Fig. P13. Along the course of this ruder wall Mylonas found a number of drains (I,K, Λ) whose construction he put contemporary with that of the Postern Gate and whose technique he compared to drains in the west cyclopean wall.[272] Thus he made the date of the breach in the north wall and construction of the Postern Gate and flanking walls contemporary with the ~~the~~ construction of the west cyclopean wall on architectural grounds; he also recovered some pottery fragments to confirm the date in the late LH IIIB phase.[273] Inspection of the masonry of this stretch bears out these observations. The wall between the bastion and the north cyclopean wall (Fig. P13, between IKΛ and "M" and, Fig. 123) is bedded on a thick layer of mortar. The blocks are very irregular in size and rough in appearance; many massive blocks appear in the wall face (up to 1.60 m. by 1.40 m.) and, although there is extensive use of heavy layers of mortar and chinking stones, the wall is not coursed but looks like a patch. This section of the wall also stops abruptly at the west at a near right-angled corner. Obviously this stretch is not part of the north cyclopean wall that continues southwestwards to the Lion Gate bastion. The employment of many rough irregular stones and of the great amount of mortar and chinking stones is a practice more commonly found in the western and southern extension of the circuit.

In his investigations along the west cyclopean wall, Mylonas discovered strata against the interior of the wall that appeared to date late in the phase LH IIIB, and in the area directly west of the western foundation of the Granary he extracted a few sherds, dating primarily to the phase LH IIIB, from the hollows in the base of the cyclopean wall. South of this he re-cleaned the area between the Grave Circle and the wall. On the basis of the finds from these areas he concluded that the wall was built during the middle of the LH IIIB phase.[274]

He confirmed Wace's observations that a heavy bed of mortar and a projecting bed of rubble stones formed a foundation for the wall around the area of the Grave Circle, above, p. 38. More recent excavation from the area of Citadel House to the southeast had exposed much more of the interior of the wall.[275]

This extension of the wall from the Lion Gate to the Chaos ravine has some of the best preserved and longest continual portions of the entire circuit.[276] It is also the most exposed: The road ascending from the lower ravine passed beneath the course of the entire stretch until it turned to ascend the ramp to the Lion Gate.

In appearance the wall is distinctly cyclopean and well conveys an impression of massive strength.but is in no way as prepossessing as the best stretches of the north cyclopean wall (cf. Fig. 92, north wall, Figs. 124 a&b). In some respects the wall compares well to the dry-stone rubblework of Midea. Sections of the wall appear to have been built differently and independently from others, so that one area may be composed of very rough irregular blocks and an adjacent one may be well-course with better selected blocks, Fig. 125, cf. 112.

The most distinctive practice is the frequent use of irregular blocks set in uneven courses, Fig. 124. Blocks are more often than not wedge shaped, and few blocks are laid as stretchers. Block size is especially larger, averaging 1.40 m. long by 0.80 m. high. The employment of these large blocks imparts the solid, cyclopean character to the wall.

The core consists of large rubble blocks interspersed with small stones. Much of it is so overgrown and covered by soil that detailed examination is not possible without cleaning.

Most of the other cyclopean work at Mycenae resembles the masonry of the west cyclopean wall. The contemporary supporting wall of the Great Ramp, Fig. 12, and the slightly later west foundation of the Granary, Fig. 16, are quite similar although much better coursed. The western terrace wall of the palace is also built in this manner, Fig. 27 (only the lower two and three courses are original).

This style of cyclopean is also evident in the walls of the northeastern extension. There are, however, certain differences in technique from the west cyclopean wall that distinguish this construction. These have been pointed out by Mylonas in his discussion of the extension.[277]

The wall is built of larger stones on the exterior than on the interior. The exterior blocks are based on the bedrock and chinked with large rubble stones (up to 0.20 m. x 0.50 m.) sometimes set vertically between two adjacent blocks.[278] The northeastern stretch was exposed to the person approaching on the roads from Berbati and Zygouries, and the blocks employed in its face are especially large. Inspection of the core reminds us of Krisa, for many of the large blocks are up-ended slabs and were obviously intended to make the wall appear more massive than it actually is. Because the wall is still preserved about 6 m. high, one can still see that many large slabs were also set as headers into the wall, Fig. 126. Behind these facade blocks large rubble stones were set in layers, but they do not bond well with the facade, which from the point of view of construction emphasizes the shell-like manner of the exterior face. Around the corner to the south the wall was hidden from view and is consequently built of less well selected blocks that required an exceptional amount of chinking, Fig. 127. This section, however, is built in a smooth curve, a feat that reflects the competence of the masons, Fig. 214. Proceeding east it bends around the southern corner, and the lower courses step out from the face creating a footing.

The entire exterior face of the northeast extension has a curving trace, especially at the corners, while the interior is articulated by angled corners. An offset occurs at the exterior at the north side about 3.5 m. east of the exit of the north sally port. Undoubtedly this marks the end of the first wall section running north from the old northeastern wall corner, Fig. ~~2~~14. 114/ This section was difficult to construct because it had to contain two corbelled passageways - for the underground cistern and for the sally port.[279]

The interior faces are built of smaller blocks of varying shapes (rectangular, triangular, trapezoidal, oblong) and sizes (examples: 0.80 x 0.70 m., 0.80 x 0.40 m., 1.20 x 1.40 m., 1.50 x 1.90 m.). Mylonas wondered if this difference might be owing to the re-use of blocks from the original northeastern wall.[280] This explanation may also account for the relative frequency of hammer-dressed blocks in the interior face. A similar appearing wall is the terrace "K" directly to the west (AE, 1962, fig. 10).

Mylonas had the opportunity to clear the core of the wall at a place in the southern leg. He reported

> From the bedrock to a determined height were large, relatively unworked stones. In the higher portion they used many smaller stones and relatively more earth. At the section of the southern leg, where an area 2.00 m. by 1.75 m. was examined, the small stones of the fill of the core continued down to a depth of 2.40 m. from the preserved surface of the wall; below this depth apparently as far as bedrock, they placed large blocks ... (my translation)[281]

This extension of the circuit of the citadel satisfied a need to extend the limits of the fortified area for a variety of reasons: to include the cistern, to defend the north Postern Gate with a sally port, to create more work and living space within the walls. The date of the extension has been placed by Mylonas in the "last years of the thirteenth century B.C." (p. 163) at the end of the ceramic phase LH IIIB:2. The date is based on finds from the core of the wall and from the stratigraphy and stone filling of the ramp of the north sally port.[282] Unfortunately the latter group of sherds are few in number and not clearly from a construction context. They may have been deposited on the cobbled surface as a part of the use of the rampway to the sally port. At present, therefore, we are safest in dating the extension to the latter half of LH IIIB.

In brief summary the entire circuit at Mycenae including all of its phases of construction may have been constructed entirely within the period LH IIIB. The first circuit as identified by Mylonas was probably built very early in LH IIIB, if not earlier as he suggested. This circuit had one gate at the west, behind and slightly above the area of the Lion Gate. The form of the gate is hypothetical and, if overlapping as Mylonas suggested,[283] then the first of its kind. A possible second entrance at the northeast has been proposed by Mylonas, but there is very little evidence for it.[284]

Like the other early enceintes of Midea and Krisa, this one at Mycenae was built as a continuous curve that enclosed the high contour of the acropolis. The masonry style, as we have remarked, was more formal and developed than at the other sites. Still, the entire circuit was founded on bedrock, mortar was sparingly used, and the wall retained a platform of stone at the interior.

The subsequent addition of the Lion Gate and the extension of the circuit to the west and south occurred in the middle of the LH IIIB phase and moved the citadel off its high perch further down on the acropolis. Changes in the masonry were introduced. Of these we have noted the introduction of a mortar and small stone bedding for the wall, the generally increased use of mortar in the walls and the less formal masonry style. To be discussed later is the introduction of ashlar conglomerate masonry which forms the Lion Gate and the Postern Gate and shows up elsewhere in the region at this time.

The breaching of the north wall to construct the Postern Gate occurred contemporaneous with the construction of the Lion Gate. The breach was quite large, about 37 m. long, and required the placement of a large patch of walling to flank the gate at the north and the reconstruction of the original wall to form an exterior corner northeast of the gate, Fig. P13. At this time opportunity was taken to provide better drainage for thee northern slope of the acropolis by laying a number of new drains under the patch of wall. As a part of the same program, and, therefore, not much later in time if at all, the original northeastern end of the circuit was dismantled and the wall was extended further northeast. This provided a sally port to protect the Postern Gate (whose orientation was wrong and allowed an attacker to shield himself as he rushed the gate), a secure water source and control of the ridge running out to the northeast, which previously had been a weak point in the northern defense system, Fig. P13.

Tiryns:

The citadel walls of Tiryns are considered to have been erected in three phases known as the I, II and III Citadels. These phases were determined by K. Müller on architectural grounds. In the rare instances where ceramic or stratigraphic information had been recovered it provided only termini ante or post quem and could be used only with caution to link the phases to the relative and absolute chronology of the Late Bronze Age.[285] Later research has made little advance on this problem.

The chronology of the circuit walls can be summarized as follows: The construction of the I Citadel walls is dated to the phase LH IIIA:1 based on cup fragments published by Müller and identified as LH IIIA:1

by Ålin.[286] The destruction of the palace is dated at the end of LH IIIB:2, and now we can consider the Lower Citadel circuit to have been erected midway through the LH IIIB phase. Sandwiched between these dates for the I and III Citadel walls are the constructions of the II Citadel for which there is no exter/// evidence. /nal The most significant construction of the II Citadel, the Great Gate (Steintor) can be compared architecturally to the Lion Gate at Mycenae, which we have seen is dated according to Mylonas shortly after the middle of the LH IIIB phase, above, pp. 192-194.

The walls of the first citadel consist of a massive platform created by cyclopean terrace walls that form the palace area, above, pp. 80-89, and a southern area enclosed by a heavy cyclopean fortification wall. The terrace walls of the palace area are arranged like a garland around the summit of the low-lying citd-del, Fig. 13. The lower walls crown the more precipitous but even lower southern half of the citadel.

The walls of the second period extended the crown of the southern walls further south; to the north they enclosed the acropolis up to a narrowing in the outcrop of limestone that underlies it.[287] Finally the third period walls enclose the remainder of the ridge of the citadel and further fortify the principal entranceways of the entire citadel down to ground level at the west and east.

The masonry of the three phases is, according to Müller, distinctive. He has described it with great thoroughness, and the core of the description that follows is a detailed summary and criticism of his observations. Further work on the walls of the Lower Citadel was accomplished by P. Grossmann and has added considerably to our understanding of the construction techniques of massive cyclopean walls.[288]

I. Citadel:

The first citadel circuit walls are characterized by their construction and masonry. The masonry as Müller noted is easily recognizable once the eye adjusts to the variations among the walls of the three periods. Salient features of the first period are the uniformity of block size, the tendency to build in distinct courses, and the careful use of a mortar of mud and the local asprόchoma for pointing the interstices, Fig. 175. This latter technique is rarely visible today; one has to read Müller's descriptions and look at photographs in the publication to get an idea of the application of the mortar as an aesthetic dressing to the walls.[289] In conjunction with the use of mortar, small stone wedges were used to fill the joints and level the coursing of the walls. Because the rubble blocks were carefully selected for size, shape and fit, the stone wedges employed were usually of uniform size, 0.10-0.20 m. x 0.10-0.20 m. and often appear as a lining above, under and around the blocks, Figs. 91, 12~~8~~. The neat smooth appearance /9 of the wall faces given by these attentions was further enhanced by dressing the exposed faces with a stone hammer to remove projections, Fig. 88.

The system of building in consistent courses is dependent upon block selection. The regularity of block size as well as the care in the selection of rectangular shaped blocks of hard blue limestone with few flaws is perhaps most characteristic of the first citadel walls. More than any other architectural practice, this demonstrates the care and time given to the construction of these walls. Blocks were in rare cases of exceptional size and irregular shape. The most numerous occurrences of these are in the northern half of the east wall (<u>Tiryns</u>, III, pl. 21) where massive and small blocks are found together and the coursing is irregular. The best masonry is found on either side of and including the main gate, Fig. 129.[290] The terrace walls of the palace are also notably impressive, Fig. 13. They present a massive, solid character that is accentuated by the placement of large regular shaped blocks at the corners and by the occasional placement of very large irregular blocks in the face. The poorly preserved walls of the southern fortification offer insufficient coursing to be described; only the eastern stretch flanking the gate is well preserved, Fig. 129, and reflects the attention placed upon good construction in that area. The western terrace walls are made of rough irregular blocks. They present none of the massiveness that is so evident in the corresponding walls to the east.

Course height in the first period walls averages 0.60 m. to 0.70 m. and rarely exceeds 1.00 m. Most blocks are 1.00 m. to 1.30 m. in length; many are as long as 1.50 m.

In terms of construction the first citadel walls are remarkable for the employment of both terrace and freestanding walls to form the circuit. We have already noted the construction of the terrace in compartments emphasized by offsets in the wall face; these offsets occur also in the preserved portions of the southern circuit wall, Fig. P12. A running joint at the southeastern corner of the wall shows that the eastern and southern sections were built separately, Fig. P12. On the west side of the southern circuit wall the preserved courses show two offsets which appear to occur with vertical joints though the original wall is only preserved a few courses high, Fig. P12, #13, 14, 15. This stretch of walling was probably built of three adjacent units.

II. Citadel:

The walls of Müller's second citadel are not as distinctive as those of the first, an observation in character with the nature of the walls as forming the transition between the early palace of the first period and the final formation of the citadel in the third period. Müller identified two styles of masonry in the walls of the second period. He was careful not to use these styles as criteria for identification of the second period and relied instead upon structural criteria.[291]

Müller identified the first of these II Citadel masonry styles among the walls of the extension of the Southern Citadel, espcially along the western side, and in the western wall of the Middle Citadel walls. The masonry is characterized by the frequent employment of friable red limestone and the use of small cyclopean blocks. Coursing is not always evident and small blocks intermingle with large.

The second style of II Citadel masonry is the more prominent. As with the first, the interchange between small and large blocks is common. Periodically very large blocks, notably in height, were placed in the wall, The friable red limestone is, however, rarely employed; instead, hard gray limestone was favored. These walls characteristically have very massive regular blocks forming solid corners. A striking contrast is visible between the bold heavy corners with emphatic courses and the irregular slightly meandering faces of the walls.[292]

Müller recognized no chronological difference between these two styles. He wondered if, in fact, they might be the work of different gangs of masons. This would appear likely because the walls were built of independent units, the evidence for which is discussed below, pp. 208-214. We must also consider the role that location played in influencing the masonry style. In his account of the walls around the Great Gate, Müller observed that the west wall of the gateway (Tiryns, III, pls. 21, 22) has distinctively second style masonry, whereas the eastern wall is different; very irregular massive blocks often nearly square are set in courses over 1.00 m. high, Fig. 94. Müller saw this monumental facade as a culmination of the second period masonry styles placed where it would impress most at the Great Gate. He compared this work to the coursed ashlar walls of conglomerate that flank the

the entrance to the Lion Gate at Mycenae.[293] This observation of the importance of location, which we have observed at other sites, can be carried further at Tiryns.

The walls of the first style of the II Citadel are all located along the western side of the citadel, mostly at the south, and one other at the northwest, Fig. P5. They do not appear carefully built nor are they in the least monumental. In character they remind one of the western terrace walls of the first period which are the least impressive of its walls. The north face of the Middle Citadel presents an equally uneven appearance. The two eastern units (Fig. 131, left) are built of medium sized blocks of irregular shape laid in rough coursing. The masonry has nothing to recommend it. The central projecting unit is entirely different and out of character (Fig. 131, right). Massive irregular blocks appear tumbled into position. A kind of coursing is achieved by the use of smaller rubble blocks around the massive ones to level the courses.

All of this masonry was primarily functional. It was not located in proximity to the principal palace or citadel entrances.[294] For this reason it had need neither to be monumental in appearance nor unified in style. The masonry of the walls of the I Citadel corroborates this view. The best, most regularly coursed and carefully jointed and mortar-pointed walls are those of the gate and flanking it. Less regular are the northern and western terrace walls (cf. Figs. 13, 129). All the walls of the palace terrace, however, have a notably massive appearance, especially at the corners, Fig. 13 (Tiryns, III, pl 21). They formed the visible face of the palatial platform just as those at Gla and were consequently constructed with an aim to impress the visitor.

This analysis of the importance of location upon the style of masonry weakens Müller's distinctions of the various styles of II Citadel masonry. It should be evident, moreover, that the most characteristic aspect of these walls is their lack of uniformity.[295] This makes sense if the walls of this period are viewed as additions to a growing citadel rather than as a creation of another citadel. The walls of the second period were built in piecemeal manner: additions at the south, two phases of additions at the east, and an addition at the north.[296]

The probability that location rather than period of construction and style played the determining role in the visual quality of the cyclopean masonry thus raises the question of the validity of Müller's identification of the three phases. We must ask what kind of evidence other than stylistic differentiates the additions to the Southern Citadel of the second and third periods. To this question we shall return later, below, pp. 237-240. We should observe, however, that distinctions of style may too finely subdivide contemporary work - witness the possibility mentioned above that the north-eastern extension at Mycenae and the north Postern Gate are contemporary constructions. This consideration is particularly relevant because there is abundant evidence that the walls at Tiryns were built in units abutted one to the other. Architectural analysis, then, has to rely on distinguishing between sequentially erected walls and divisions among major building phases separated by many years and different plans.

In construction the walls of the II Citadel differ from the preserved wall of the first period in the Southern Citadel - a fact which first and foremost separates the walls into two distinct phases. This is seen in plan by the difference in thickness and in the form of the offsets, Fig. P5 . The southern walls of the first period have a saw-tooth plan, and the distance from offset to offset does not exceed 6 m. on the east side and 11.5 m. on the west. Moreover, the walls, though thick (approx. 4.00 m.), are not as thick as those of the II Citadel, which are block-like. The eastern unit at the Southern Citadel measured on the outside face is over 9 m. long and 6.30 m. thick, Fig. P15 , B3.

The next two units on either side of the stairway are 13.30 m. and 14.20 m. long, and the western one reaches a thickness of over 8 m, Fig. P15, B1 & 2.

The enclosing walls of the Middle Citadel are also built in massive units that range from 24.5m. to 11. 5 m. in length from offset to offset. The maximum thickness is approximately 7.5 m., Fig.P15. The great thickness of the walls of the Middle Citadel is distinctive and may be partly a result of their use as terrace walls to retain the debris and fill of the Middle Citadel. Müller remarked, pp. 37-38, that the Middle Citadel walls are two-faced, self-standing walls, but that the interior face is constructed of smallet stones set in less regular fashion. This contrasts sharply with the terrace wall of the first period, which is merely a one-faced retaining wall; the difference is also manifested in the lack of compartmentalization of the fill of the Middle Citadel, which may account for the increased thickness.

Another salient feature of II period construction is the care devoted to corners. Massive blocks, often approaching ashlar shape, were placed at corners to strengthen the bond and set the coursing, Fig. 13,(lower wall). The contrast between these well built corners and the somewhat irregular construction of the remainder of the walls has already been pointed out. Remarkable, however, is that these well built corners are seen at offset corners as well as the end of wall sections. This is exactly as we have already witnessed at Gla, above, pp. 180-182. As at Gla close examination of the wall shows that there is either a change of coursing or a running joint at the offsets, Figs. 130, 132. Clearly these are units abutted to one another. Of particular interest are the corners created at the end of major wall sections, i.e. the northeastern corner of the Middle Citadel and the southeeastern corner of the Southern Citadel, Fig. P5 . At these points the termination of adjacent units creates a deep jog at the corner forming a kind of defensive bastion. Unfortunately neither of these corners is completely preserved, but at least the lower four to five courses of each can still be inspected with confidence today. At the northeastern corner of the Middle Citadel the lower four courses show a vertical joint at the juncture of the units, Fig. 215.[297] At the southeastern corner of the Southern Citadel such a joint is not easy to find. There is, however, a change in coursing and the first and second and fourth courses show a joint running into the wall north to south. But the third and, if original, fifth courses show the joint going the opposite direction, indicatinga bond.[298] The bond, however, does not appear continuous, rather the blocks make a very shallow penetration into the east face of the southern unit creating, perhaps, a false bond. A bonded corner, however, is probable here because a vertical joint will have to jog west on the line of the north face of the southern unit, B2, Fig. 215.

A description of the order of construction of the southern extension of the II Citadel might be as follows: First the westernmost unit B1 was constructed abutting the south face of the first period wall. Then the area for the stairway was reserved and the central unit B2 was begun; its southern face set back 0.20 m. from that of B1. This central section was built from the stairway to the east. At the same time the easternmost unit, B3, was abutted to the first period citadel wall and built southwards to meet the central unit. The juncture of the two is the result of simultaneous construction of both units, and a bond was created at the interior corner. This bond was carried out to the outer recessed corner, but was not carefully attended to because each unit (B2 and B3) was built independently of the other.[299]

The order of construction of the Middle Citadel walls and the formation of its northeastern corner requires a more complicated explanation than that just given for the southeastern corner of the Southern Citadel. We should observe that the Middle Citadel wall units are of relatively uniform length. The long north-south walls at the east and west are respectively approximately 7.20 m. and 8.60 m. in length and their northern ends are roughly in line with each other, Fig. P15. The northern stretch is built of four more or less equal units (approx. 11.70 m., 12.50 m., 10.65 m., and 11.00 m. from west to east) each set out about 0.20 m. from the other, Fig. 131. This arrangement presents a symmetrical appearance that bespeaks a coordinated construction according to a common plan. Clearly the eastern (a) and western (a) legs were first built extending northwards to the projected interior line of the northern section, Fig. 215.[300]

Thus the northern boundary had been determined at the time of the inception of construction. According to Müller (pp. 38, 62) an earlier wall around the Middle Citadel was replaced piecemeal during the second period. Thus he accounted for the construction of the wall in what he saw as three sections - east, west and north. Whatever the case, the most protruding unit of the northern stretch - that with the massive cyclopean corner (Fig. 131, 215 a) may have been constructed at the same time as the eastern and western legs (a). Then the northwestern unit (b) would have been joined with the projecting western leg (a) and an eastern unit

(b) was abutted to the original northern unit (a). Last the northeastern corner unit (c) was built. The result was a projecting square bastion along the eastern side Fig. 215.

According to Müller this bastion formed the northeastern corner of the entranceway in the early phase of the second period (IIa); south of it a ramp led up to two gates defended by a tower, Fig. 215.[301] Subsequently the Great Gate and its flanking walls were added. The eastern flanking wall of the Great Gate has, as reconstructed by Müller, pp. 63-65, two projecting bastions in its eastern face similar to that of the northeastern corner of the Middle Citadel, Fig. 21~~4~~5. Inspection of the west flanking wall shows that it was constructed of three units, each set back from the other about 0.30 m. to 0.40 m. The one preserved offset shows a running joint, Fig. 132. Presumably the units were begun at the south where the Great Gate was to be placed and proceeded north until the last one obliterated the southern corner of the northeastern defensive bastion, Fig. ~~216~~. As remarked above, p. 205 the eastern flanking wall is especially well coursed with carefully selected squared blocks, Fig. 94. The western wall, though well built and with well attended corners, does not have the monumental flavor of the eastern. Yet clearly these walls are contemporary and necessary constructionsfor the Great Gate. The difference in appearacne is probably due to the fact that the western units overlap both the terrace of the I Citadel and the extension of the Middle Citadel, and it was desireable to give the facade a unified appearance for its entire length.

This analysis of the style and construction of the walls of the II Citadel has emphasized the importance of location as a determinant of the masonry style and has suggested the manner in which these walls were built of individual adjacent units. This dual consideration of location and unit construction is also impor nt for an understanding of the walls of the third period.

III Citadel:

The third period walls constitute the greatest extent of the fortification walls of Tiryns. The most significant elements of the circuit additions at this time are the great looping fortification of the Lower Citadel and the massive curving wall protecting the western stairway, Fig. P 5.[302] The other elements assigned to this period are the southern and eastern galleries which represent special additions to the citadel.

Even though large stretches of the Lower Citadel fortifications are preserved, they did not receive much detailed attention and description until P. Grossmann published his article on the Lower Citadel in 1967.[303] Ongoing excavations have exposed long sections of the interior of the circuit of the Lower Citadel extending in places to bedrock. This work will facilitate a more detailed study of the wall construction; at present one can study longer stretches of the original masonry with the original mortar still in place than ever before, Fig. 128. As remarked in the first chapter (above, pp. 31-32) these new excavations have disclosed that the foundations were all carried to bedrock and set symmetrically on either side of the spine of the Lower Citadel, which required the removal of a great percentage of the Early and Middle Helladic mound that lay to the east.

Müller considered the Lower Citadel walls to best illustrate cyclopean masonry. He described the masonry as "heavy" and "bold" with a "rustic" flavor that imparted and "unruhig und bewegt" character to the walls.[304] In this respect these walls compare well with the flanking wall of the western stairway of the citadel and, also, with the west cyclopean walls at Mycenae. But they are distinctive in that they are consistently better coursed than the others and in the numerous offset corners and running vertical joints in the faces of the circuit.

The Lower Citadel walls are built of a mixture of friable red and hard blue limestone blocks. The blocks are massive though not on the average any larger than those of Mycenae: courses vary between 0.60 m. and 1.00 m. in height and block length is between 0.50 m. and 1.50 m. Fig. 128, 133.[305] They are rarely worked in any fashion except at the corners, especially the corners of the eastern and western gates, Fig. 217. Block shape is irregu- /P16
lar, particularly the ends which are curved, blunt, sloped and fractured. Consequently large cavities formed between adjacent blocks. These were filled by smaller stones set in an abundance of clay mortar. The top and bottom surfaces of the blocks are often relatively flat and horizontal, thus insuring the coursing. But the presence of totally irregular shaped blocks often required the insertion of smaller blocks to fill out the gap, Fig. 133. In like manner, occasionally extra large blocks protrude into the next course, or two small blocks will be set to make one course height.

The abundant use of clay and mud mortar can at present be seen along the western interior of the wall from the syringes south about 60 m., Fig. 128. As has often been pointed out, this mortar was laid as a bedding for

The giant blocks, and their weight pushed the mortar up through the interstices.[306] The filling stones and small blocks were set into the mortar-filled gaps and, where necessary, additional mortar was placed in the gaps. The resulting appearance is much different from the neat pointing of the first period walls (cf. Fig. 175 and Fig. 91).

The corners were carefully built with rectangular shaped blocks whose faces are often hammeredressed.[307] As in the walls of the second period, these corner blocks can be extra large and rectangular of shape. The most striking instance of this emphasis on the corners is to be seen at the southern corner of the Great Ramp. Fig. 93, where some blocks exceed 3 and 4 m. in length and are over 1 m. in height.

The most distinctive aspect of the Lower Citadel walls is the frequent appearance of offset corners and vertical joints. These are by now familiar to us from Gla, Pylos and from the earlier periods at Tiryns itself. The offsets of the Lower Citadel walls, though, are of special interest because they have been studied and reported in detail by Grossmann, and their use appears to have been different from that at Gla. A brief summary of his findings and of some of the details will be presented here. The plan, Figs. 211, shows the position of the /P16 offsets and vertical joints in the wall.

As Grossmann observed (pp. 99-100) the entire wall of some 350 m. was built of coursed masonry, the courses of which are carried more or less through the wall thickness.[308] This construction was accomplished by erecting the wall in sections and raising an earthen platform around the sections as they were built.

As we have observed elsewhere, the termination of adjacent sections is marked by a vertical joint and/or an offset corner. Grossmann pointed out that Dörpfeld's interpretation of these offsets as towers and Müller's of them as construction and decorative do not fit the evidence.[309] Instead they reflect the system commonly employed in the Near East where walls were erected in separate sections or casemates.

He remarked that the section terminals on the exterior face did not always correspond perpendicularly to those on the interior. Furthermore, the sections did not terminate in a straight wall face that extended from exterior to interior, but instead the courses in the interior were staggered, thus allowing for a better bond between sections.[310] This system is different from that of the circuit wall at Gla with its built faces, Figs. 32, 118, but may well be related to that predicted for Midea where the independent units were probably joined together after they had been built up, above, p. 173.

Also different from Gla is the lack of regularity of section length, for example, the section forming the southern side of the stairway entrance at the west (Fig. 117, #3, #44) is just 5 m. long, while that between nos. 10 and 14 north of the syringes is over 35 m. long. Another long straight section between nos. 19 and 21 is interrupted by a vertical joint at no. 20 to which no corresponding inner joint can be found. It is remarkable that the wall does not change direction at point 20; this raises the question of how long a stretch the builders would erect without changing courses or direction. /P16

A different anomaly occurs on the west side between nos. 6a and 40. Here, recent excavations have uncovered the interior wall face and show that this entire section was stepped in to the east and, at no. 6, stepped out to the west along the exterior face, Fig. 128. This merits the conclusion that this section was erected prior to those on either side of it, which appears strange in view of the section's position in the middle of the wall.

On other area of interest is that between points 10 and 14 north of the syringes. Although it is a single section, it changes course by making angles at nos. 11 and 13. As Grossmann observed,[311] there are no curving sections in the wall. He explains this shift in direction to the outcrop of bedrock at this point and suggests that the builders shifted the base of the wall up the crest of the rock where it levelled off and afforded better purchase.[312]

The Lower Citadel walls also possess a number of corbelled intramural niches that open to the interior. They are commonly considered in conjunction with the galleries in the main citadel. In fact Müller argued that the niches and galleries, or rather their corbelled vaults, and the corbelled gateway at the base of the western stairs were characteristic of III Citadel construction[313] This appears to be the case, although the sequence of the southern galleries is disputable (below, pp. 237-240), and with them should be considered the subterranean passageways of the syringes. Along with these examples of corbelled masonry should be grouped the many other examples found at other sites.[313]

<u>Corbelling</u>:

Within solid masonry constructions, especially cyclopean structures, spans for doorways and various kinds of passageways were normally covered by corbelled vaults.

A corbelled vault is created by laying horizontal courses of masonry and at a determined height stepping each succeeding course out from the lower one on each side of the area to be spanned; the point of juncture at the top is not keyed as in the arch but merely covered by the succeeding masonry course or filled with a wedge shaped block, Fig. 218. The superposed weight, then, is shifted away from the center of the span as each successive course steps back from the other as shown in the diagram.

This technique was often employed to form a relieving triangle in Mycenaean tholoi beginning as early as the phase LH I/II in the tholoi at Thorikos & Mycenae and continuing with increasing popularity through the LH III phase. Commonly relieving triangles were masked, either by the insertion of a decorated veneer of stone or merely by walling the area up as part of the masonry facade.[314] In the later tombs the corbelling of the relieving triangle was formalized by the even coursing of the facades and the diagonally cut ends of the corbelled blocks, Fig. 147, while the interior of the vault remained rough with projecting rubble blocks. The last major appearance of the relieving triangle in tombs is in the tholoi of Atreus and Klytemnestra at Mycenae whose formal relieving triangles of sawn and hammer-faced ashlar conglomerate blocks are comparable to the mid-thirteenth century constructions of the Lion Gate.

In non-funereal architecture corbelled vaults are found in structures of cyclopean masonry for intramural galleries and niches, for gates and passageways, causeways and culverts. In these forms the technique does not appear before the thirteenth century B.C., indeed, perhaps only within the last half of the century. The technique is limited to the major sites of the Argolid, particularly Tiryns.[315]

Fortunately all of the corbelled vaults in the Lower Citadel at Tiryns can now be dated with some certainty within the LH IIIB phase, probably towards its middle.[316] And the remaining examples - the west gateway, Fig. 134, and the eastern and southern galleries, Figs. 135-137, are of the latest architectural phase of the citadel. Likewise the corbelled vaults at Mycenae are late additions. The secret cistern and the northeastern port were added on after the middle of the phase LH IIIB, and the Lion Gate was built perhaps slightly earlier in the middle of the phase LH IIIB, above, p. 188. Thus the majority of the evidence inclines to a late date for the introduction of corbelling in cyclopean architecture.

Although the construction of a corbelled vault, as outlined above, is a relatively simple affair, there are variations discernible in the late Mycenaean examples. Perhaps the simplest are those constructed as culverts and for bridges on the road system of the Argolid.

The best preserved example is a bridge at Kazarma, Fig. 219. Essentially it is no more than a culvert. A simple corbelled arch spans the bed of a small ravine and supports a roadway about 4.50 m. wide. The vault is built of cyclopean blocks stacked upon each other; each side forms a wedge of masonry that leans against the other. Only the uppermost row of blocks supporting the roadbed is coursed.

Other examples of such culverts can be found along the road leading behind Mycenae and around Mt. Agrilovounaki,[317] The first at Drakonera is buried in several meters of silt, Fig. 138. Excavation of it would reveal a culvert over a ravine, perhaps as much as 2 or more meters high.[318] Traces of another bridge can be found around Agrilovounaki to the north between that mount and the northerly one named Koutsojannis (at "kyklopische brücke" on Steffen's map). It is not well enough preserved to study today, but it probably had some kind of culvert beneath it since the ravine is wide, and there is a distinct drop off of some five meters, much obscured by brush, on the downstream side of the bridge remains. About 100 meters eastwards up the slope of Koutsojannis is another culvert, known locally as "lykotroupi".[319]

This one is complete . a corbelled vault runs beneath the road to the other side (now blocked with silt) to drain the ravine. Undoubtedly other examples existed, notably at the bridge at Aghios Georgios, Fig. 95, and at another one upstream discovered by Mylonas.[320] One good simple example within the citadel of Mycenae is the drain that runs under the conglomerate threshold on the ramp leading to the cult center, Fig. 139.[321] This culvert is not a true culvert, primarily because the span is not great, but as one can see in Fig. 139, the sides of the drain are stepped in while the top is capped by the threshold.

Most examples of corbelling were for larger spans than necessary in these culverts and were, also, more carefully built. But the northeastern port at Mycenae illustrates that occasionally even this attention could be disregarded, Fig. 140. One can see that the builders encountered little difficulty building corbelled vaults even with poorly selected massive rubble stones that did not course well and did not form an even sided triangular vault. Usually, however, more attention was placed upon coursing and the blocks that formed the jambs and the vault. This careful attention to corbelling is best illustrated in the many examples at Tiryns.

Starting at the east flanking wall of the rampway at Tiryns and continuing intermittently around the Lower Citadel wall are vaulted intramural niches. They begin from one to two meters above ground level and run from two to three meters back into the wall. Most of them open only to the inside of the wall, Fig. 141, but at least one has a window that looks down to the plain below, Fig. 142, Similar chambers existed in the north cyclopean wall at Mycenae, but they are not well-enough preserved to tell if they were ever vaulted.[322] There is, however, a small corbelled chamber alongside the north cyclopean wall much like these at Tiryns, Fig. 143.[323]

Usually the blocks of these niches have flat top and bottom surfaces and the course height is fairly regular. The corbelling starts either with the third or fourth course. Blocks with naturally diagonal faces are employed for the corbelling. They are never cut to shape, though gross anomalies of the surface were usually hammered away. Maximum spans of the vaults did not exceed three meters.[324]

The crown of the vault can be distinguished by two different practices: sometimes a course of masonry continues across the point of the vault, Fig. 142, at other times a wedge-shaped block was inserted into a gap between the uppermost blocks of the vault, Fig. 136 (lower vault). The explanation of this first practice is that the selection of the blocks and the calculation of the span were such that the uppermost course of corbelled blocks met at their top edges, i.e. at the apex of the vault (for example in the east gallery of Tiryns, Fig. 135, and its chambers, Fig. 136, upper vault). In instances of the second type where the selection of corbelled blocks was such that they did not meet at the top and a wedge-like block was inserted, it appears that the vault was not considered of structural importance to the builders, i.e. that this technique was to be employed only for niches and doorways, not for long passageways (Figs. 141, 136, lower vault, 144).[325]

The galleries demonstrate the art of cyclopean corbelling at its best. Both the gallery corridors have straight-sided triangular vaults. In the southern one specially selected blocks were required at the doorjambs of the chambers where the corbelled vault sprang in two directions at once - for the door and for the corridor (cf. Tiryns, III, fig. 42).

Also the corbelling of the passage through the curving western circuit wall is complicated. The eight meter thickness of the wall and the downward slope of the stairs through it led the builders to incline the vault downwards as well, Fig. 144. Starting from the interior a steep vault was built that stepped downward.

Usually the blocks meet to form the apex of the vault. At the door, however, the vault height is dramatically reduced; the apex is filled by a wedge, Figs. 134, 144.[326]

This technique of stepping the vault downwards was employed twice more in the citadel. First is the stairway that leads down to the southern gallery. The corbelling starts in mid-length of the first flight and then begins to step down as the stairs descend, Fig. 220 . But then it turns to continue down the next flight, Fig. 155. This trick was achieved by canting long blocks out from each other at the outside corner. At the inside corner specially selected blocks continued the corbelling in two directions at once - towards the upper and lower flight of steps - just as those at the juncture of the corridor and chambers mentioned above.

The other instance of a vault stepping down is found in the syringes. This solution here is different from that of the others, for, though the sides of the passageways are vaulted, the apex is not. Instead it is covered by slabs that run across the vault and are stepped down one from the other the entire length of the syringes, Figs. 145, 221 .[327] The Perseia Fountain at Mycenae is the only other example of this technique employed on the mainland. There the stepped slabs begin in the second flight of stairs, Fig. 222. As we have noted the date of these two water supplies is probably the same.[328]

In conclusion we may see that corbelling was widely employed in funeral architecture on the mainland from the early Mycenaean period on, but that it was not introduced to general architecture until late in the final period of Mycenaean civilization. At that time it assumed its full blown form under the impetus of defensive architecture where it was adapted for special uses, especially at Tiryns. A similar relation between tomb and civic architecture has already been observed for ashlar masonry. The addition of corbelling gives further evidence of how the architecture of the thirteenth century fully exploited the practices that it had inherited from the narrow but good workshop of the tholos tombs.

<u>Conglomerate and its Use in Cyclopean Ashlar Masonry</u>:

In our examination of poros and sandstone masonry the relation between it and the ashlar work in conglomerate of tholos tomb architecture was mentioned. Yet we also remarked upon the affinity of ashlar conglomerate to cyclopean masonry. The explanation of the marriage of these two disparate masonry practices lies in the monumentalizing tendency of cyclopean work. In brief the experience of an early and well established tradition of building ashlar walls of conglomerate was drawn upon to create a special masonry style of monumental proportions for the cyclopean defensive works of the late Mycenaean period.

In order to gain a clearer understanding of this development, we should step back in time and watch how conglomerate was introduced in tholos architecture and then utilized more and more as the builders became familiar with its qualities as a stone.

As remarked earlier, conglomerate is easily available at Mycenae.[329] In fact it composes the Panagia ridge that runs from the citadel south to the modern village, the acropolis of which is the site of the ancient quarries. North of the village and west of the Panagia ridge is the Kalkani hill, also a conglomerate outcrop. Cut into the sides of these hills are the tholos tombs. Thus the stone was readily accessible and transportation was, as usual, a minor consideration. Elsewhere in the Argolid, however, the stone is not locally available. As a result it was only exceptionally employed outside Mycenae.

This conglomerate is especially hard consisting of cemented alluviated sediments, pebbles and cobbles of different origin and hardness. It presents a pleasing variegated surface that gives the appearance as well as the performance of great strength.

Conglomerate in worked form first appears in the tholos tombs of Wace's second category, These tombs, it has recently been argued, all date no later than the phase LH IIA and, in fact, were constructed within a short period of time, as little, perhaps, as two generations.[330] Whatever the sequence according to ceramic phases, we can order them according to the degree to which conglomerate was employed in their construction.

The first would be the tomb of Aegisthus in its first phase. Conglomerate appears only in the lintel composing one of three slabs. Second should come the Panagia tomb. A conglomerate base two courses high supports the dromos walls of poros ashlar for a distance of 1.13 m. before the facade. The stomion is built of conglomerate in ashlar style and the two lintel slabs were also conglomerate. About this time the Aegisthus tholos may have received its facing of poros that was set on a conglomerate base. Next the Lion Tomb appears with an ashlar conglomerate stomion covered by a poros facade. Along with it the tomb at Kato Phournos may have been constructed. The facade and stomion were built of hammer-dressed conglomerate blocks and the lintel was composed of three slabs of conglomerate.[331] All of these tombs belong no later than the phase LH IIA according to Dickinson.

The next tholos in chronological order is the tomb of the Genii. The dromos foundation is built of conglomerate ashlar supporting a rubble upper wall. The facade and stomion were built of coursed conglomerate blocks, most of which were sawn rather than hammer-dressed. The lintel was of conglomerate and, for the first time, so was the chamber, where hammer-dressed and sawn blocks are found together. This tomb is not well dated, but is supposed to be of the phase LH III (A/B). Last in the developed LH IIIB phase are the monumental tombs of Atreus and Klytemnestra. In both of these the entire tomb is built of conglomerate blocks including the thresholds. The facades and stomia are built of sawn conglomerate blocks; those of the dromoi and chambers are hammer-dressed.[332]

The growing preference for conglomerate in these tombs reaches its maximum expression in these last two, sometime about the middle of the thirteenth century B.C. at latest. This is paralleled by the rise of cyclopean masonry and the major extensions of the defensive circuit at Mycenae. Each in its way constituted a monumental architectural form. The decision to build the Lion Gate and its flanking walls of conglomerate in the same style and similar form as the Atreus dromos and facade is the most visible assertion of a distinct

Mycenaean architectural taste that is preserved for us to study. And the similarity and contemporaneity of these constructions can be construed as evidence for an extensive royal building program, perhaps celebrating the ascendancy of Mycenae over the Argolid and beyond.

A description of some of the details of the Lion Gate and the Atreus tholos will illustrate the intimate relation between them. Each has a gateway with a relieving triangle and decorated stone facade. The gate wall is built of coursed conglomerate, Figs. 146, 147. The gates are flanked by the walls of a dromos; in the case of the Lion Gate the defensive walls form the dromos. These walls are also of cut conglomerate, but the blocks in each case are larger and more irregular than those in the facade. Those of the Atreus dromos, Fig. 147, 223, are of an irregular isodomic coursing; course height varied between approximately 0.60 m. and 1.00 m.[333] The blocks of the flanking walls of the Lion Gate are much larger and irregular of shape. The best section is that of the south flanking wall, Fig. 148, where massive squared blocks form a coursed cyclopean facade. This is reiterated in the north wall, Fig. 149, 224, but the effect is on the one hand monumental and on the other cyclopean. Yet as Mylonas has pointed out, the conglomerate work is only a facade over the actual cyclopean wall.[334] As the coursed conglomerate facade continues northwards to the corner that flanks the approach, Fig. 149, the formal coursing continues. But after turning the corner and joining with the north cyclopean wall, the masonry changes. The blocks become more irregular in shape, their faces less well worked, Fig. 150. Coursing is discontinous and chinking stones appear in the interstices. This section of wall best illustrates the extent to which this facade may be considered as cyclopean. And its continuation to the Lion Gate illustrates the monumentality of the style and its debt to the tradition of ashlar conglomerate masonry in the tholos tomb architecture.

The style found expression elsewhere on the acropolis. The north Postern Gate with its projecting bastion and interior and exterior flanking walls of conglomerate is only a lesser relation of the Lion Gate, Fig. 151. Another, rather curious, example is the western corner of the square bastion below the House of the Columns, Fig. 152. Mylonas has argued that the ashlar conglomerate masonry here is part of a rebuilding when a drain was installed through the wall.[335] This remodeling is on his analysis to have occurred contemporaneously with the insertion of the north Postern Gate, a conclusion that fits well with the use of ashlar conglomerate. Its presence, nonetheless, at this point in the wall rings discordantly with our view of this masonry style as a monumental one aimed at impressing the passerby, for the closest natural access to the tower, as far as we know, is the bottom of the Chaos ravine.

Other ashlar-like constructions are also set where they would have been seen. The terrace retaining wall at the end of the dromos of the treasury of Atreus would have been visible to anyone passing along the base of the Panagia ridge, that is to anyone who approached one of the numerous houses along the ridge, Fig. 96. Further down the ravine, due east of the chapel of St. George, is the Mycenaean bridge or causeway that crosses the ravine and leads off towards the Argive Heraeum, Fig. 153. The masonry is an alternation of slabs of much worn conglomerate and squarish cyclopean blocks of limestone. Although the construction is not strictly ashlar, even under the loose rubric of our definition, the use of conglomerate and the coursed faces of the causeway deserve to be considered with the above examples.[336]

Other examples of this style are not found at Mycenae. Elsewhere in the Argolid ashlar work in conglomerate is not at home. But there are a few instances that merit attention. First is the use of cut and hammer-dressed conglomerate for the jambs and threshold of the Great Gate at Tiryns.[337] Dörpfeld and Müller along with most other scholars considered this gate to be a contemporary relation to the Lion Gate. If anthing, our discussion of this style should reinforce this view and provide a relatively firm date for the Great Gate. As reconstructed by Sulze, the Great Gate had also a relieving triangle with symbolic relief and upper courses od ashlar masonry.[338] And the flanking wall to the east, as described earlier, p. 205, formalized the approach in coursed squared limestone blocks, Fig. 94.

Corroboration of the use of conglomerate for specific monumental construction, such as gateways, outside of Mycenae is found on the Larissa at Argos. Whatever other Mycenaean buildings might have existed atop the citadel, we can be certain there was a formal gateway with massive cut limestone threshold and jambs. The lintel of the gate was formed by a massive conglomerate slab now built into the western wall of the Venetian fortress, Fig. 154.[339]

No other contemporary instances of this style and the use of conglomerate are known from the Argolid or the mainland. But there is one other imposing monument of conglomerate, the great terrace at the Argive Heraeum.

This terrace has been discussed above, pp. 109-112, and corroborative evidence was offered for a post-Mycenaean date on the basis of comparison of its construction as a terrace to Mycenaean terraces. Our interest here concerns the material. The terrace is constructed of massive slabs of conglomerate that was quarried from the acropolis itself. One wonders why this stone was used, and when used, why such immense blocks were selected, especially as it appears that the construction is to date late in the Geometric period.

Without wishing to seem fanciful, I wish to propose the following explanation. Because we have abundant evidence that this cult of Hera was established in late Geometric times, we should consider this event as the principal impetus for the construction of the great terrace. As to why such massive slabs of conglomerate were employed, we need only look to the most impressive standing monument of the time for the answer - the Lion Gate. Though crude of workmanship the terrace wall may be, it carries in its monumental blocks a convincing echo of the Age of Heroes.[340]

Addendum: The Construction of the Southern Gallery

Müller (Tiryns, III, p. 21) argues that the southern gallery dates to the third period in the following manner, Fig. P15 : The first period circuit wall (A) was extended southwards in the second period (B), and then in the third period the galleries and western rooms (XLIII, XLIV) were added on (C). And because the corbelling of the corridor (a-a) depends on the south wall of the second period, that wall must have been dismantled in order to build the corbelled vault. Müller favored this argument because he claimed that the third period walls (C) were largely built of stones originally used in the second period. In order to understand these conclusions, we must examine the architectural relations of the various parts of the walls and galleries of the second and third periods.

Earlier (pp. 208 - 211) it was determined that the southern extension of the second period was built of three units, Fig. P15, 1, 2, 3. Wall unit B1, the western one, is set about 0.20 m. beyond the face of wall unit B2, the eastern one. Between these is the stairway leading to the upper citadel. Müller believed, p. 22, that the stairway led out of the citadel in the second period, although he was unable to find any trace of a pivot or other fastening for a door. He also believed that because the face of wall section B1 was 0.20 m. southwards of the face of section B2, that the faces were necessarily those of an outer wall. But this need not be so, because the difference could be accounted for merely as a constructional practice: each section was routinely offset from the other regardless of position.

Because he believed walls B1-3 to represent a second period, Müller was forced to explain three things: (1) Why the window at the east end of the third period corridor had its north side bonded to the second period wall; (2) how the corbelled vault of the east-west corridor of the gallery was constructed since the north half of the vault constituted the southern face of the second period circuit; and, finally, (3) given the assumption that corbelling is confined to the third period constructions, how and when was the corbelled vault of the stairway in the second period wall constructed? Müller accounted for these anomalies by allowing differences in the masonry style guide his explanations. Thus he determined that the east end of the wall unit B2 was torn down and completely rebuilt in the third period in order to place the window. This accounted for (a) the lack of a joint between the north jamb of the window and the southern face of the second period wall,

(b) for the differences in masonry style along this eastern face: the northern section up to the first period wall had better masonry than the southern section, which constituted the third period rebuilding (p. 22). For the erection of the corbelling of the corridor, it was necessary to suppose that the southern face of the second period wall was torn down, or had remained unfinished, and this is recognized in the presence of many "re-employed" blocks in the gallery. These re-employed blocks were identified as being smaller and having less regular faces than the blocks of wall B (p. 22).

The conclusions drawn by Müller were not the only possible ones. The differences in masonry style and block size can be satisfactorily explained by the practice of unit construction: The blocks selected for one unit need bear no relation to those of another unit, and variation in style is admissable within a given period, e.g. the north wall of the Middle Citadel, Fig. 131, above, p. 206. Moreover, the architectural relation of units C to B only requires that C with its abutted sections at points 'a', 'b' and 'c' be built after B, and does not specify how long thereafter. Because the corbelled vaulting unifies sections B and C in the upper wall courses and at the eastern window, it would be easier to consider the construction of B and C as essentially simultaneous, i.e. part of the same plan. Then the corbelled vault over the stairway (whose construction is a piece of cyclopean acrobatics because the vault ascends as do the stairs and also turns the corner) can easily be viewed as contemporary with the stair's erection. Any other explanation requires a secondary explanation of what the state of the stairs was throughout the second period; according to Müller they would have been uncovered. A glance at the drawing, Fig. 220, and the photograph in Tiryns, III, p. 59, fig. 40, shows how the corbelling starts midway down the stairs and slopes down the following steps. If this passage was left open during the second period, it must either have also stepped down then or have continued at the highest preserved level of the uncorbelled side walls (elev. 24.43 m.) and, consequently, have been torn down when the vault was installed in the third period. This is, of course, possible and not beyond the imaginable and actual efforts of normal Mycenaean building. The view, however, that units B and C are contemporary is more economic and requires less explanation of non-existent information.

When this addition was built, we cannot ascertain. Müller's position that the corbelled work is all of the third period is a sensible one and has been corroborated by recent excavations, above,

Notes

[222] Epinikoi, 38 (X) 77; cf. R. Jebb, Bacchylides (Cambridge: 1905) p. 329 and nt. toll. 77f. Hellanicus (FGH, 179) and Pherekydes (FGH, 26b) referred to the Cyclopes, as did Pindar (fr. 169) as being active in the Argolid, but they are silent on their building activities. One wonders if there might be a reason why the story of the walling of Tiryns first appears with Bacchylides. I thank M.J. Mellink for the reference to Bacchylides.

[223] W. Leake, Travels in the Morea, vol. II, pp. 350, 354-355 et passim; H. Schliemann, Mycenae and Tiryns, pp. 3-4; C. Tsountas, Mykenai kai mykenaios Politismos, p. 13; Wace, Mycenae, p. 49; Mylonas, MMA, p. 16.

[224] Thus Vermeule in Greece in the Bronze Age, p. 264; Mylonas, MMA, pp. 14-21 et passim.

[225] Cyclopean masonry in terraces is noted above, Chapter III, and intermittently throughout this discussion; for bridges, culverts and causeways it is discussed in the section on corbelling, below, pp. 223-224 , and elsewhere as appropriate. Thessaly with its numerous Late Bronze Age walled sites is not included here, pri-

marily because I have never visited these sites and, also, because very little is published about them as yet; they are, moreover, located very much at the northern reaches of Mycenaean cultural influence: see P. Halstead's paper, "Prehistoric Thessaly: The Submergence of Civilisation", in Mycenaean Geography, ed. J. Bintliffe, The British Association for Mycenaean Studies (Cambridge: 1977) pp. 23-28. For prehistoric sites in Thessaly see V. Milojcic, AA, 65 (1955) cols. 221-230 (Petra), cols. 230-231 (Ktouri); 70 (1960), col. 150; GAMS #485, 490, 499, 537, 541.

226 I prefer the word "massive" to "megalithic" in order not to confuse the masonry of Mycenaean Greece with culturally different masonry of sites in Malta, Spain and Portugal, Germany, the British isles and elsewhere that is truly megalithic and has no relation to the Mycenaean. For an excellent discussion of rubble masonry and comments about cyclopean see, E. Hansen, "Emploi de pierres brutes dans les constructions surtout à Delphes", Mélanges hellénique offerts a Georges Daux, (Paris: 1974) pp. 159-162. I owe this reference to I. Mark.

227 Schliemann, Mycenae, pp. 116-117; Müller, Tiryns, III, p. 177; Hansen, above. Conglomerate was quarried from the hill atop the modern village of Mycenae (Charvati), directly behind the modern town hall and

excavation headquarters (the Melathron) and also along the Kalkani ridge. A walk from the village to the site along the back road discloses many traces of this quarrying.

228 Müller, Tiryns, III, p. 57, remarks that the well coursed masonry of the eastern flanking wall of the Great Gate is a monumental expression comparable to the conglomerate ashlar of Mycenae, below, pp. 228-236.

229 There are at least three other significant sites with known or likely Middle Helladic or early Mycenaean circuit walls, Geraki in Laconia, the Aspis of Argos and Kandia near Asine. Geraki has never been properly excavated; MH is very evident and the circuit wall can be considered early for four reasons: (1) The wall runs on a curving course along the contour of the acropolis top; it possesses no offsets or bastions, except one possible one southeast of the northeast gate (BSA, 11 (1904-1905) pp. 92-98), (2) The remains of one gate at the northeast and the possible remains of another approached by a ramp at the west show they were merely simple axial openings through the wall. (3) The wall as preserved in its entirety appears to be primarily a retaining wall; ploughing, however, may have covered the interior face. (4) The masonry is not sophisticated cyclopean; it is uncoursed and the core appears to be of smaller rubble stones, Fig. 97 and BSA, 11, pp. 92-98; 16 (1909-1910)

pp. 72-75; 55 (1960) pp. 85-86; see also a possible LH IIIB wall at Aghios Stephanos, BSA, 67 (1972) pp. 249, 262, wall CJ, fig. 26.

Vollgraff identified two circuit walls with a circular shape on the Aspis: BCH, 30 (1906) pp. 5-45 (pottery and finds); 31 (1907) pp. 139-144 with plan. No date was given, but the inner circuit was ostensibly MH, the outer "cyclopean". They are being re-examined by G. Touchais: BCH, 99 (1975) pp. 707-708; 100 (1976) pp. 755-758 withplan, fig. 9. The presence of occupation strata and architecture of late MH date just within the outer wall may in the final analysis show it to be MH as well.

Kandia was briefly explored in 1938 by K. Gebauer, AA, 54 (1939) cols. 288-293. Remains of Mycenaean buildings were found inside a small cyclopean circuit wall; beneath them was an MH room within a thick MH terrace wall that may also have been a circuit wall.

[230] S. Iakovides, Archaeologia Homerica, E:1, pp. 164-168.

[231] Valmin, SME, pp. 16-20, 69-77.

[232] SME, pp. 17-20.

[233] S, Marinatos, Ergon, 1962, p. 110; Praktika, 1964, pp. 93-94; 1965, fig. 51 Dickinson, Origins, p. 6.

[234] Pylos,III, pp. 4-18; the existence of this circuit has been doubted by Shaw in his review of Pylos, III

Archaeology, 27 (1974) pp. 141-143.

[235] Nichoria: Hesperia, 41 (1972) pp. 240-242, 272-273; 44, 1975, pp. 76-79. Pylos, III, pp. 73-134. Routsi: Praktika, 1956, p. 203. Kakovatos A: AthMitt, 33 (1908) pp. 299-307.

[236] E. Mastrokostas, Praktika. 1965, pp. 123-124: Two Mycenaean structures were found west of the central gate; the earliest one, not dated by phase, post-dates the circuit wall. Below were remains of an EH house cut through by the foundation trench of the circuit wall. Iakovides, Wehrbauten, p. 166, nt. 1114, puts the wall to the end of MH transition to LH. In view of the developed form of the circuit and the lack of an accurate date of the house remains, I would rather see the circuit as later, perhaps even as late as early LH IIIA.

[237] Locally the 'Kastro tis Kalógrias' at Araxos; the site is a few hundred meters south of the modern limestone quarries on the ridge and about half a kilometer west of the airfield of the Hellenic Air Force: GAMS #282. It is identified by Polybius as one built by Herakles (IV, 59, 4). Other reports than the above-cited are Deltion, 18 (1963) Chronika, pp. 111-114; Praktika, 1962, pp. 127-133; Deltion, 19 (1964) Chronika, pp. 187-190; 20 (1965) Chronika, pp. 224-227.

[238] Wehrbauten, p. 167

[239] J. Jannoray and H. van Effenterre, BCH, 61 (1937) p. 323

[240] BCH, 61 (1937) Bldg F, pp. 317-320; Bldg. G, p. 322.

[241] Although the plan shows the wall built in straight sections, I could not detect any angles of intersection when walking the wall; in fact, at the ravine the wall definitely curves.

[242] Wehrbauten, p. 174; Persson, Royal Tombs; New Tombs; CMP, pp. 53, 62, 64-65, 66; Verdelis, ArchEph, 1957, Chronika, p. 15; Åström, Deltion, 19 (1964) Chronika, p. 134; Dickinson, Origins, p. 88 et passim. Although Persson thought the excavations disclosed the remains of a palace, no architectural evidence descriptive of a palace was found, i.e. worked column bases, sawn thresholds of hard limestone or conglomerate or the remains of a terrace large enough to have supported a palace. If one considers the floruit of the site to be pre-palatial, i.e. pre LH IIIA, this lack of evidence would be normal. Late LH IIIB occupation is best demonstrated by the remains of a small structure just inside the gate destroyed during that time: Åström, Deltion above; "The Destruction of Midea", Atti e Memorie del 1° Congresso internazionale di Micenologia, (Incun. Grae. XXV) 1967, pp. 54-57.

[243] *New Tombs*, p. 3.

[244] *New Tombs*, pp.5-6.

[245] The presence of this gate was determined by Persson who noted the bastion, a rampway and evidence that the rampway had been partly formed by cutting away the hillside: *New Tombs*, pp. 5-6. The area was so overgrown when I visited it that I was unable to verify the existence of this ramp. Two aspects of the topography are troublesome: 1) the hillside above the ramp (directly beneath the area of the supposed palace) is undefended, 2) the ascent to the ramp can only be made by an arduous climb up the steepest accessible face of the citadel. On the site I wondered if the western bastion could not have been a tower and guard post defending the undefended slope and a watch station to the plain below.

[246] *Wehrbauten*, pp. 174, 186-189.

[247] *AE*, 1962, pp. 139-143, also 89, 168-182; *MMA* pp. 24-25.

[248] *AE*, 1962, pp. 14-15; at the southeastern corner of the first circuit, fig. 8, this area is contrasted to the reconstruction of the inner face of the north wall between the north Postern Gate and the underground cistern (pp. 11-13).

[249] *Tiryns*, III, pp. 10-11.

[250] above, nt. 66.

[251] F. Noack, <u>AthMitt</u>, 19 (1894) pp. 405-485 with a good survey of the sites in the Kopaïs; early excavation by de Ridder, <u>BCH</u>, 18 (1894) pp. 271-310, 446-452, and later by Threpsiades, <u>Praktika</u>, 1955, pp. 121-124; 1956, pp. 90-93; 1957, pp. 48-53; 1959, pp. 21-25; <u>Ergon</u>, 1960, p. 47; <u>Deltion</u>, 17 (1961/1962) pp. 132-137. The material of these excavations is presently being prepared by S. Iakovides.

[252] De Ridder, p. 273 and nt. 4, recognized this method of construction and observed it was due to "la difficulte de construite des murs courbes et la necessite de suivre les contours de l'Acropole"; Scoufopoulos, <u>Mycenaean Citadels</u>, p. 82 and 98-99, observed this practice, which she termed "section building".

[253] Neither the palace not the circuit wall at Gla are dated; Threpsiades found pottery of the LH IIIB period on the floors of the palace, <u>Ergon</u>, 1960, p. 47.

[254] Schliemann, <u>Mycenae</u>, pp. 4, 29-31; Tsountas, <u>Mykenai kai mykenaios Politismos</u>, pp. 13-14.

[255] Under the direction of E. Stikas the Department of Restoration re-erected many blocks on the circuit walls and tore down and re-built other sections from

1955 through 1959. Many of these areas are identified by Mylonas in his study of the walls: AE, 1962, pp. 27, 28 (Postern Gate), 51-61, esp. fig. 28 (north cyclo. wall), 62-63, 70, fig. 39, pl. 33 (east flank Lion Gate and Lion Gate), 183 (northeastern extension); see also: I, Papademetriou, ArchEph, 1948-1949,Chronika, pp. 45-48.

256 C. Tsountas, JdI, 10 (1895), pp. 143-147; Tsountas and Manatt, The Mycenaean Age, p. 113.

257 BSA, 25, p. 12 et passim

258 Wace, BSA, 48 (1953) p. 15; ArchEph, 1953-1954, vol. 1, pp. 137-140; and BSA, 49 (1954) p. 247; The Aegean and the Near East (1956) pp. 126-135; MycTabs, II (1958) p. 8, nt. 21; contra Furumark, CMP, p. 115.

259 Mylonas, ArchEph, 1958, pp. 172-207, esp. pp. 205-206; Ancient Mycenae, pp. 33-55 and nt. 42.

260 Architecturally this may be considered as the earliest dated evidence of ashlar conglomerate masonry and of the use of the saw on conglomerate.

261 The publication of the destruction groups of pottery is found in BSA, 62 (1967) pp. 149-193.

262 AE, 1962.

263 The pottery of LH IIIA:2 phase was found together with the carbonized remains of small branches and animal bones, among which was a jawbone that Mylonas thought might belong to a goat, AE, 1962, p. 61. The published pottery

consists entirely of decorated sherds, fig. 34, p. 60, and clearly was not used for preparation or serving of the meal that Mylonas believes the burnt feature represented. It, therefore, only dates the period after which the burnt layer must have been deposited in the wall core, i.e. a terminus post quem of LH IIIA:2, or conversely, the period before which the wall could not have been constructed. The actual construction date, which might be established by the discovery of a foundation trench or of construction layers or fills, cannot be determined on the basis of a handful of sherds from a single area.

[264] AE, 1962, pp. 101-109, 184, figs. 60-62, 65-67.

[265] AE, 1962, Postern Gate, pp. 47, 185, figs. 23, 24; northeastern extension, p. 166, fig. 97.

[266] AE, 1962, pp. 2-26, 51-109.

[267] Even though he was able to dismantle sections of the walls, especially at the north, Mylonas hitherto has not published a detailed description with photographs of the state of the original walls beyond that in AE, 1962; the description that follows was made during the summer and fall of 1977.

[268] The assertion of Mylonas, AE, 1962, pp. 52-53, that at no point in the north cyclopean wall was mortar with asprochoma used to lay the blocks of the first course on the bedrock is correct, but mud mortar is still

visible between and beneath many blocks; never, however, was even simple mud mortar visible as thickly applied as in the west circuit wall. Many sections of the north wall are now consolidated or have been rebuilt with cement; I have studied and photographed only those areas that have been left undisturbed.

[269] Mylonas' investigations inside the Lion Gate behind the terrace wall #9 on Wace's plan (Fig. P4) and into the paving of the Great Ramp provide indications of the original ascent and gateway to the citadel, AE, 1962, pp. 88-99, esp. pl. 21 and pp. 130-143.

[270] AE, 1962, pp. 27-50, esp. fig. 16 (Fig.); "E Voreia Pyle ton Mykenon", Charisterion eis A.K. Orlandon, vol. A, pp. 213-224; of special interest are his explanations of the engineering of the lintel and threshold slabs.

[271] AE, 1962, pp. 28-32, fig. 16, pl. 9; pp. 33-45 , pls. 10-11, figs. 13, 14.

[272] AE, 1962, pp. 39-50, drains I, K, in the stretch to point "M" in our Fig. .

[273] AE, 1962, pp. 45-49.

[274] AE, 1962, pp. 101-109.

[275] Mylonas, Praktika, 1966, pp. 103-114; 1968, pp. 5-11; 1970, pp. 118-124; 1971, pp. 146-156, 1972, pp. 114-146.

[276] See the excellent composite photograph of the restored walls in MMA, pl. 8b; the coursed masonry of the smaller blocks is hellenistic.

[277] AE, 1962, pp. 144-148.

[278] AE, 1962, p.145, fig. 88, pls. 28-29.

[279] AE, 1962, pp. 146, 153-157.

[280] AE, 1962, pp. 23-25, 146.

[281] AE, 1962, p. 146 (my translation).

[282] AE, 1962, p. 163; fig. 97 shows the pottery from the three different soundings in the wall grouped together; fig. 98 shows the pottery from the ramp of the Sally Port, which is discussed on p. 156. Although the sherds appear to be of the phase LH IIIB:2 as Mylonas asserts (p. 166), they are few in number.

[283] AE, 1962, p. 182, fig. 102.

[284] AE, 1962, p. 25.

[285] The chronological evidence for the phases of building, destruction and abandonment at Tiryns is complicated and disputed. The most thorough review is that of Åin, Fundstätten, pp. 25-36, valid through 1962. Subsequent evidence has been published by Verdelis and E. and D. French, Deltion, 19 (1965), Meletai, pp. 137-152, dealing with the epichosis material of LH IIIB:2 phase. This material was recently reinterpreted by W. Voigtländer, Tiryns, VI (1973), p. 243, as

dumped fill for the Great Court (II), a conclusion that is contrary to all the detailed architectural and archaeological analysis of Müller (Tiryns, III, pp. 21-22, 119-127, and now Schachermeyr, Die mykenische Zeit, p. 123). Schachermeyr, pp. 119-125, has strongly suggested that the epichosis is not a sealed deposit, but constitutes Schliemann's dump. Though his argument is penetrating, he must surely be wrong: Verdelis stated clearly in 1956 (AE, 1956, p. 5): "Καθ' ὃν χρόνον οἱ ἐργάται τῆς ἐν λόγῳ Ὑπηρεσίας ἐκαθάριζον τὸ τμῆμα τοῦ τείχους τὸ περιλαμβανόμενον μεταξὺ τῆς δυτικῆς πυλίδος καὶ τῆς πρὸς Ν. μεγάλης ἐπιχώσεως ἐκ τῶν ἀπορριμάτων τῆς ἀνασκαφῆς τοῦ Schliemann."
This statement taken in combination with the illustration given by Verdelis, fig. 7, p. 5 and also fig. 8 (see a better print in Deltion, 19 (1965) pl. 65) leaves little doubt that the deposit excavated and published by him bore no relation to the dump, which lay farther south as is clear from the photograph in Tiryns, III, pl. 16. (The excavation of the square area behind the workman shown in the photograph, Deltion, 19 (1965) pl. 65, is the modern clearing away of Schliemann's dump, but not the area of the epichosis).

Recent work in the Unterburg (Lower Citadel) has dated the construction of the circuit wall in the mid-phase LH IIIB, Grossmann and Schäfer, Tiryns, V, pp. 42-54, esp. pp. 43-44; Tiryns, VIII, pp. 94-96. This area is presently being investigated by K. Kilian, and his reports will clarify the sequence from LH IIIB through LH IIIC; at present he has found evidence of a destruction at the very end of the phase LH IIIB:2 with an immediate change of orientation and rebuilding in early LH IIIC (personal communication).

286 Fundstätten, p. 25, nt. 108.

287 Actually a saddle between the Upper Citadel and the Lower Citadel. This is clear from the manner in which the walls are pinched together at the juncture of Mid and Lower Citadels and is confirmed as of 1977 by stratigraphy of a trench in this area that shows the ground level in antiquity sloping steeply southwards into the saddle. I wish to thank K. Kilian for allowing me to mention this trench here.

288 Müller's description of the masonry is found in Tiryns, III, pp. 55-61 et passim; P. Grossmann, AA, 82 (1967) pp. 92-101.

289 Tiryns, III, pp. 4,5, 10, 178-180, figs. 3, 5, 9.

290 Tiryns, III, p. 55; the longest block in the I. period walls is 2.38 m. and 0.90 m. high.

291 Nonetheless, Müller was quick to use his stylistic criteria for corroborative evidence, e.g. the identification of the north-south section west of the northwestern palace stairway entrance as I. period because its mason-

ry resembles that of the I. period, but the section immediately to the north he placed in the II. period by comparison to the Southern Citadel masonry of that period, p. 36.

[292] Tiryns, III, p. 57,

[293] Tiryns, III, p. 57.

[294] There was an entrance at the northwest, even perhaps formed in the I. period, but it appears to have been at all times a utility entrance. In the III. period it was transformed into a defended passageway by the addition of the great curved western wall.

[295] There is a marked tendency to emphasize well built corners, however, which sets all the walls of this phase apart from those of the I. period.

[296] Müller sees the second period as a time of intensive construction, p. 206. This is, perhaps, true for the interior arrangement of the palace and Southern Citadel. In fact, one might consider the palace plan as preserved as of this period. The additions to the defensive walls, however, remain additions to a core and are not organically related one to another as are the walls of the first and third periods.

[297] The next two courses as preserved reverse the joint and give a bond to the upper part of the wall. I could not tell from on the spot inspection if there is any modern restoration, but comparison with the photo-

graphs in Tiryns, III, pl 20, fig. 24, indicate that they are original. They probably are a false bond, i.e. where a stretcher only appears to run deeply into th adjacent unit, but actually is set into a shallow hollow in the other wall face, or a rebuilding in a later period of Mycenaean construction. Müller says the corner is bonded, p. 35: "...und diese Bauart bleibt die gleiche in dem einspringenden Winkel, der Verband zeigt, bis an die Nordostecke der Mittelburg."

[298] Once again I am unable to ascertain the extent of restoration by on the spot inspection and, in this case, the photograph in the publication, pl. 15, is not detailed enough to compare with the present restored corner.

[299] The normal manner of bonding is to build the wall continuously in one direction, even when turning corners; by bonding separate units only a crude bond can be made because it is too difficult to keep equal equal course heights without shaping all the wall blocks-even then the chance of error is very high.

[300] Tiryns, III, pp. 36-37 and nt. 1, p. 37.

[301] Tiryns, III, pp. 26-28, p. 64, fig. 43. There is a problem with this reconstruction, for as Müller pointed out, not only did the ramp preceed the construction of the tower, but also the two elements have nothing to do with each other architecturally. He, therefore,

considered the tower to be of the second period and the ramp-terrace of the first. The resulting quandary, which he was unable to resolve to his own satisfaction, p. 28, was to have a useless terrace with the inclination of a ramp sitting over the best entranceway to the gate of the first period.

302 The protecting wall of the western stairway will not be included in this description because it was preserved only in its lowest courses originally and is now almost completely restored, Fig. 134. This wall and that of the Lower Citadel are among the most heavily restored elements at Tiryns (also the west side of the I. period wall). The restoration was conducted by the Department of Restoration under the supervision of E. Stikas and during the superintendency of N. Verdelis. It was part of a program of restoration in the Argolid begun by I. Papademetriou and carried out in the 1950's and 1960's. During these operations the epichosis, above, nt, 285, was found and excavated and the syringes were discovered and cleaned (Deltion, 18 (1963) Chronika, B:1, pp. 66-73; 19 (1964) Chronika,B:1, pp. 108-118). Unfortunately Stikas did not publish accounts of the work nor a record of what was left in the original state. Today it is often difficult to differentiate between the restored and the unrestored elements. A simple rule of thumbis that the original masonry is darker, except

where it was buried and has been recently exposed, and the restoration is lighter and, also, cruder, cf. AA, 82 (1967) fig. 3, p. 99. Photographs from the early excavations of Tiryns, including those of the late nineteenth century, provide an accurate account of the state of the walls after their discovery. They can be compared with present day photographs of the walls, and the distinction between the original and restored masonry then becomes clear. The relevant photographs are on file as prints in the German Institute in Nauplion, as negatives in Athens: DAI Negativen, Tiryns, 5, 8, 33, 36.

[303] AA, 82 (1967), pp. 92-101.

[304] Tiryns, III, pp. 57-58, 61.

[305] contra Grossmann, AA, 82 (1967) p. 98.

[306] AA, 82 (1967) p. 98.

[307] Grossmann, p. 99, discusses the techniques of hammer dressing and says that hammers of hard stone like diorite or basalt would have been used. These stones would, however, have to have been imported; perhaps some locally available material was used instead.

[308] That is to say that the blocks forming the core were set behind the blocks of the outer face, but they were not courses in a formal sense.

[309] Dörpfeld, Tiryns, p. 204; Müller, Tiryns, III, pp. 4, 39; Grossmann, AA, 82 (1967) p. 100.

[310] I have not been able to confirm the presence of these staggered or step-like joints in my inspection of the walls and have not discovered how Grossmann made this observation except on the basis of negative evidence: there is no trace of built terminations that extend from face to face. On the contrary I would expect that built faces would be found at some sections if the wall were dismantled, see Fig. 111, nos. 28 & 22, P16/ 30 & 31, 14 & 36, 4 & 42, 3 & 44.

[311] Grossmann, AA, 82 (1967) p. 95, but he is wrong to doubt that curved walls generally existed in Mycenaean fortifications; we have noted them at Athens, Midea, Mycenae, Krisa, and Teichos.

[312] Cf. the footing at the southeastern side of the Southern Citadel, Fig. 17.

[313] Müller, Tiryns, III, pp. 60-61 on corbelling, pp. 53-54 on the niches.

[314] Thorikos, T. 2, Thorikos, V, p.38-48; CMP, p. 48. Bridges, Tombs, pp. 189-192, chart, p. 217, observes that only fifteen examples of relieving triangles are certain, but predicts that other s may be undiscovered behind facade walls.

[315] A kind of model of a corbelled vault exists in Athens in the niche in the west bastion below the Nike Pyrgos, N. Balanos, ArchEph, (1937, pub. 1953) vol. 3,

pp. 776-807, fig. 20. It should be considered in a symbolic context rather than a structural one.

316 P. Grossmann and G. Schäfer, Tiryns, VIII, pp. 94-96, where the sequence of buildings #3 and #4 inside the wall is established.

317 Place names for the following structures are those found in Steffen, Karten, pl. 1.

318 The ravine has shifted its course westwards of the vault of the bridge; the alluviation before and behind the bridge is easily identifiable.

319 MMA, p. 87, fig. 79; Wace, Mycenae, p. 23, fig. 38b.

320 MMA, p. 87.

321 Mylonas, "To Threskevtikon kentron ton Mykenon", Pragmateiai tis Akademias Athenon, 33 (1972) p. 19, fig. 2.

322 Mylonas, Praktika, 1963, p. 103, pl. A'; MMA, p. 29.

323 K. Rowe and A.J.B. Wace, BSA, 49 (1953) pp. 254-257.

324 Tiryns, III, p. 61; of course this does not apply to the chambers of tholos tombs.

325 Of note here is that the doors of the eastern gallery chambers have key blocks while those of the southern gallery chambers do not, e.g. Tiryns, III, fig. 23, pl. 15. The difference is accounted for by noting that the vault of the east gallery is formed by one course and a wedge while the southern gallery chambers are formed

of two courses, the last one with contingent blocks, cf. Müller's comments, _Tiryns_, III, p. 34, that the explanation of the differences is to be sought in the selection of blocks.

[326] _Tiryns_, III, p. 42.

[327] N. Verdelis, _Deltion_, 18 (1963) Chronika, pl. 84.

[328] G. Karo, _AJA_, 38 (1934) pp. 123-127, pls. XII-XIII; J. Caskey, _Hesperia_, 40 (1971) pp. 365-367, fig. 6, pl. 78, discusses his discovery of a syrinx through the MMIII fortification wall at Aghia Eirene; the syrinx has a slabbed roof that steps down. There are two differences from the Mycenaean examples aside from that of date: (1) that at Aghia Eirene does not have corbelled side walls and (2) the practice of laying slabs for roofs is a distinct local custom at Aghia Eirene, as Caskey points out.

[329] On the conglomerate quarries see: Steffen, _Karten_, p. 24; Schliemann, Mycenae, pp. 41, 117; on the geology of the area and esp. conglomerate formations: Philippson, _Die griechische Landschaften_: _Der Peloponnes_, vol. III: 1 (Frankfurt am Main: 1959) pp. 99-100, 135; H. Lehmann, _Argolis_, pp. 17-20, esp. 70-71, 72-73.

[330] Dickinson, _Origins_, pp. 62 and nt. 24, 63; Wace, _BSA_, 25, pp. 316-338.

[331] _BSA_, 25, pp. 320-325: Bridges, _Tombs_, pp. 7-11.

[332] BSA, 25, pp. 338-376; Mycenae, pp. 28-33, 119-131; BSA, 50 (1955) pp. 194-198, 209-237; Bridges, Tombs, pp. 14-18.

[333] In the Klytemnestra tholos the coursing of the dromos walls is more regular.

[334] AE, 1962, pp. 62-63.

[335] Praktika, 1966, p. 105; MMA, pp. 78-79.

[336] Blegen believed this bridge to be Geometric in date, principally on the masonry style, which he compared to the Great Terrace of the Argive Heraeum, Prosymna, pp. 19-20, but also because of the great number of Geometric sherds lying about on the ground around the bridge. Cook's discovery of the Agamemoneion in this area, BSA, 48 (1953) p. 30, explains the presence of the pottery. The causeway fits well into our explanation of the use of conglomerate at Mycenae and is one of the principal monuments of the Mycenaean road system around Mycenae; there should be no doubt about its pedigree.

[337] Tiryns, III, pp. 7-73.

[338] Tiryns, III, fig. 47, p. 72; the height and restoration of the flanking walls in the reconstruction is perhaps exaggerated; compare the actual remains as shown in pl. 21 with the reconstruction, esp. the western wall.

[339] G. Vollgraff, Mnemosyne, 56 (1928) p. 6.

340 It is remarkable that the Agamemnoneion was situated directly on the east bank directly upstream from the causeway at Aghios Georgios, along the line of the Mycenaean roadway to the Heraeum, and dates also the Late Geometric times: Cook, BSA, 48 (1953) pp. 30-68. In a lecture delivered to the British School at Athens in the spring of 1976, A. Snodgrass attempted to marshal archaeological evidence that the Late Geometric peoples "discovered" the Age of Heroes by casual and fortuitous contact with Late Helladic remains such as tombs, tholoi, architectural remains such as the bridge and the Lion Gate, as well as through Homer. This discovery they recognized, according to Snodgrass, as lending historical validity to their legends and dim perceptions of their past, and spurred them to depict the Heroes in art, worship them in ancient, hallowed spots and emulate a few of their monuments.

VI. CONCLUDING REMARKS

The principal direction of pursuit when assessing the information presented in this study is to interpret the material in an historical and cultural framework. This requires separate consideration of (1) the architectural value of the information, (2) the extent of foreign influence in the architecture, and (3) the extent to which the architecture is indigenous. Since the study has focused on only two aspects of Middle and Late Helladic architecture - building practices and the basic elements of construction - and these only in so far as they related to masonry practices, it is necessary to consider to what extent conclusions can be drawn about the development and organization of the architecture under consideration.

Before proceeding with any discussion, therefore, it should be pointed out that owing to the limited scope of the study, remarks on the above-mentioned considerations are necessarily tentative and intended more as preliminary to further research than as conclusive. Only the masonry and its fundamental application with regard to foundations and walls was examined. Excluded was the bulk of the architecture: mudbrick, pise and half-timbered wall construction, doorways and gateways, windows, stairs, roofs, floors, columns, pillars, antae, water supply and drainage, metrics, and finally, plan. Thus, much information relating to specialized practices cannot be assessed. There is, nonetheless, much to be said for the limited material studied, and it will provide us with a general picture of the development and culmination of Mycenaean architecture as well as directions of further inquiry.

The Architectural Value of the Information:

The architecture of prehistoric Greece was not a science but a tradition. The homogeneity of building forms in the Middle Helladic period is sensibly understood as a reflection of the manner by which houses were constructed, i,e. by the family, perhaps with the help of neighbors, and within the local definition of the suitable architectural responses to the basic structural needs of the family. The similarity of building practices between the vernacular architecture of the Middle and Late Helladic periods bespeaks the continuity of this tradition. This is especially seen in plan.[341] In terms of construction it is observable in the practice of founding simple domestic structures in both periods in simply cut shallow trenches, the placement of a light rubble socle in the trench, and the erection of a light mudbrick or pise wall atop the socle. These simple structures rarely needed interior supports, special entrances or stairs and, consequently, specialist construction is not recognizable, not even in the buildings of the well organized Middle Helladic town of Malthi, Fig. P6, and only rarely in the flourishing late Mycenaean settlement of Korakou.[342]

The traditional practices, however, were unsuitable in their original form for the founding of structures larger, more complex and differently situated than the simple, rectangular village houses. Thus when these larger buildings began to appear, new and more sophisticated practices were introduced.

The first sign of a change in construction practice is the introduction in LH II of cobbled foundation beddings in the trenches of the first mansion at the Menelaion. Also new is the placement of timber in the walls. The construction of the bedding would appear to have been principally a means of providing a secure and level surface upon which to build a half-timbered wall, Fig. 165.

The use of a foundation bedding subsequently became a common practice with examples ranging from the Palace of Nestor in Messenia to the large houses at Mycenae. It seems not, however, to have been employed after the destruction of the palaces with the exception of the cobbled levelling course atop the foundation wall of Megaron W at Tiryns, above, p. 29. The probable reason for this is the lack of complex plans and the cessation of half-timbering after the destruction of the citadels.

The second period construction at the Menelaion of an elaborate terraced platform in early LH IIIA:1 well documents an immediate and effective change in local construction practice. It demonstrates the degree to which the builders recognized the problem they faced in re-building their mansion and how quickly they developed a successful method of dealing with it.

These instances inform us that the Mycenaean builders had not only a well developed practical grasp of the structural demands of their larger buildings, but probably also an abstract concept of appropriate solutions to the problems of load and lateral and vertical movement. The compartmentalized construction of terraced foundations further supports this observation. For example the Southwestern Building at Pylos, which is preserved only in its foundations, clearly shows how the practices of terraced foundation construction had been developed to break up artificial fill and prevent lateral movement as well as to place the load of each wall directly on the stable ground surface rather than on the fill. This practice was refined in details such as the buttressing of the terrace wall at the southern corner of room 65, Fig. P 18, and the thickening of the walls of that room and, also, of those of room 81. These two practices of strengthening walls and founding them on stable ground were seen, also, to be paramount in palatial constructions such as the platforms at Tiryns and Gla, the rooms of the Southern Citadel at Tiryns, and in the placement of circuit walls at specific locations upon the bedrock from early in the Mycenaean period (Teichos of the Dymaians) through late (Lower Citadel of Tiryns).

In conjunction with the concern to compartmentalize terrace fills was the knowledge that moisture should be kept out of them. The evidence of hydraulic sealings over fills of rubble in the palatial terraces at Mycenae and the packing behind the walls of tholoi, as well as the numerous instances in terraced platforms and passageways, documents this additional concern for the stability of the terrace fill.

The compartmentalized construction of terrace platforms and circuit walls is of primary importance in assessing the expertise of Mycenaean masons. Not only did they have many structural advantages, but they were also important in giving the builders the opportunity to place their structures where they would. In this regard the II. period mansion at the Menelaion is important because by the construction of a platform terrace, the mansion was placed where the builders wished rather than where nature dictated. It is possible to see the same aim at work in the Southwestern Building at Pylos which, placed at the southwesternmost end of the ridge, enjoyed an unobstructed view of all of the land and sea before it, and also in the Palace at Mycenae, which not only gained the view, but also left space for the remainder of the palace on the crown of the citadel. At Tiryns the terraces enlarged the palace area, especially at west and south, and also allowed the imposition of a single palace plan on a uniform level.[343]

In terms of defensive architecture the system of building in compartments or units appears to have taken two forms exemplified at Tiryns and Gla. The first, and perhaps earliest if associated with Midea, is the construction of separate sections of wall that were subsequently bonded together forming a more or less continuous face. Essentially this involved building adjacent open-ended boxes of wall, Fig. 225, which were later patched together. At Tiryns the Lower Citadel walls were evidently built in this manner. Often, where the bedrock changed in height or direction, it was necessary to change the course of the wall, and at these points a formal offset corner was constructed, probably to insure accurate control over the position of the wall and also to facilitate the bonding between adjacent units. For this reason some of the offsets do not correspond perpendicularly through the wall.

At Gla this system of building corners was evolved into a method of construction. The construction of the wall of rectangular box-like units much facilitated the work on the 3 km. enceinte. The position of each unit was determined by two factors - its relation to the ad-jent preceeding unit and the bedrock. Concern with bonding adjacent units was minimal. Planning, too, was minimal since the basic principal was to follow the contour of the acropolis rock. Construction was quick and efficient. The system of building closed boxes minimized the need to build the interior with care, and it is likely that the core was not coursed in conjunction with the faces.

One last aspect for consideration is corbelling. As pointed out earlier, corbelling was only late in the Mycenaean period taken from funerary and introduced to military architecture. At that time we observed how it was employed for a multiplicity of purposes which changed and elaborated upon the previous simple used of corbelled vaults for relieving triangles. This adaptation of corbelled vaulting exemplifies the developments in all of the practices just discussed - foundations, terraces and circuit walls. It shows how the Mycenaen builders took from their traditional practices and constructions and created effective new or more developed practices to handle the more complicated demands of their more complexly organized society. Further study , therefore, will undoubtedly be more rewarding. For example future work might concentrate on wall construction, thickness, span and load and examine technical developments in relation to them.

The Extent of Foreign Influence:

The recognition of the introduction of foreign practices and materials of construction depends upon the identification of local and foreign building practices and materials and a comparative study of them. It is beyond the scope and capability of this study to make concluding observations on the basis of these criteria. To do so would require a separate definition of how far afield research should go to identify foreign practices and, even, what was to be considered foreign (see below, p. 279). Furthermore, too few practices have been studied here to begin to offer a complete assessment of this problem, for example the technique of half-timbering and the application of decorative details such as veneers, special floorings, doorways and columns will be of special significance to this problem when completely studied. Therefore, we will select only two of the most recognizable practices for discussion: poros limestone ashlar masonry and cyclopean masonry. In this manner we can avoid having to discuss the identification of local practices as a means of recognizing foreign ones and, also, avoid the necessarily detailed comparative study of indigenous and local practices.

Ashlar Masonry:

The principal reasons for believing that ashlar might have been introduced from Crete to the mainland are the presence of Linear A signs on some of the blocks, the early LH I/II appearance of ashlar on the mainland, the similarity of size, shape and material of the Mycenaean and Minoan ashlar blocks, the use of dove-tailed mortises to receive wooden tenons that secured the blocks to the rubble wall core, the use of square dowels to hold horizontal timbers along the outer face of the blocks, and the occasional use of mortar (see above, pp. 134-151). To these we can add the frequent cutting of beddings for the timbers both parallel and perpendicular to the wall face, Fig. 206,[344] and the practice of cutting ashlar blocks to interlock with each other at offset corners, Fig. 205.[345]

There are fundamental differences in the ashlar masonry of the Mycenaean mainland and Minoan Crete however. First is the original Mycenaean use of poros ashlar only on tholos tombs as opposed to the Minoan practice of using it forbuildings. On the basis of present evidence only with the erection of the palaces, perhaps as early as LH IIIA, did ashlar begin to be used in civic architecture, and this was long after the destruction of most of the Minoan palatial centers. Second is the principal Mycenaean use of poros ashlar in tombs and buildings as a masonry facade backed by rubble as opposed to its frequent use as a structural masonry, i.e. with ashlar forming the exterior and interior wall surfaces, in Minoan Crete. In connection with this use of ashlar by the Mycenaeans, it is important to point out that the introduction of dove-tailed mortises, square dowel holes, horizontal timber emplacement and a regularization of course height only began on the mainland with the erection of the palaces. Thus the principal body of evidence supporting the view that the techniques of Mycenaean ashlar were imported from Crete is much later than the palatial period of Crete and too late to be related to the introduction of ashlar in tholos tombs. In view of this evidence we may ask three questions. 1) Did the early Mycenaeans hire Minoan craftsmen to do the ashlar work of their tholos tombs?

Distribution of Tholoi with Ashlar Poros/Sandstone Masonry:

Mycenae:	Aegisthus (II. phase)	LH II	stomion, facade
	Panagia	LH II	facade
	Kato Phournos	LH II (late)	dromos, dromos blocking wall
	Lion Tomb	LH II ?	dromos, dromos blocking wall
	Genii	LH III A ?	dromos blocking wall, relieving triangle
	Atreus	LH IIIA/B	dromos blocking wall, tumulus enclosure
	Klytemnestra	LH IIIA/B	dromos blocking wall, tumulus enclosure
Argive Heraeum		LH II	facade
Berbati		LH IIIA:1	facade
Dendra		LH IIIA:1	poros jambs
Messenia:			
	Kambos	LH II/III	facade and stomion
	Tragana 1	LH II/IIIA:1	facade and stomion
	Peristeria 1	LH II	facade

2) Did these masons teach the Mycenaeans their craft?

3) Did the Mycenaeans later import Minoan masons to do specialized work for the construction of the palaces?

Consideration of the first two questions leads us to observe that two things are necessary for the practice of ashlar masonry of this kind: a local source of soft stone such as poros, sandstone or gypsum, and the appropriate tools to quarry and shape it. Furthermore, one must possess the necessary skills to quarry and shape the stone. Since there is no evidence of specialist architectural skills of this nature having been practiced on the mainland before LH II (beginning with the I. period mansion at the Menelaion, Figs. 63, 71, and Peristeria tomb 1), it is reasonable to assume that the initial appearance of ashlar on the Mycenaean mainland was the work of foreign specialist craftsmen, presumably Minoans imported to do decorative work on the tholoi.

Since the distribution of tholoi with ashlar facades is limited to Messenia and the Argolid (see chart facing page), and spans a period of at least two hundred years (LH II - LH IIIB early), there is no compelling reason to believe that the Mycenaean mason learned this craft solely for this purpose. On the other hand there are facts and considerations that suggest that the Mycenaeans, or at least the craftsmen at Mycenae, cut their own ashlar blocks and developed their own style. First is the relation between limestone and conglomerate ashlar styles in the tholoi, above, pp. 228-236. The introduction of conglomerate is dated to LH II, though not to its earliest architectural phase in terms of the tholoi (e.g. Peristeria T. 1, Aegisthus 1st phase, above, p. 230). In light of the extremely localized source of conglomerate and its later extensive use as an ashlar and as a cyclopean style at Mycenae, it is reasonable to imagine that a group of specialized masons grew up at Mycenae, if not in the Argolid, who cut poros and conglomerate ashlar masonry. By and large these men worked locally, though it is not improbable that they travelled as well.

Whether or not these men did the ashlar work in the palaces cannot be decided merely on technical grounds, for the ashlar work in the tholoi (except the LH III retaining wall of the Atreus tholos) lacks significant comparative details. First the coursing of the tholoi ashlar is often uneven, and course heights and block size are often greater than in the palaces, e.g. Aegisthus: 0.60 x 0.93 m., 0.55 x 1.10 m., 0.58 x 1.07 m. (H. x L.). Second, by its nature the ashlar work of the tombs did not require horizontal timbering. Last, except for the retaining walls of the Atreus tholos, none of the blocks of ashlar in tholos tombs to my knowledge has dove-tailed mortises for tenons that secure the facade to the backing.

Dimensions for Ashlar Blocks (for Pylos, see chart, p. 145):

<u>Mycenae</u> -

		L.	H.
Megaron Porch,	1st course,	0.90	
		0.75	
		0.72	0.60
		0.75	0.60
		1.01	0.60
	2nd course,	0.83	0.68
		0.71	0.68
		1.05	0.68
Court, N. wall			H.
(L. vary, e.g. 0.70 0.89, 1.43, 0.92)			0.52
			0.41
			0.43
			0.39
			0.35

<u>Thebes</u> -

	L.	H.
1st course,	0.93	0.58
2nd course,	0.63	0.45
	0.45	0.45
3rd course,		0.36

Thus the practice of ashlar construction found in the palace facades is new in comparison to that of the tombs.

Given that the majority of ashlar faced tombs are at Mycenae and environs, it is conceivable that the palatial practice was developed there and spread via master craftsmen and their gangs to other centers. Thus the similarity of construction of the ashlar walls at Pylos and at Thebes and Mycenae indicates some connection in the palatial period (see chart facing page). The significant common aspects of the masonry at this time are its use as a facade for half-timbered rubble walls, the close relation in the order of coursing and placement of horizontal beams, and the dimensions of course heights. Certainly knowledge of the craft had spread widely. Significant in this respect is the common use of poros limestone and sandstone for the risers of stairways at Pylos, Mycenae and Athens.[346]

But it is by no means impossible that each palatial center maintained its own masons and, perhaps, even had its own tradition. This is particularly likely at Pylos where there exist remains of at least three different palatial structures (above, p. 136), all of which were built with ashlar facades. In this case, the hypothesis of a group at Mycenae having developed the style from the tholoi needs to be given greater chronological precision, since these men would have to have worked, or introduced their style, at Pylos and at Thebes by the time of the construction of the first palaces at those sites, whose construction unfortunately is not dated, above, p. 136.

There remains the close technical relation between Minoan and Mycenaean ashlar work. It may be suggested that this relation represents the work of a small group or school of Minoan masons who aided palatial construction on the mainland in the early LH III period. These men could have travelled to different sites and even taught local masons their skills. As specialists they would not have influenced plan, though perhaps appointment, hence the gypsum flagging at Mycenae and a dado of gypsum at Citadel House (unpublished). Certainly it might have been possible to bring craftsmen from Crete in LH IIIA - LM IIIA times to the mainland since exists considerable evidence of Mycenaean domination on Crete at that time and even some Mycenaean architectural forms on Crete at that time.[347] The problem with this view is that on the one hand it forces us to view the ashlar work of tholos tombs separately from that of the palaces. But we have seen that this is a possibility, even though our analysis of the relation of poros and conglomerate ashlar in the tholoi and their developement from LH II through LH III speaks for an indigenous group of craftsmen. On the other hand the attempt to see the handiwork of late Minoan craftsmen in the Mycenaean palaces is somewhat frustrated because we are forced to compare the work of LH IIIA/B with that of the earlier neo-palatial period of Crete and earlier, there being a dearth of architectural parallels from the intervening periods LM II - LM IIIA/B.

Until the discovery of a more decisive relation between the ashlar work of the tholos tombs and the Mycenaean palaces and of more evidence for the construction date of the Mycenaean palaces and for the architecture of LH II, we may be safest in reserving judgment on this problem. Nonetheless, the possibility of Minoans working directly with Mycenaeans on the palaces remains strong.

Cyclopean Masonry:

The next possible area considered in this study that may have been subjected to some external influence is cyclopean masonry as employed in fortifications. Although Crete was not fortified in the Bronze Age and cyclopean masonry does not occur there, some of the islands of the Cyclades were fortified, in particular Phylakopi on Melos and Aghia Eirene on Keos. Both were fortified in the Middle Bronze Age and again at its end and toward the beginning of the Late Bronze Age.[348] At the same time, as we have shown in Chapter V, some of the mainland sites began to be fortified. But the fortifications of the island sites are the more advanced. In the case of Aghia Eirene the MMIII-LM IA fortifications mark a radical departure from the previous fortifications: straight thick cyclopean walls with angular bastions and an underground water supply replaced narrow rubble walls with semi-circular projecting bastions. The II. period fortifications at Phylakopi are comparably cyclopean forming straight wall sections with frequent offsets. The offsets range from about half a meter to several meters deep. At least one (grid C5 at 13 c) appears to occur with a vertical joint in the wall.[349]

Iakovides has dealt with the problem of the relation of these important and active island centers with the mainland by only considering Aghia Eirene and placing it within the orbit of the Helladic world.[350] Certainly the island of Kea is, except for Aigina, the most accessible of the Cyclades to the Mainland, but at this time (MMIII - LH I) the preponderance of cultural connections of Aghia Eirene is with Minoan Crete.[351] So, too, Phylakopi and the other cities of the Cyclades were oriented towards Crete. The islands were also much more architecturally and culturally developed at this time than the sites of the mainland. One need only compare the architecture of Aghia Eirene, Phylakopi and Thera with that of Malthi and contemporary remains at Mycenae and Tiryns to see the difference. And whatever the date of the more developed fortifications of Teichos of the Dymaians, Krisa and Midea - MH, LH I, II or III, they are not as developed as those of Aghia Eirene and Phylakopi. In particular, they do not yet exhibit the offset trace. The walls of Phylakopi only find good parallels in the LH IIIA:1 fortifications at Tiryns, Fig. P12.

Thus we find ourselves once again making close comparison between the mainland work of LH IIIA and foreign work of LH I or earlier. But it is far from unlikely that the rise of cyclopean fortifications on the mainland was not affected by those of the Cyclades. The most visible borrowing was that of the construction of the wall face of massive rubble blocks. This is witnessed in the change from smaller rubble walls at the early sites (Malthi, Pylos) to massive ones (Teichos, Krisa). At Krisa the borrowing is especially apparent in the shell-like construction of the walls and the monumentalizing of the gate facade. It may be, too, that the construction of the I. Citadel circuit wall at Tiryns will be found to be similar to that of Phylakopi when further investigation of this problem is conducted.

In general we have no reason to doubt the Mycenaean development of cyclopean fortifications as outlined above in Chapter V. But it is reasonable to see the impetus for this style as coming from the Cyclades when they were at their cultural peak and the Mycenaeans were just beginning to fortify their towns. Surely, though it is one of the ironies of history that it is Bacchylides of Keos' account that first tells us of the building of the great walls of Tiryns by the Cyclopes.

<u>The Indigenous Character of the Architecture</u>:

The discussion of traditional buildingpractices of the Middle and Late Helladic vernacular architecture, above, p. 265, has already provided a basic definition of indigenous Mycenaean architecture. Here we shall elaborate on this identification to include the more formal and monumental facets of Mycenaean architecture.

The local nature of Mycenaean building practices can be broken down into three elements, materials, techniques and locale. From Middle Helladic through Mycenaean times local materials were employed for wall construction - flat stone slabs in the southern and western Peloponnese, alluviated stone when near rivers or on alluvial deposits as at the Menelaion, coarse raw stone in mountainous areas; local marls for mortar and plaster; and timber. In conjunction with these materials are the techniques that can be identified in the vernacular architecture that continue to be used during palatial times. Some good examples are the practice of making preparatory cuttings for buildings and walls when feasible, the construction of buildings on terraces, the tendency to found walls on stable ground and the tradition of rubblework. Although these are generally recognizable practices in many Mediterranean cultures, taken in combination with the use of local materials and the architectural plan of the buildings, a distinctive character can be discerned.

Because the Middle and Late Helladic peoples inhabited acropoleis, they necessarily had to create level areas for construction. As we have observed, the terrace was the most common and effective solution of this need, and because the acropoleis were inhabited continuously through the Bronze Age, we have been able to trace the development of terrace form and construction over the wide geography and time span of the Middle and Late Helladic periods, above, pp. 105-108. Then we noted that terrace construction appeared to be an indigenous development in response the increasing organization of Mycenaean society and reached its culmination in the terraced platforms of the palaces. Recognizable indigenous details were the inward thickening of retaining walls, concern with compartmentalizing terrace fill, the similarity between foundation and palatial terraces, and the desire to control the siting of buildings. In view of the influence of locale on terrace construction and by comparison with the lack of as highly organized a terrace technique in contemporary or earlier Minoan and Cycladic architecture, we are justified in concluding that the extensive use of the terrace in Mycenaean times, particularly the complex terraces of the palaces and large palatial period houses, was an indigenous response to the increasing need for a more complicated architecture.

This view is verified in consideration of the tradition of rubblework in Mycenaean architecture. As noted already the local influence of available stone much affected rubble construction including cyclopean construction. Thus the absence of good outcrops of limestone in the southwestern Peloponnese contributed to the lack of a development of a cyclopean style there. And in spite of the the probability of influence from the Cyclades the styles of cyclopean vary greatly from site to site and region to region and can be seen to develop in time. Furthermore, cyclopean masonry was shown to be a monumental form of rubblework with the use of chinking stones and mortar to maintain coursing, the placement of large stones with flat faces at the exterior of the wall and the strengthening of corners with larger and more regular blocks.

The tendency to monumentalize cyclopean work from early through late Mycenaean times is exemplified by the development of ashlar conglomerate masonry at Mycenae in the thirteenth century B.C. and there is no question of the local nature of this practice. Technically corbelling well documents the Mycenaeans' ability to develop new applications of old practices.

Thus we see the Helladic character behind these practices and elements of constructions reaching back to old traditions and developing them for new needs and tastes. And whem their own devices failed, or there existed no means of solving an architectural problem or elaborating a form, the required practice or technique was learned or imported from abroad and used, often until it, too, became a Mycenaean trait.

This study has been fruitful from many points of view. It has described in detail the basic masonry practices of Mycenaean architecture and documented their development through the Mycenaean period. This has enabled consideration of the architectural value of Mycenaean building and comparison with foreign practices. as well as an assessment of the importance of the Mycenaean architectural tradition. Beyond these results, the study has raised questions concerning the interpretation of the architecture of the principal sites and pointed out directions for future study and excavation. More fruitful, then, will be this future research, for it would not doubt constitute a major addition to the body of knowledge of Mycenaean civilization and to our understanding of these early Greeks.

Notes

341 See Sinos, Hausformen, pp. 73-97, above nt. 7.

342 A column base in House P, Korakou, p. 86, fig. 118, and especially the cut stone threshold with a pivot hole, fig. 125, p. 97.

343 Contrast this level platform with the deep cutting in the east side of the hill at Knossos for the Residential Quarters.

344 Shaw, Minoan Architecture, pp. 174-183, demonstrated that many of these cuttings were for timbers that formed the sill of windows; there are,,however, examples in the Mycenaean palaces that did not form windows, e.g. the wall forming the southern face of the entrance to the Grand Staircase at Mycenae, Fig. 206.

345 Minoan Architecture, fig. 92, 94.

346 Pylos, I, pp. 112, 167; Mycenae: BSA, 25, pp. 149, 159; Wace, Mycenae, p. 137; Athens: MAA, pp. 175-178.

347 Gournia: see, F. Oelmann, "Ein achaïsches Herrenhaus auf Kreta", JdI, 27 (1912) pp. 38-51; Plati, Lasithi: R. Dawkins, BSA, 20 (1913-1914) pp. 1-17; Aghia Triada: L. Pernier and L. Banti, Guida degli Scavi Italiani in Creta (Rome: 1947), fig. 40 (the mercato).

348 For the date and sequence at Phylakopi see T.D. Atkinson, P.C. Bosanquet et alia, Excavations at Phylakopi

in Melos, BSA Supplementary Paper No. 4, 1904, pp. 30-35; R. Barber, *BSA*, 69 (1974), pp. 50-51; for fortified sites see Barber and K. Scholes, *BSA*, 51 (1956) pp. 9-40 and, also, B. Philippaki, *AAA*, 6 (1973) pp. 95-103 with a plan of the curious cyclopean fortifications of Aghios Andreas, Siphnos, that date the late Mycenaean times. For Kea see J. L. Caskey, *ProcAmPhilSoc*, 113 (1969) pp. 433-449; Hesperis, 40 (1971) pp. 359-377; 41 (1972) pp. 386-393.

[349] Atkinson and Bosanquet, pl. I; I visited the site in 1977 and was able to inspect the wall, however, much of it was restored and much is III period (Mycenaean), so that I was unable to determine at that time to my satisfaction all of the different architectural additions to the wall; I hope to re-examine the walls more thoroughly at a future date.

[350] *Wehrbauten*, p. 160.

[351] above, nt. 348.

Vita

I, James Clinton Wright, was born to Margaret Greene and James H. Wright on 6 September 1946 at Waterloo, Iowa. I attended attended public schools in Dubuque, Iowa, and La Salle, Illinois, until 1964 when I graduated from La Salle-Peru Township High School. In autumn of that year I matriculated at Haverford College, Haverford, Pennsylvania, and in 1968 received a B.A. with a major in philosophy. I enrolled in the Department of Classical and Near Eastern Archaeology of the Graduate School of Arts and Sciences, Bryn Mawr College, in the autumn of 1968. In December of that year I was drafted into the U.S. Army where I served two years as a non-combatant conscientious objector (I-A-O) attached to the Medical Corps. One tour of duty was spent in Viet Nam. In January of 1971 I re-entered Bryn Mawr and in May, 1972, I received the degree of M.A. During that time I received support from the Graduate School and the Veterans' Administration. In autumn, 1972, I attended the American School of Classical Studies at Athens as a Regular Member. In July, 1973, I married Kathleen Slane. We returned to Greece and during the year I was an Associate Member of the American School and successfully took my preliminary examinations for the doctoral degree. In 1974 as Ella Riegel Fellow of the Department of Classical and Near

Eastern Archaeology I began work on my doctoral dissertation. Between 1975 and 1977 I performed duties as Secretary of the American School of Classical Studies and intermittently worked on my dissertation. I relinquished my post in July 1977 and, as recipient of a Whiting Fellowship in the Humanities, Bryn Mawr College, began final work on my doctoral dissertation, which was submitted in March, 1978. Beginning in autumn, 1978, my wife and I will share an appointment in the Department of Classical and Near Eastern Archaeology, Bryn Mawr College.

ABSTRACT

This dissertation is a study of the basic practices and primary elements of construction in Mycenaean architecture: foundations, terraces, rubble and ashlar masonry, cyclopean masonry and its relation to circuit walls. Special consideration is given to conglomerate masonry in the circuit walls and the practice of corbelling. Addenda deal with the cyclopean terrace at the Argive Heraeum and the construction of the Southern Citadel of Tiryns.

The study is a summation of a detailed catalogue of information gathered from published reports of excavations and from on the spot inspection of most of the sites discussed; it is accompanied by 155 photographs documenting the discussion and relevant plans and sections.

The text discusses the appearance and developement of different kinds of foundations and terraces at sites from early through late in the Mycenaen period. Special consideration is given to the development of palatial terrace platforms at Tiryns, Pylos, Gla and Mycenae. Rubble masonry and Ashlar masonry are discussed and contrasted; ashlar is examined in relation to its appearance in the tholos tombs and the palaces. Cyclopean masonry is presented as it develops in fortifications from MH through late Mycenaean times. Considerations of style and construction are stressed and detailed attention is given to

the forms of cyclopean masonry at Mycenae and Tiryns. Ashlar masonry is discussed as a style peculiar to Mycenae and its relation to poros ashlar in tholos tomb construction is defined.

In conclusion the study summarizes the architectural history of the practices examined and examines the question of foreign influences in Mycenaean architectural practices as well as the indigenous character of Mycenaean architecture. Avenues of further study are indicated.

ERRATA: Plans and Drawings

Fig. 183 - deleted

Fig. 188 - deleted

Fig. 189 - deleted

Fig. 194 - deleted

Fig. 198 - deleted

Fig. 200 - deleted

Fig. 203 - see P17

Fig. 206 - deleted

Fig. 212 - see P11

Fig. 213 - deleted

Fig. 214 - see P14

Fig. 216 - deleted

Fig. 217 - see P16

Figs, 223-226- deleted

List of Figures

Photographs

List of Drawings and Plans

Note: Owing to the pressure of time a number of drawings intended to be included here have been omitted. In lieu of these I give below in parenthesis the appropriate references.

Drawings are listed numerically following the photographic figures; principal plans are prefaced by "P" and follow the drawings. Unless otherwise indicated, all drawings were excuted by the author.

1

3

2

4

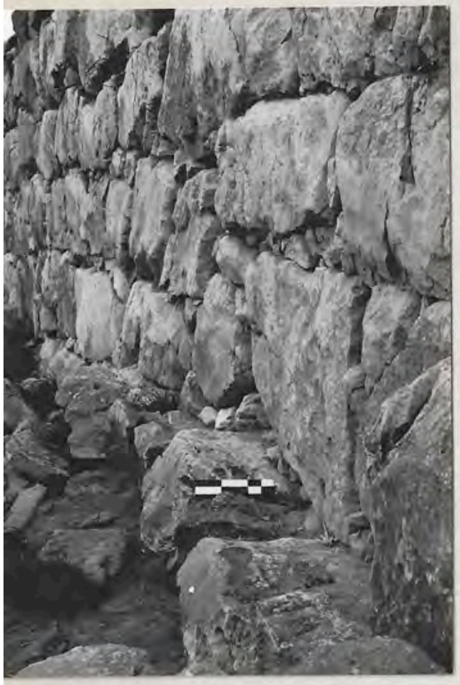
5

6

7

8

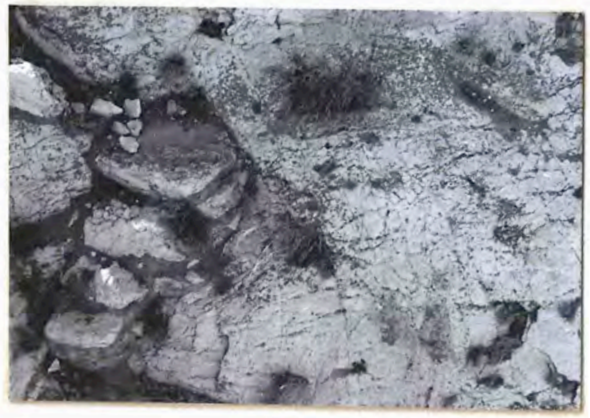
9


10


11


12

13



14

15

16

17

18

19

20

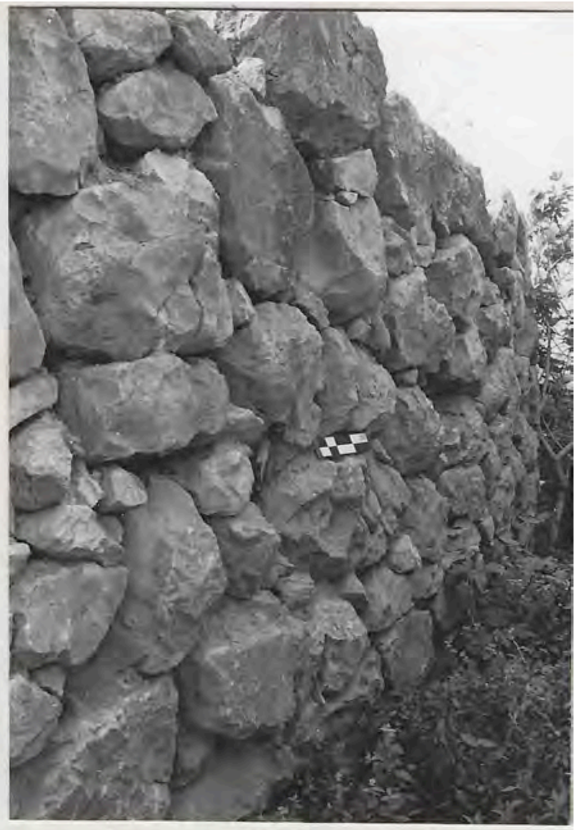
21

22

24

23

25



26

27

28

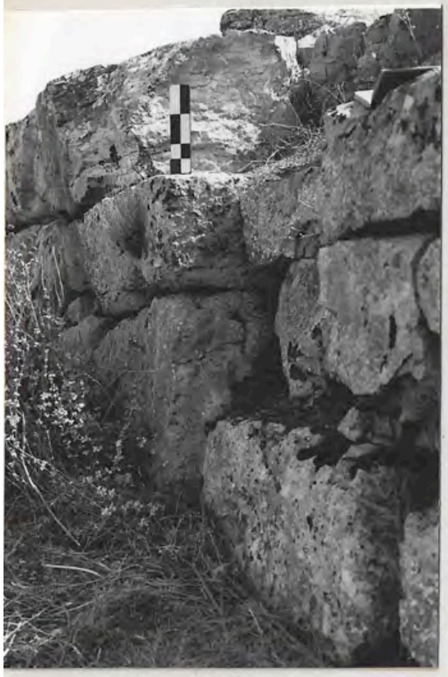
29

30

31

32

33

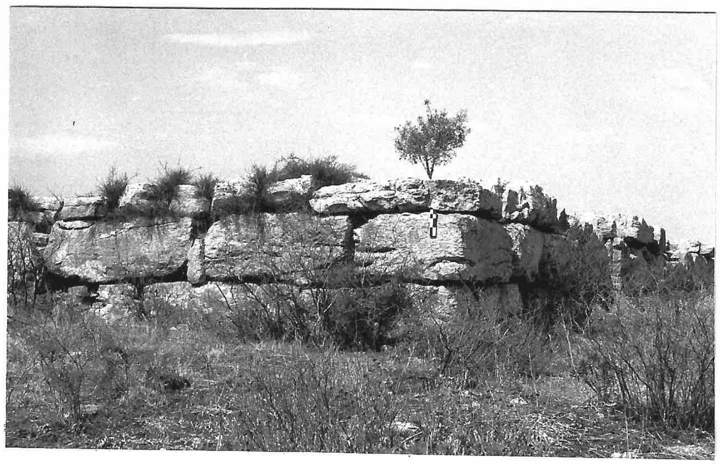


34

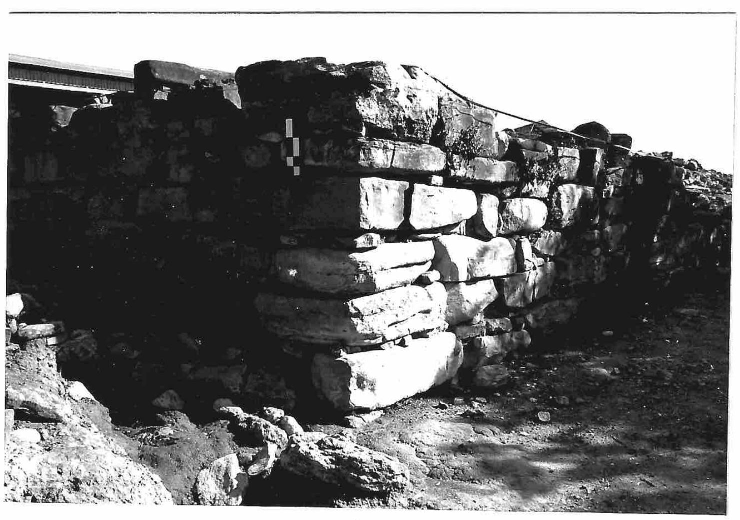
35

36

37



38

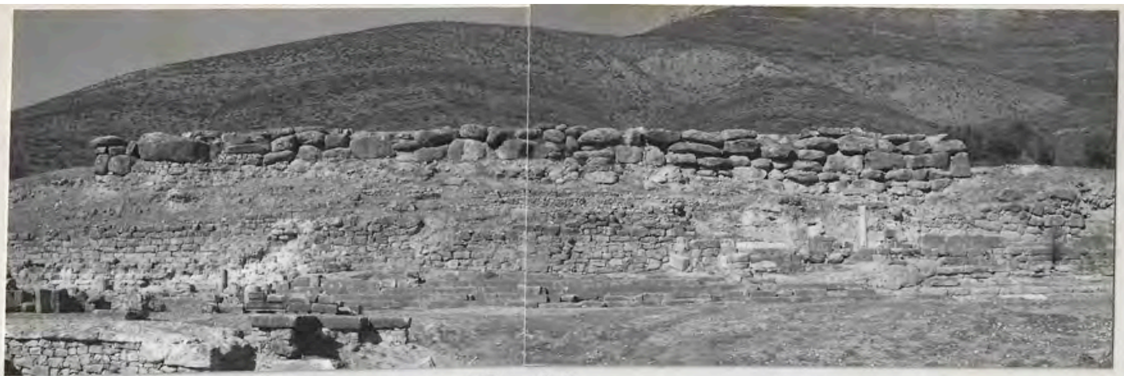


39


40


41


42



43-44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

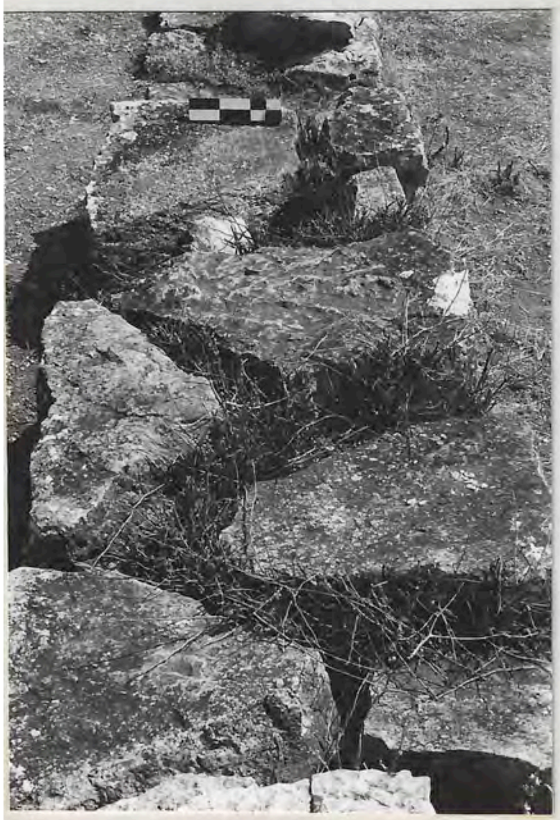

61


63


62


64

65



66

67

68

69

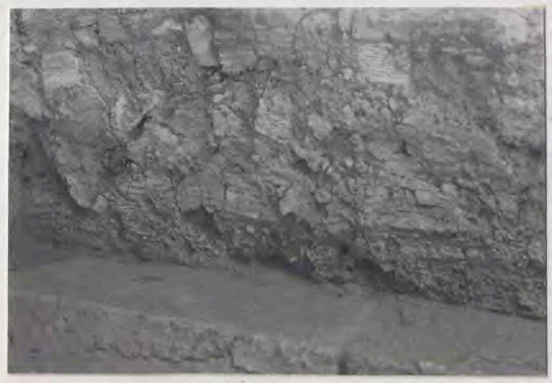
70

71


72

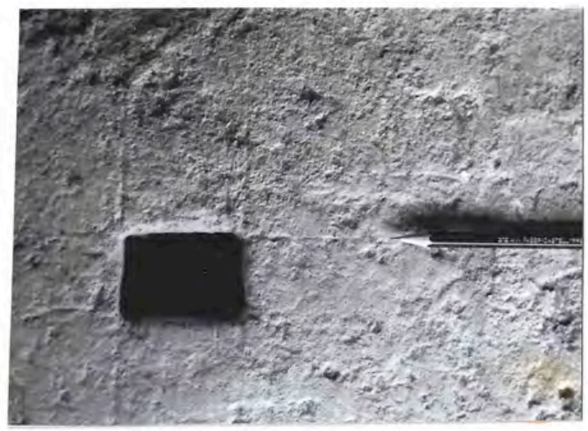

74


73


75

76

77



78

79

80

81

82

84

83

85

86

88

87

89

90

92

91

93

94

95

96

97


98


100


99


101

102

104

103

105

106

107

108

109

110

111

112

113

114

115

116

117

118

119


120


122

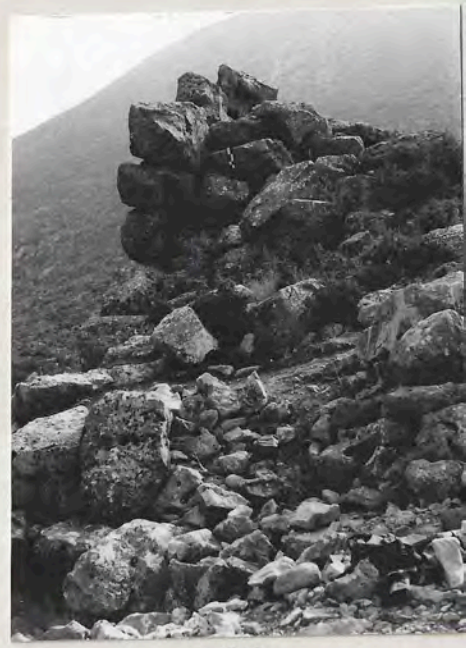

121


123

124

124

125



126

127

6

128

40

129


130


132

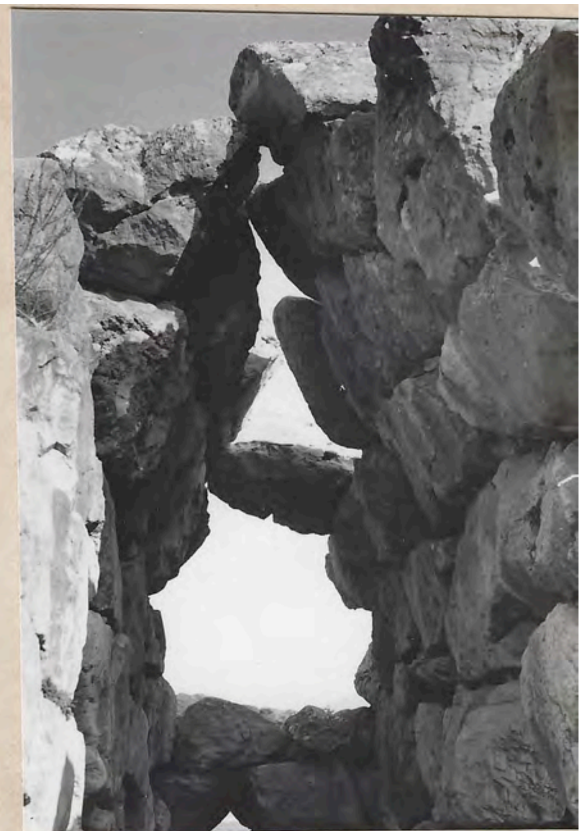

131

133

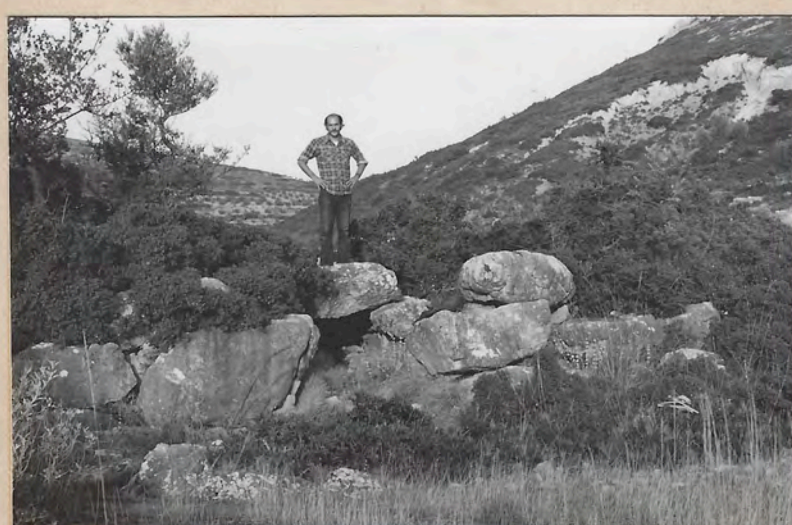
134

135

136



137



138


139


140


141

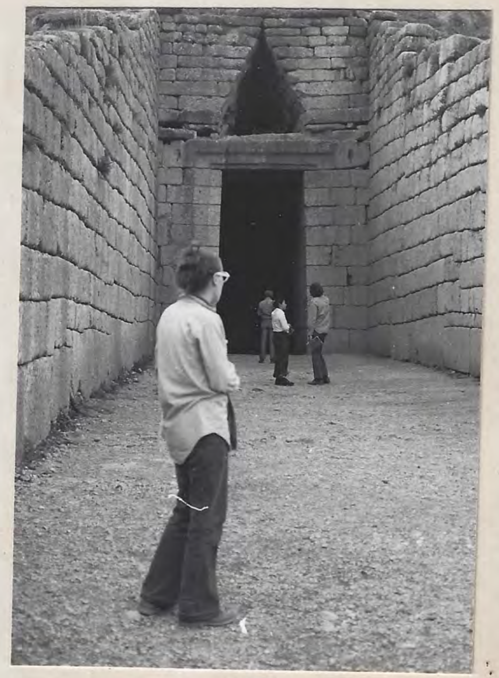
142

143

144

145

146



147

148

149

150

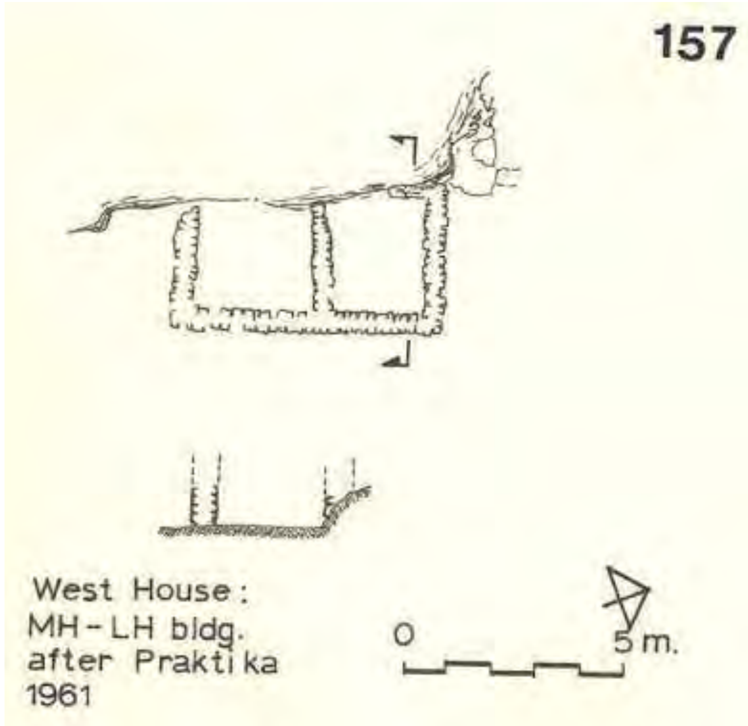
151

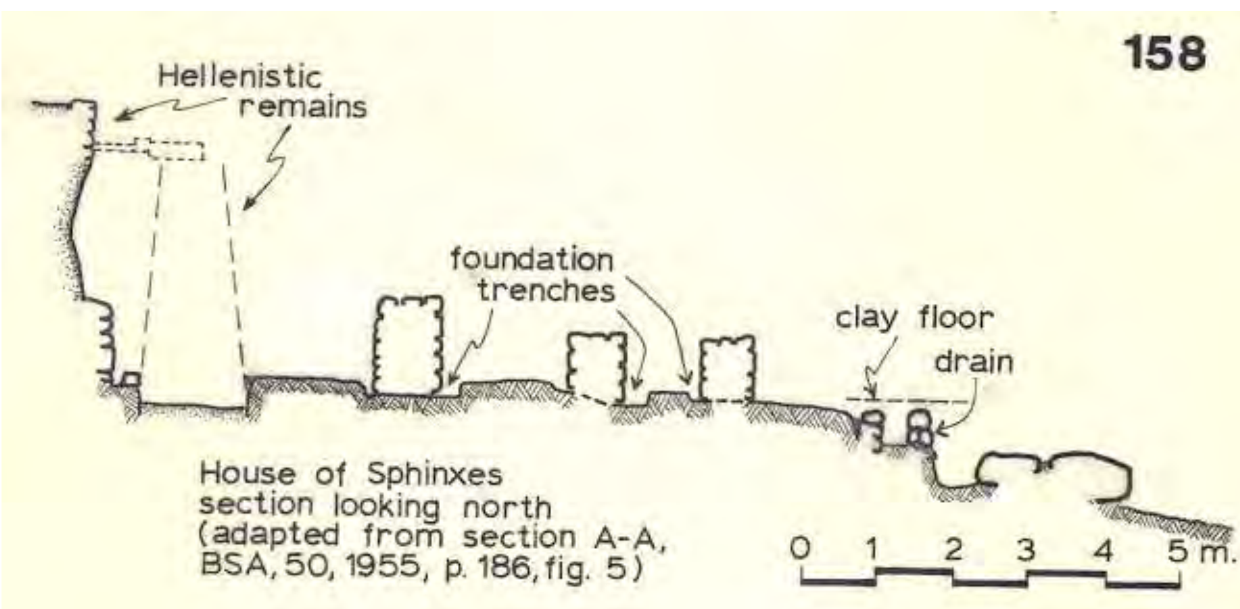
152

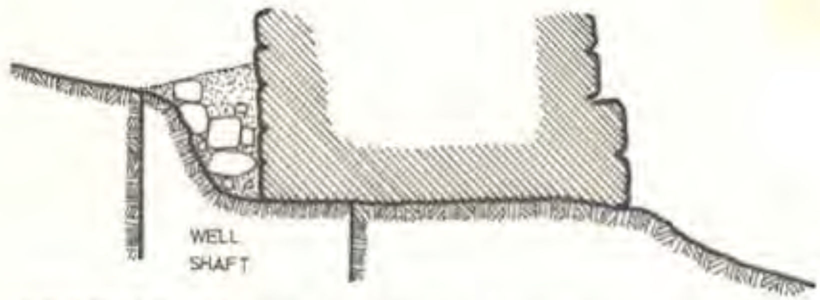
153

154

155

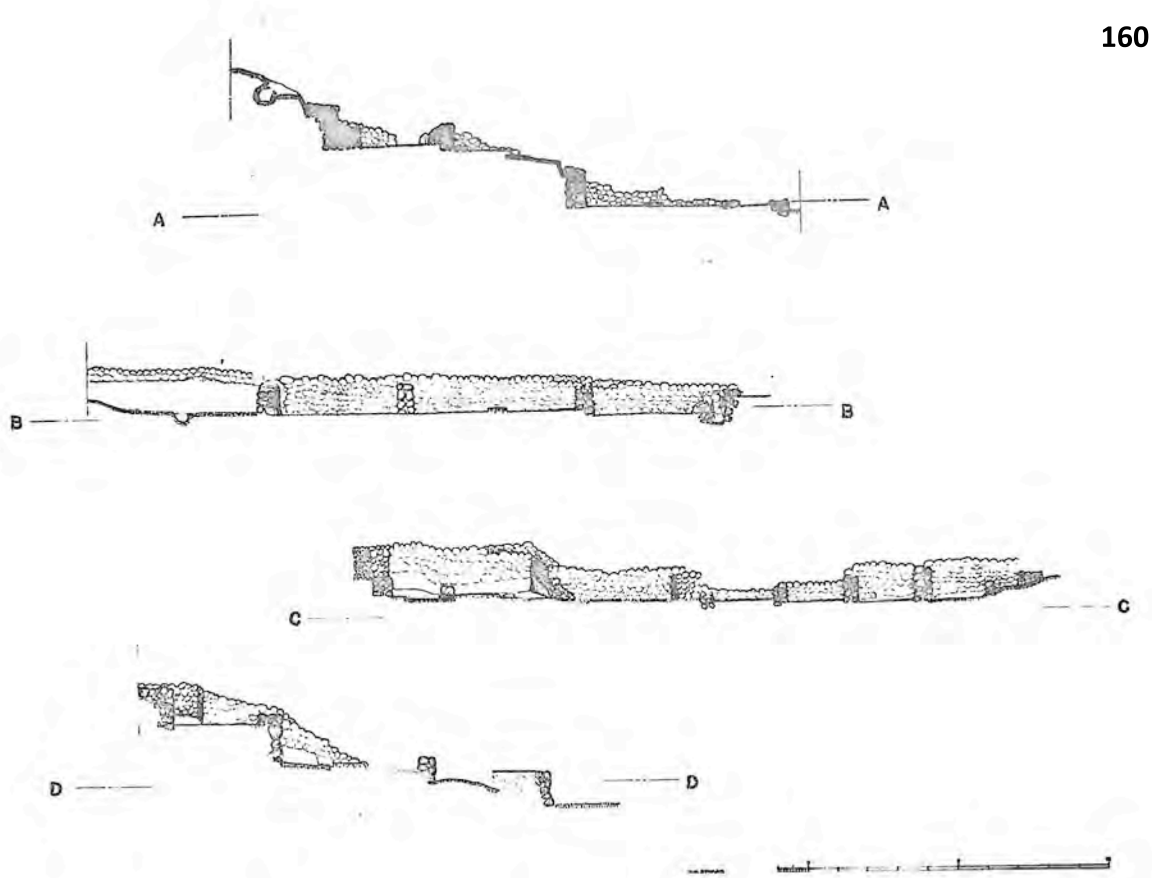

157
West House:
MH-LH bldg.
after Praktika
1961
0
5 m.


158
Hellenistic
remains
foundation
trenches
clay floor
drain
House of Sphinxes
section looking north
(adapted from section A-A,
BSA, 50, 1955, p. 186, fig. 5)
0 1 2 3 4 5 m.



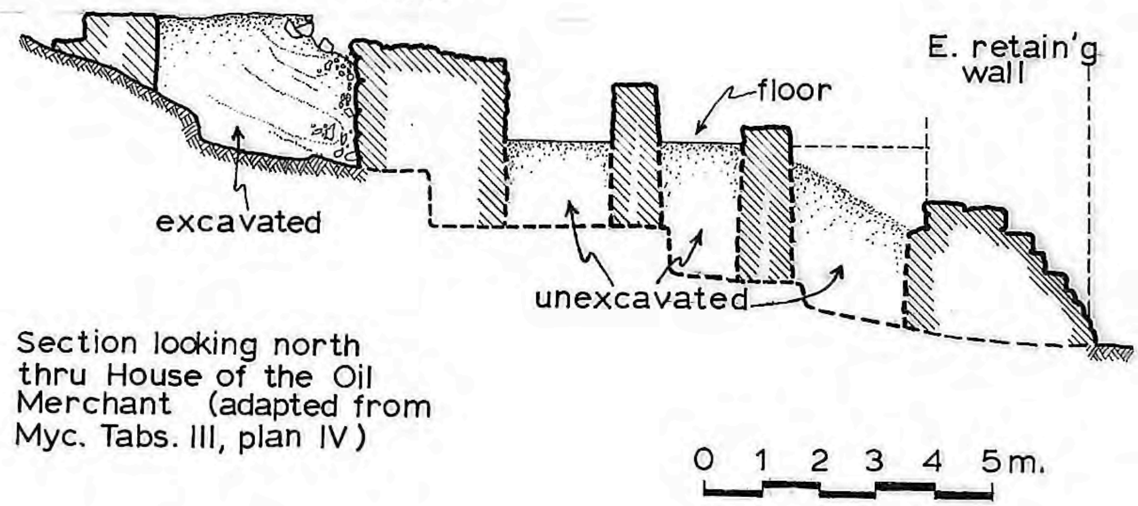
MYCENAE: House of the Warrior Vase
Sketch section looking SE thru wall 46

160



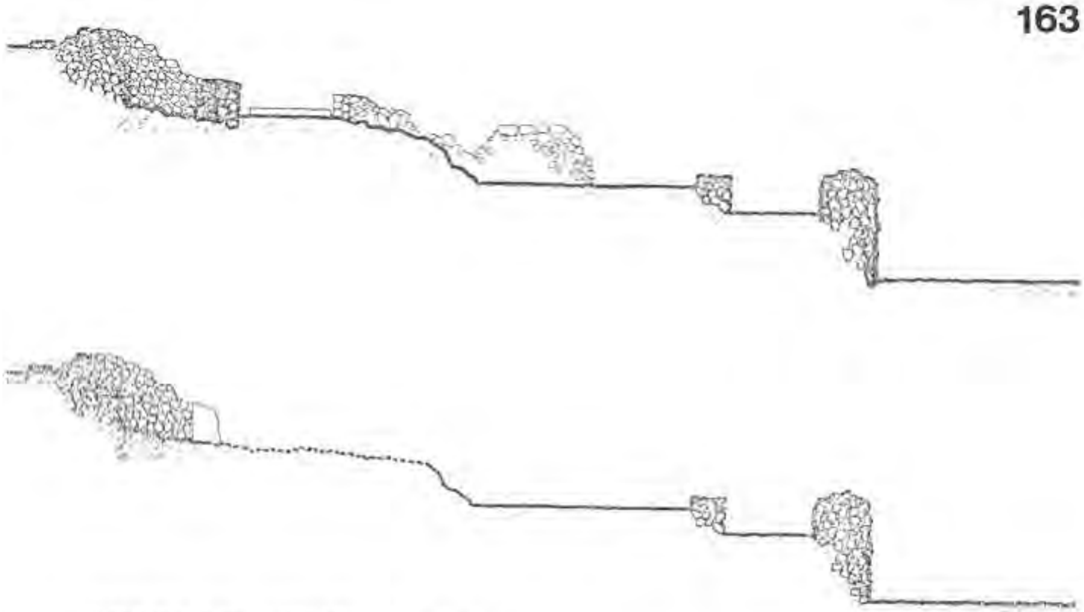
CROSS SECTIONS OF THE PANAGIA HOUSES

161



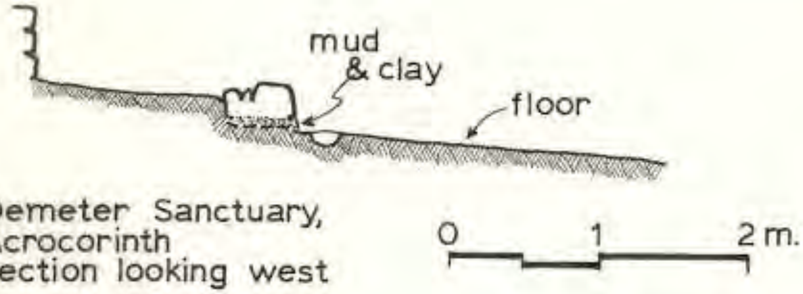
Section looking north thru House of the Oil Merchant (adapted from Myc. Tabs. III, plan IV)

163



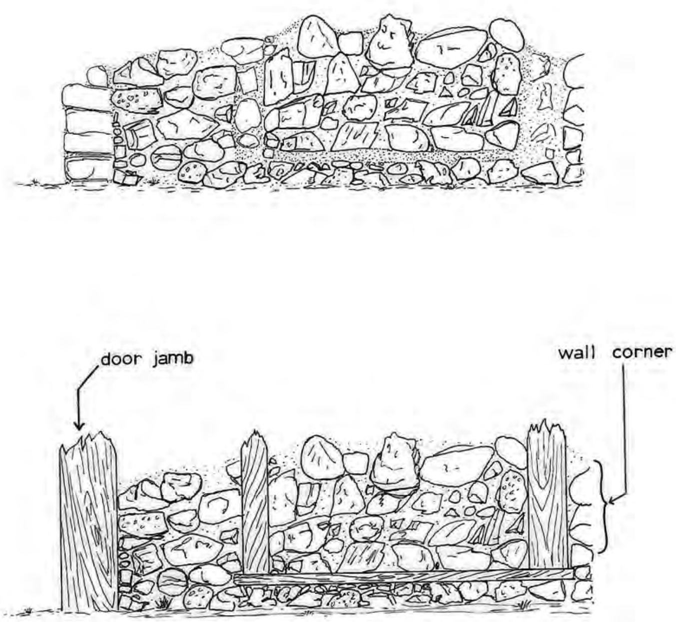
MYCENAE: ARTISTS & ARTISANS
Section looking N from Hesperia 1966 (see Fig. 197)

164



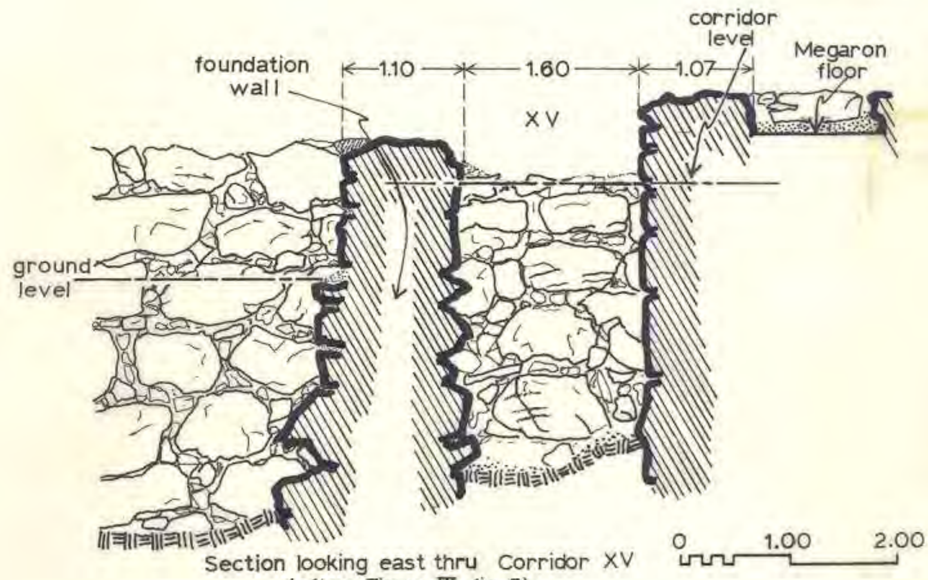
Demeter Sanctuary,
Acrocorinth
section looking west

165



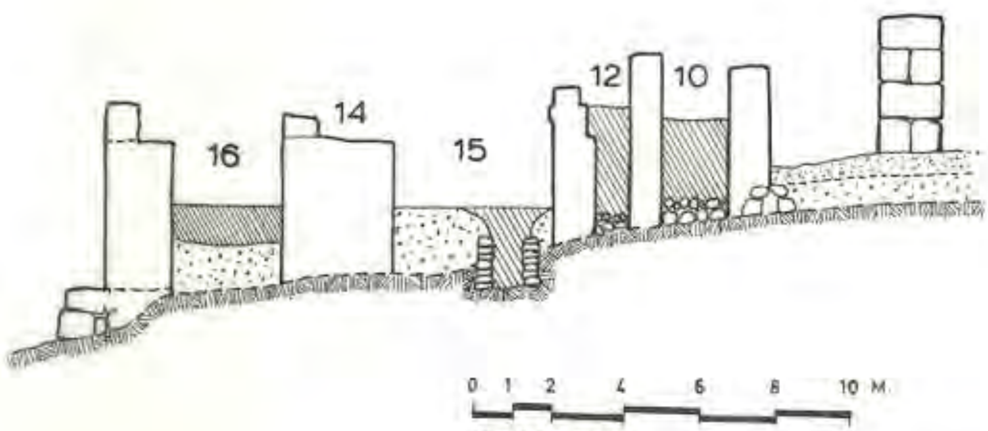
MENELAION
Actual state and
Restored elevation of
half timbered wall

166

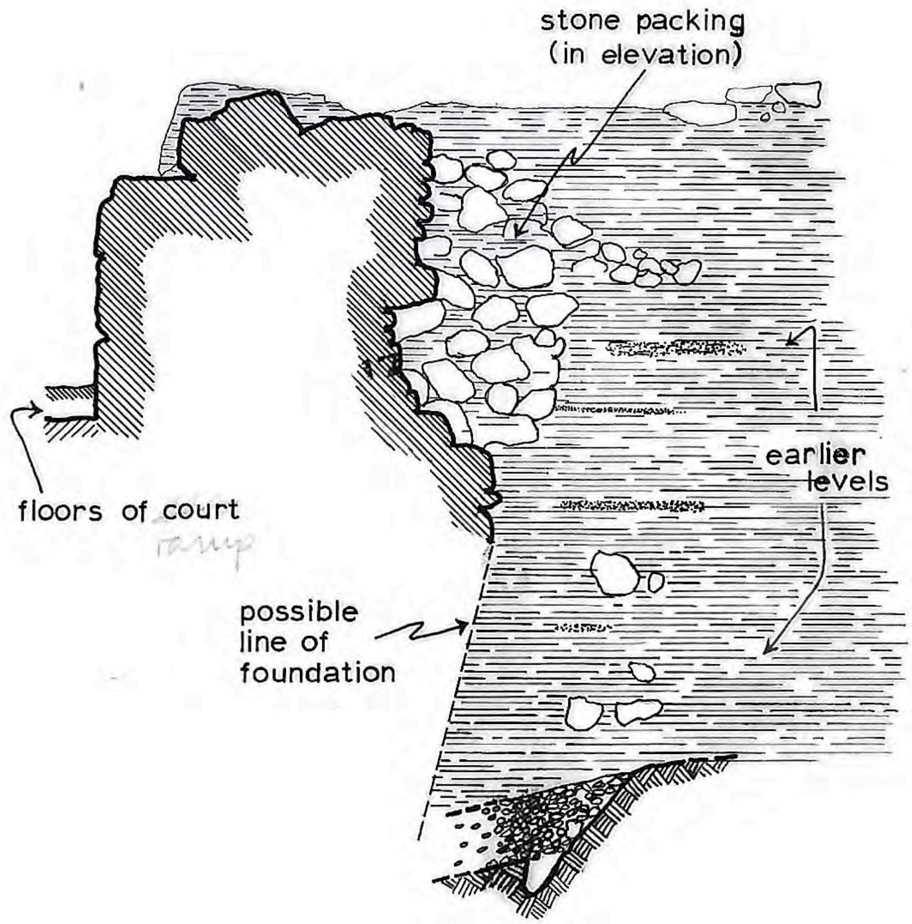


Section looking east thru Corridor XV
(after Tiryns III, fig. 5)

167

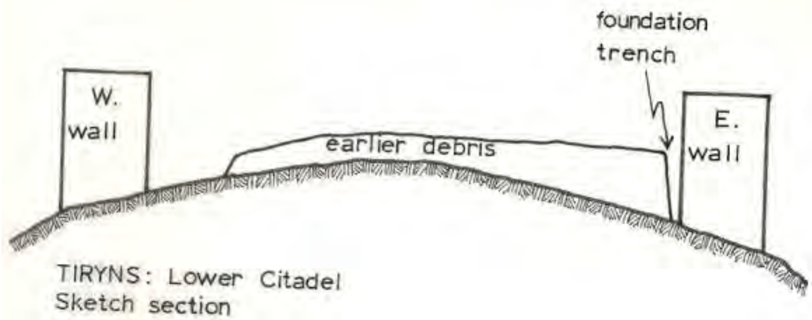


MYCENAE
Section thru Granary
looking NW (after Wace)



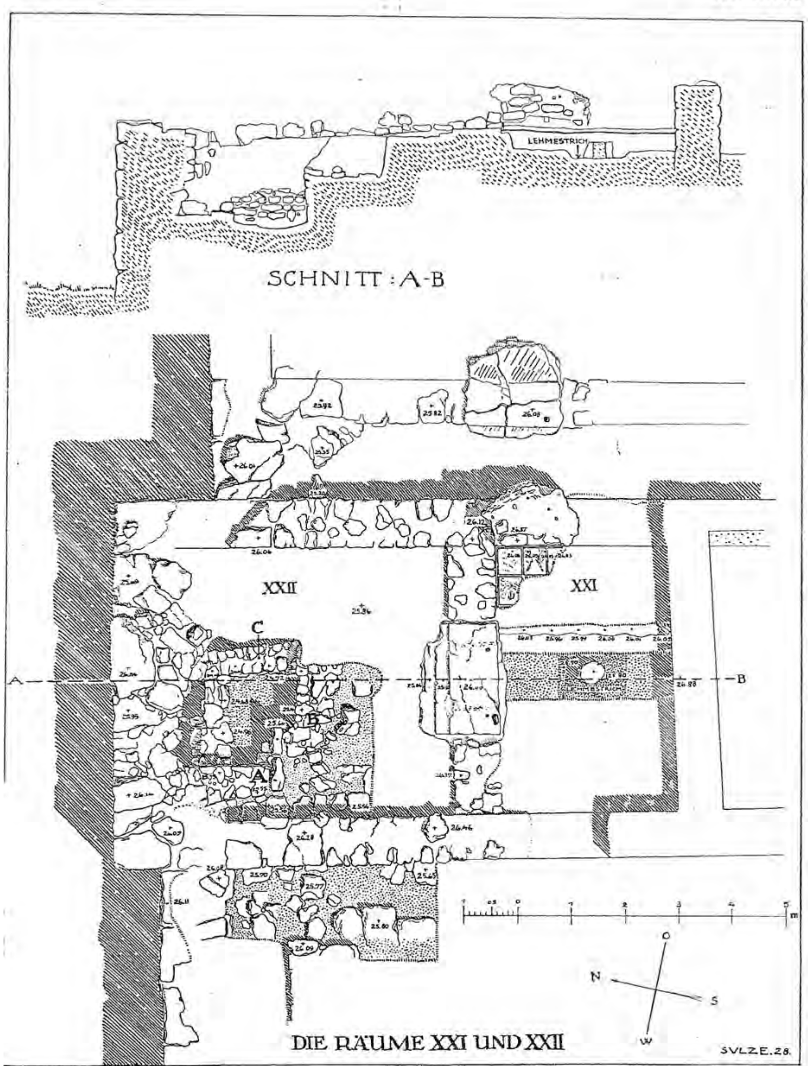
Section looking south
thru I Cit. terrace at
trench G (after Tiryns III,
fig. 12)

169

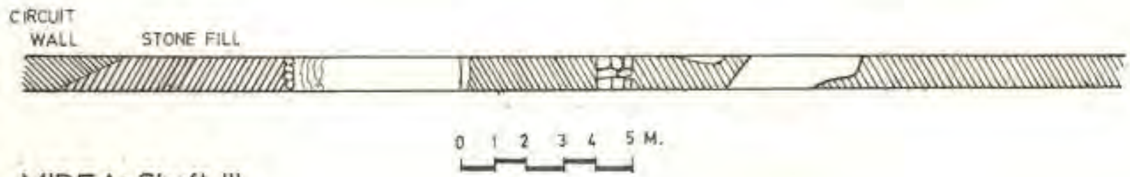


170

TIRYNS III

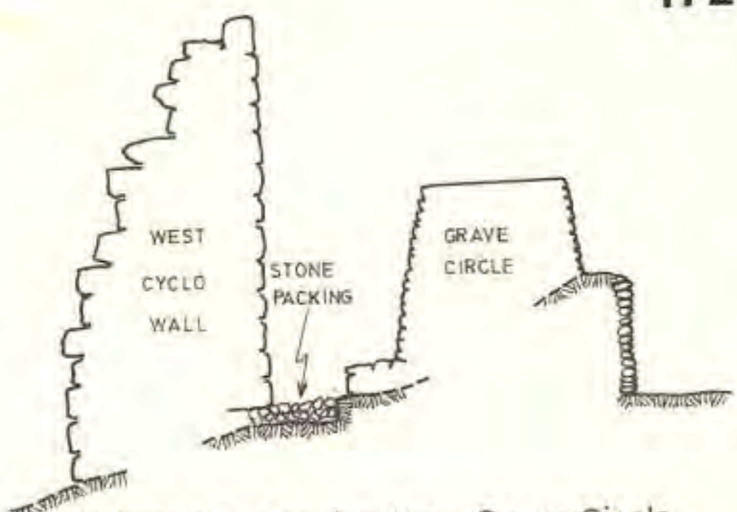


171

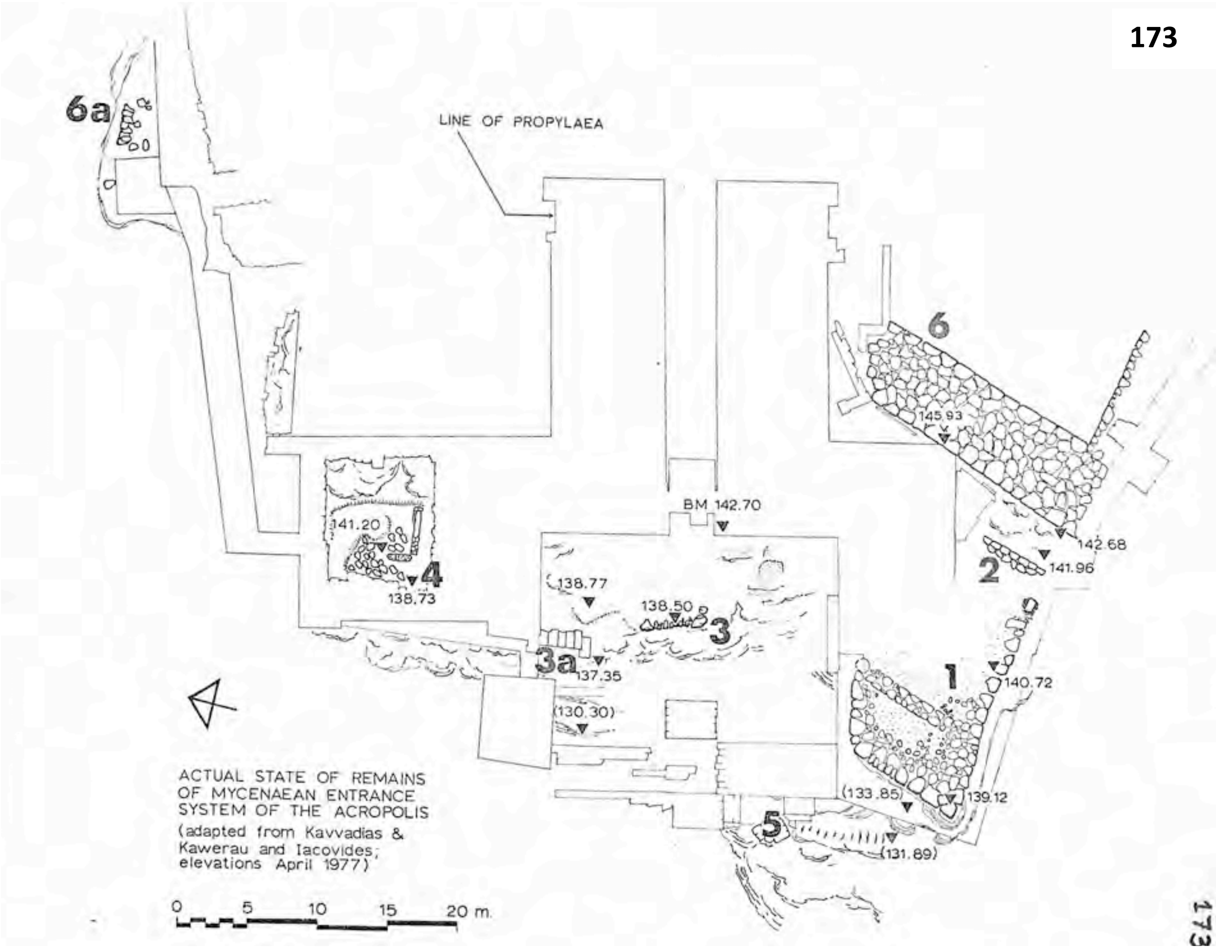


MIDEA: Shaft III

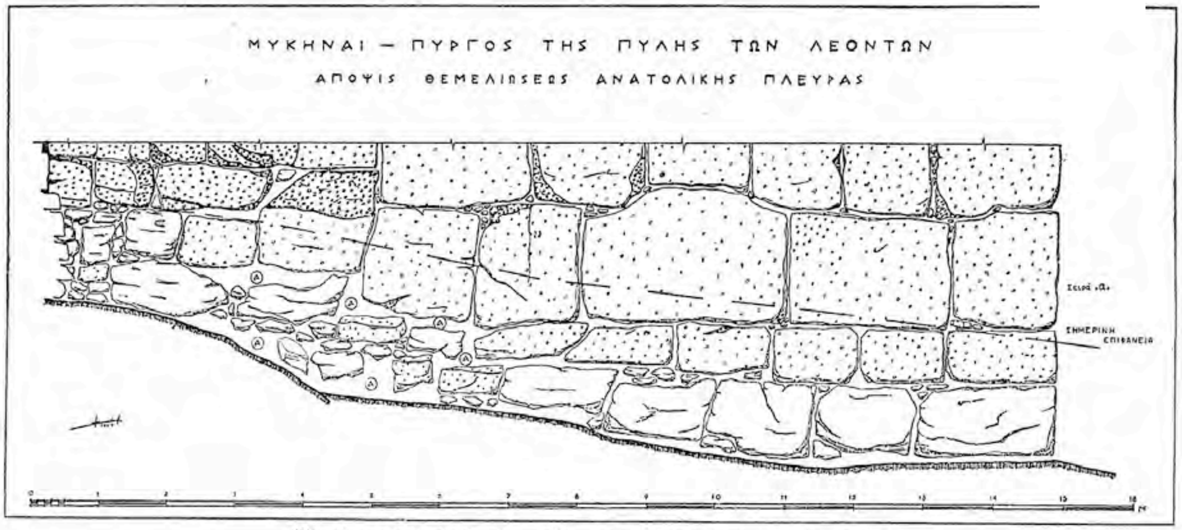
172



MYCENAE: Section thru Grave Circle
(after Wace)


LINE OF PROPYLAEA
6a
6
145.93
142.68
2
141.96
BM 142.70
141.20
4
138.73
138.77
138.50
3
3a
137.35
1
140.72
(130.30)
139.12
(133.85)
5
(131.89)
ACTUAL STATE OF REMAINS
OF MYCENAEAN ENTRANCE
SYSTEM OF THE ACROPOLIS
(adapted from Kavvadias &
Kawerau and Iacovides;
elevations April 1977)
0 5 10 15 20 m.
173

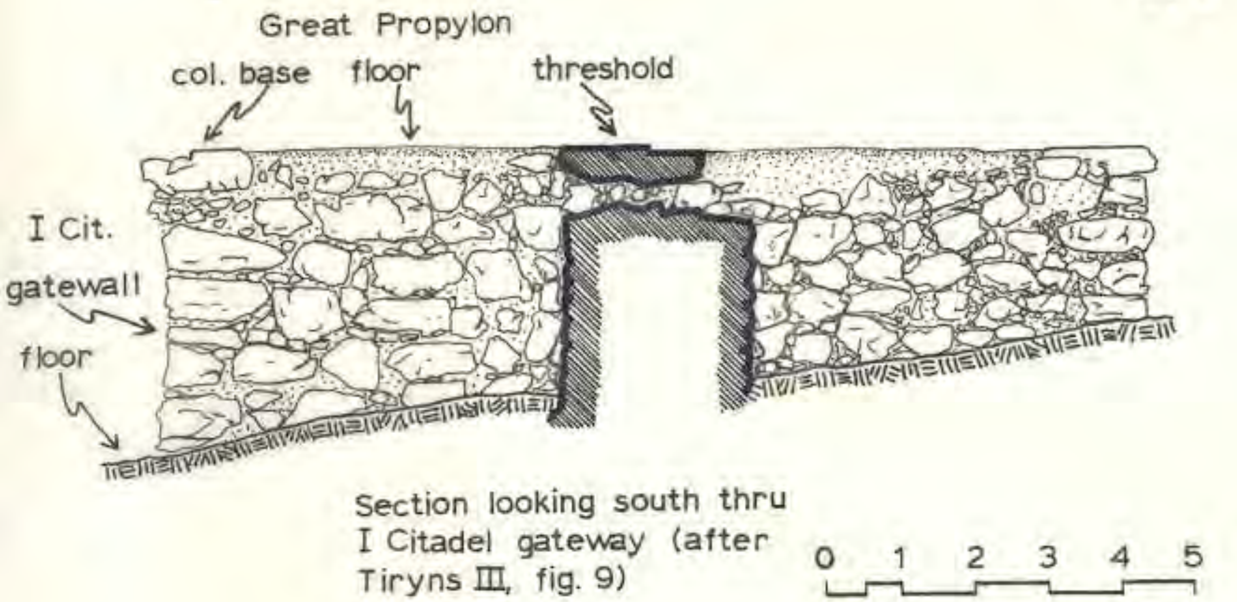
174



Εἰκ. 36. Λ, Λ, Λ, ὑποθεμελίωσις ἐκ μικρῶν λίθων τεθειμένων εἰς ἀσπρόχωμα.

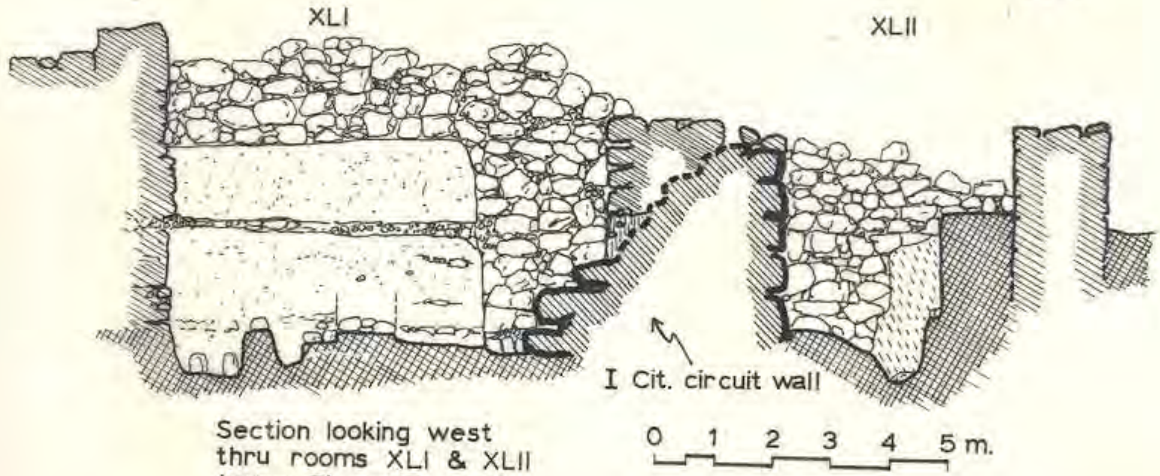
Σχέδιον Σπ. Ἰακωβίδη

175



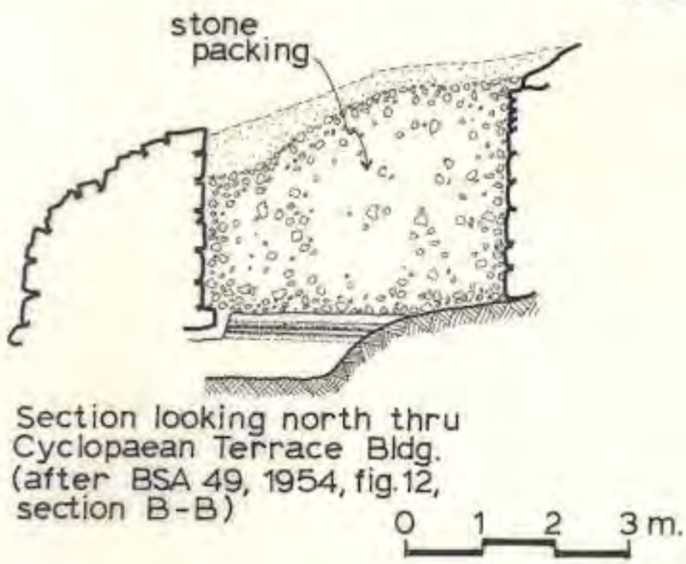
Section looking south thru
I Citadel gateway (after
Tiryns III, fig. 9)

176

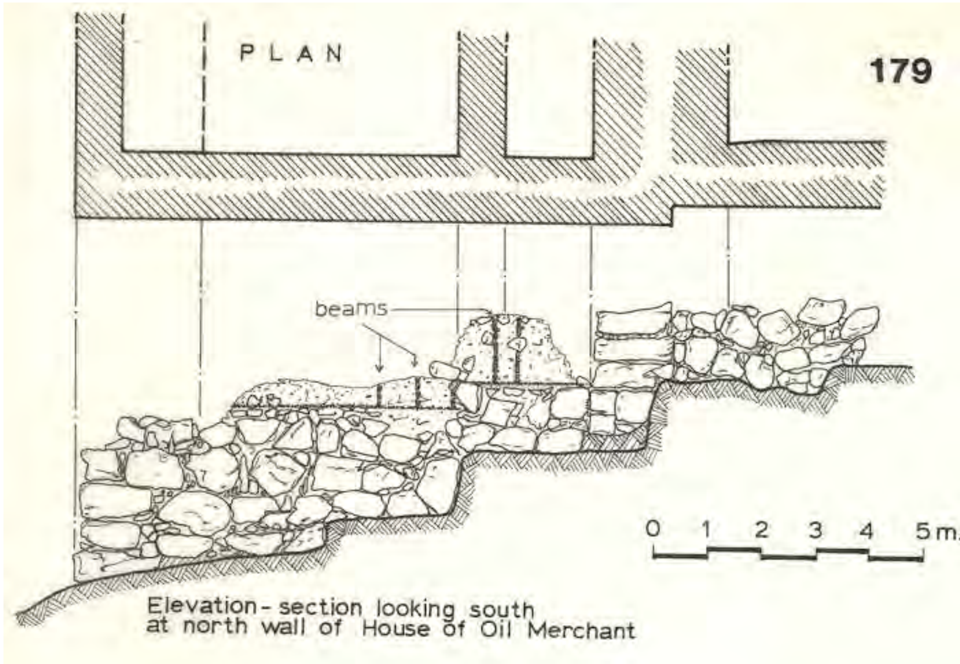


Section looking west
thru rooms XLI & XLII
(after Tiryns III, pl. 8)

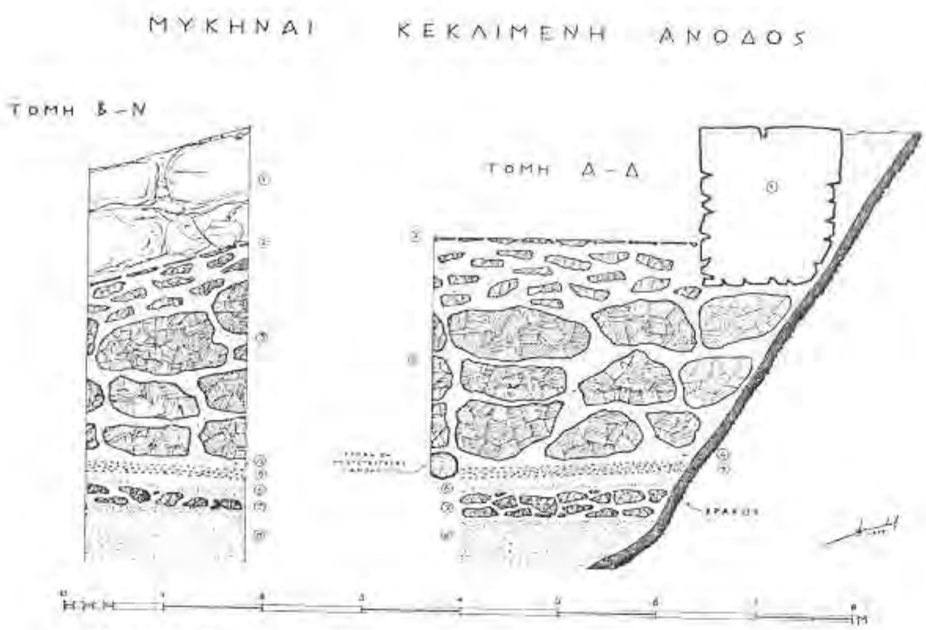
178



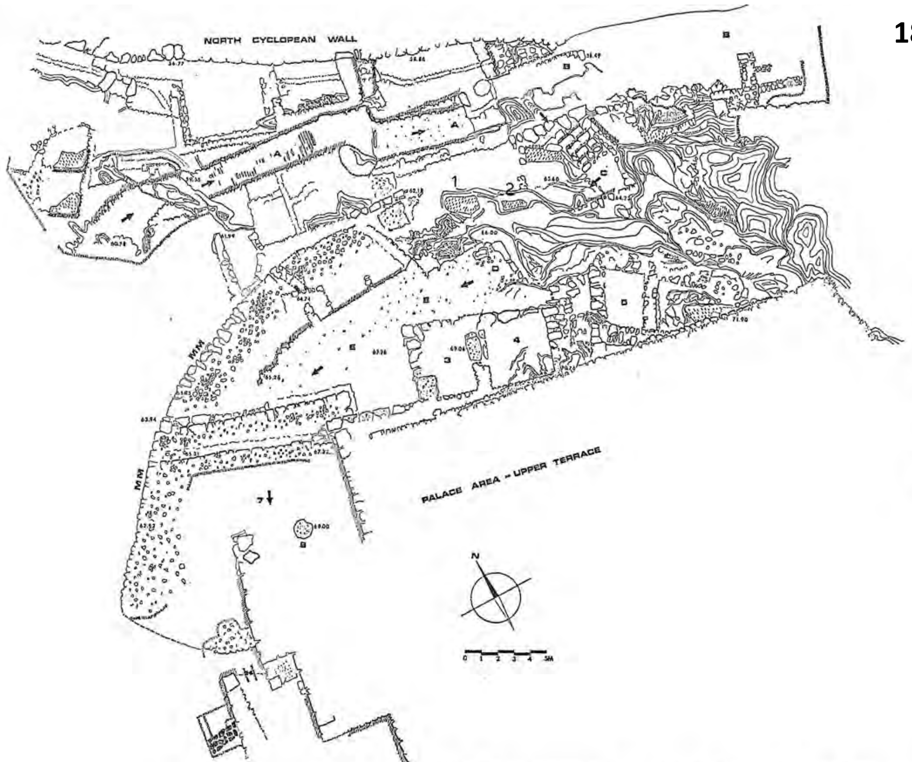
Section looking north thru
Cyclopaean Terrace Bldg.
(after BSA 49, 1954, fig. 12,
section B-B)



180



MYCENAE: Great Ramp
section, from AE 1962, fig. 81



MMA, fig. 18. Mycenae 1961. Ascent to palace (drawing Bandekas, Iacovides)

181

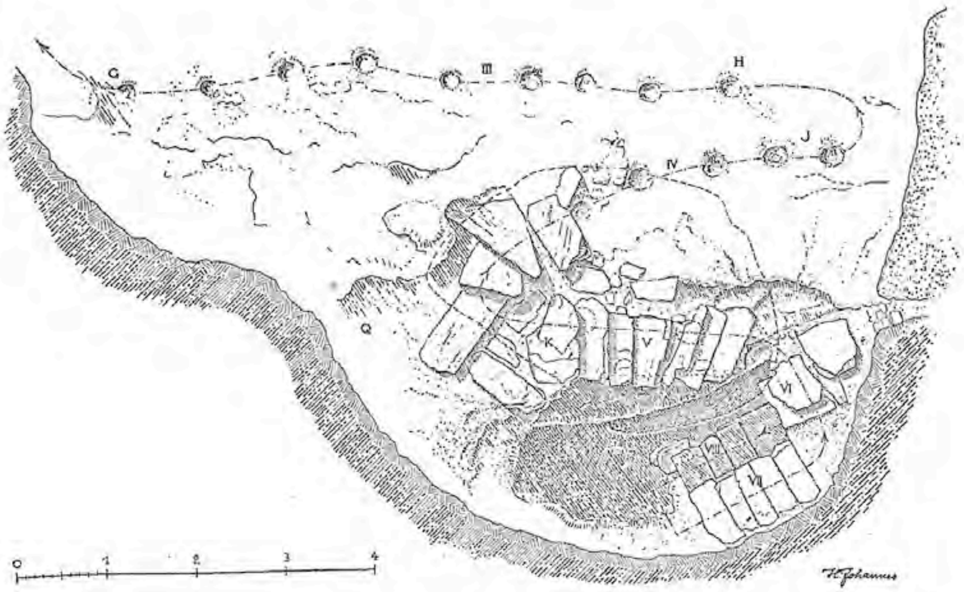


Fig. 8. Plan of Stairway below Level of East Cave

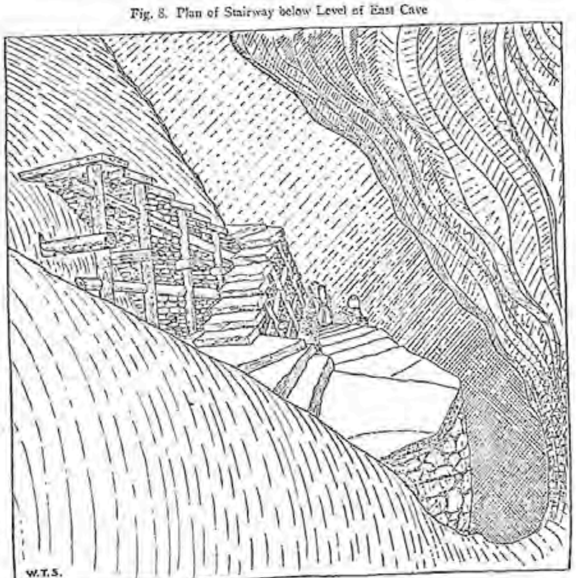
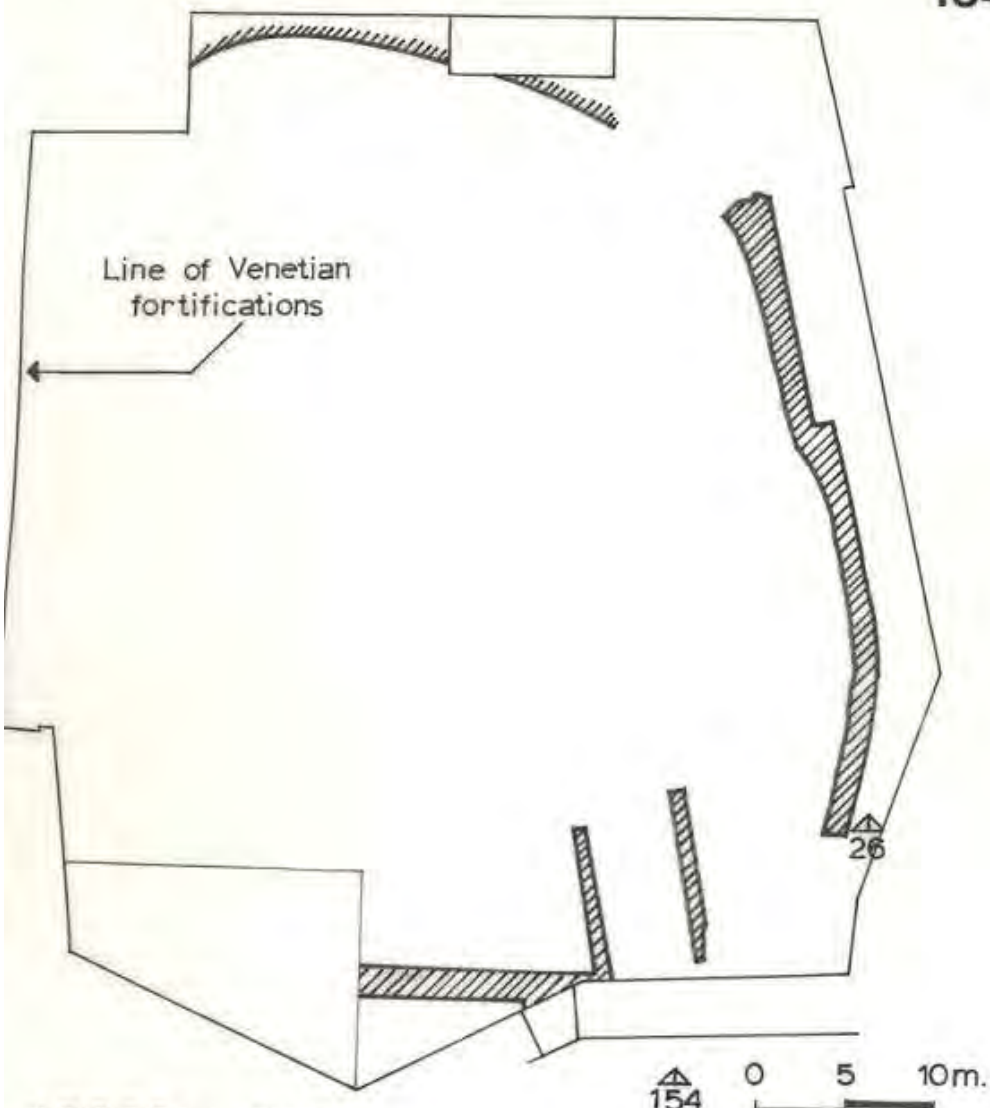
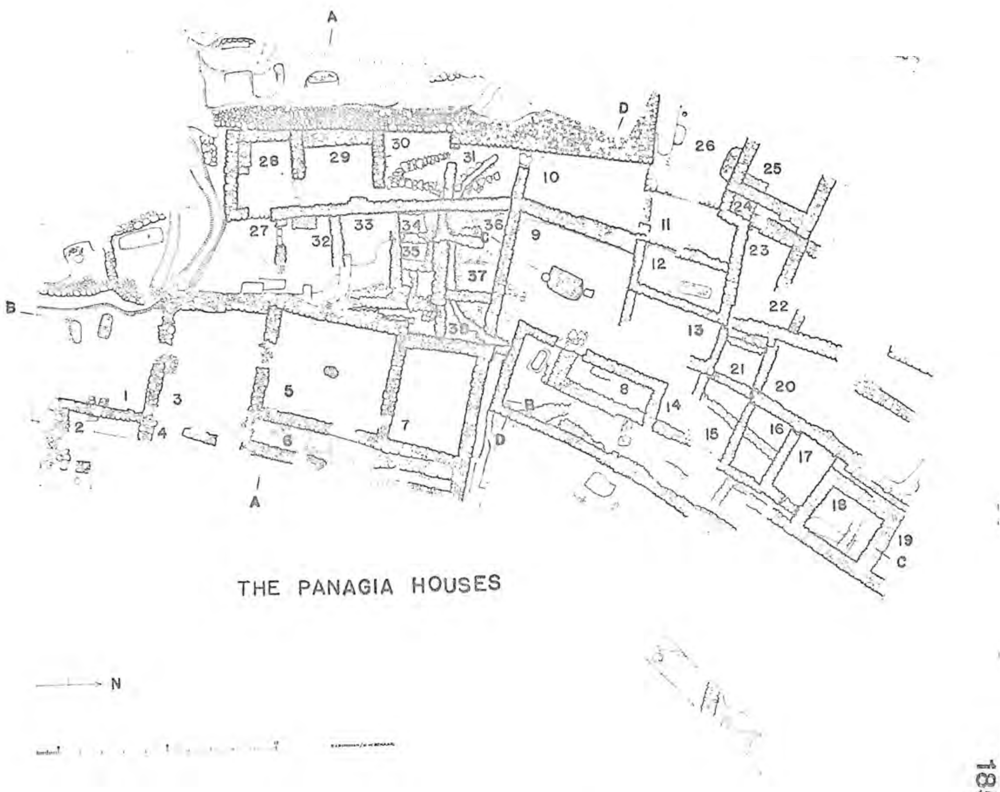


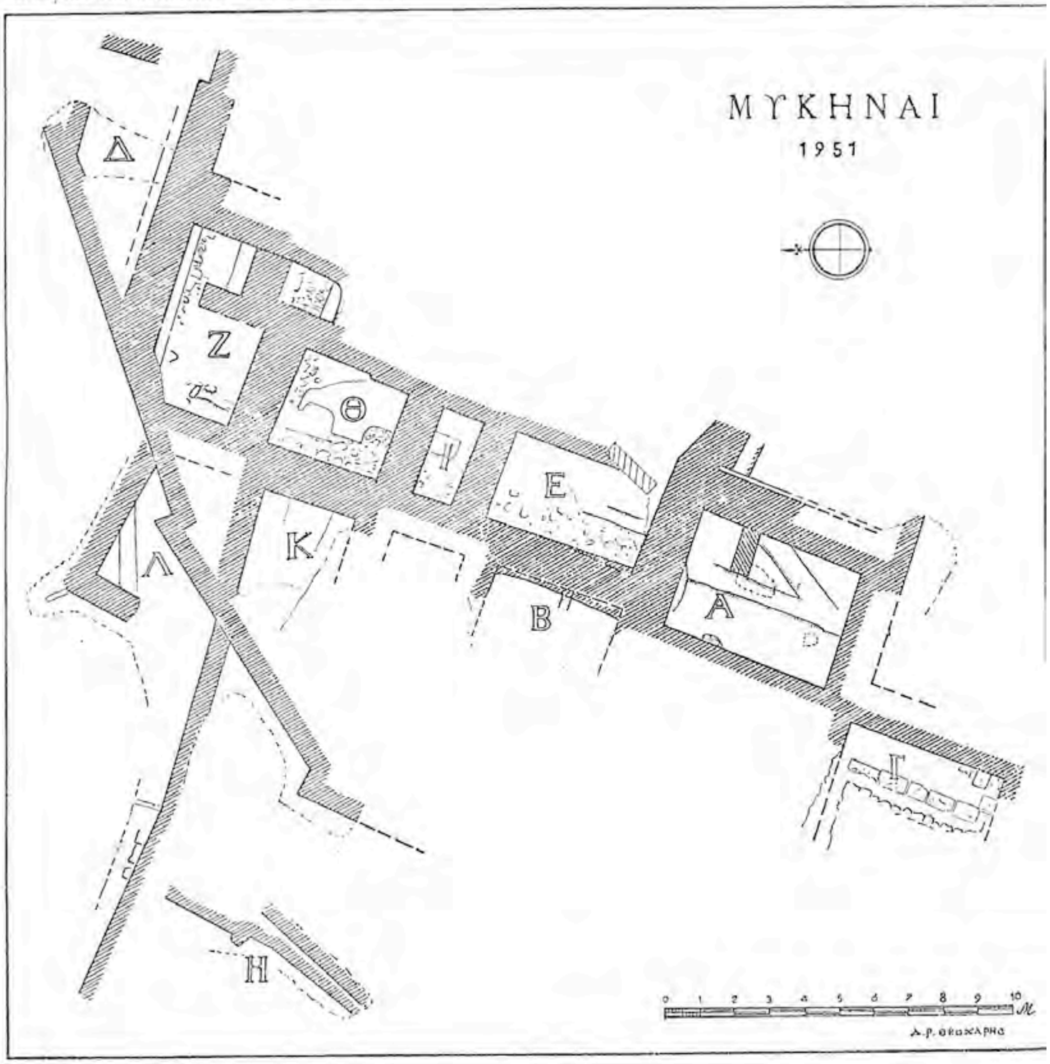
Fig. 16. Conjectural Restoration, Showing Construction of Flights III-V

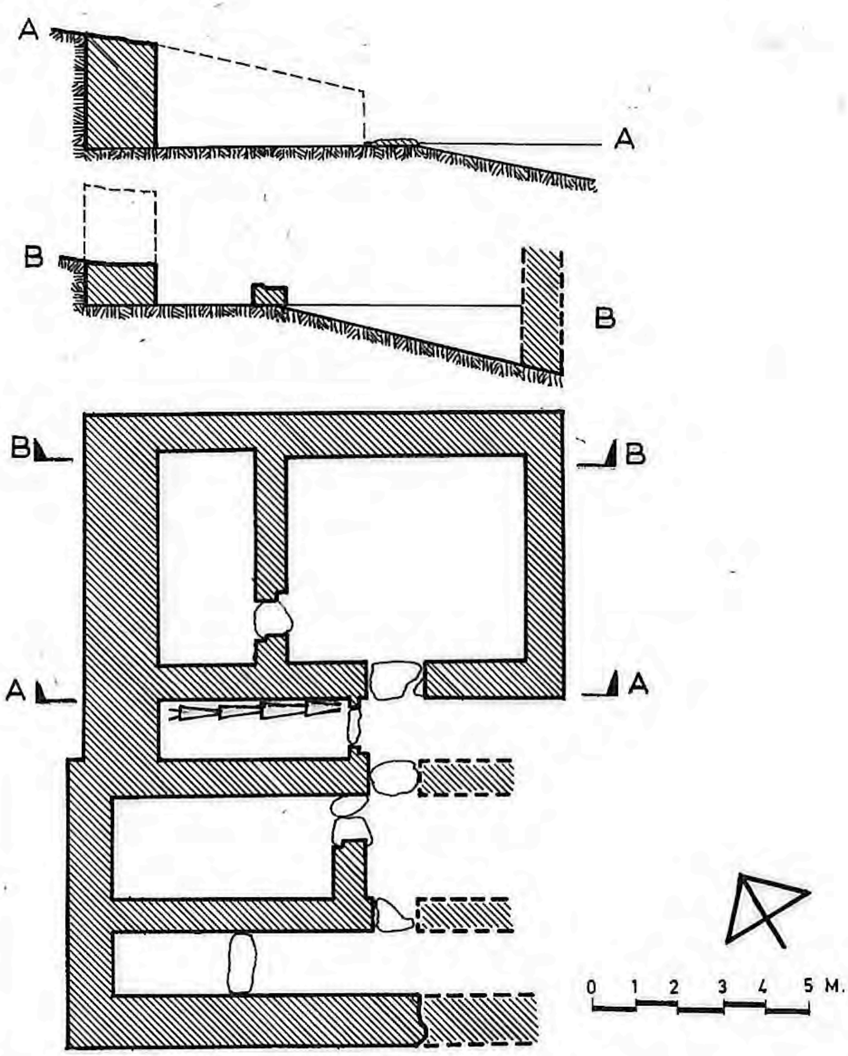


ARGOS: LARISSA
Mycenaean remains



THE PANAGIA HOUSES


ΜΥΚΗΝΑΙ
1951
Δ
Ζ
Θ
Ι
Ε
Κ
Λ
Β
Α
Γ
Η
0 1 2 3 4 5 6 7 8 9 10 Μ.



ZYGOURIES, House B
Plan & sketch section (after Blegen)

190

Diagram plan of headers
forming abutted offset joint

191

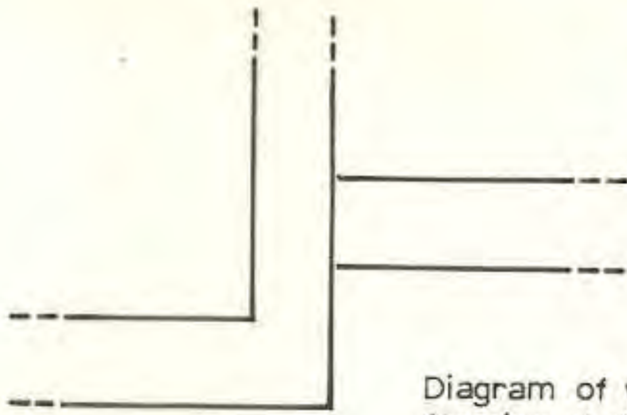
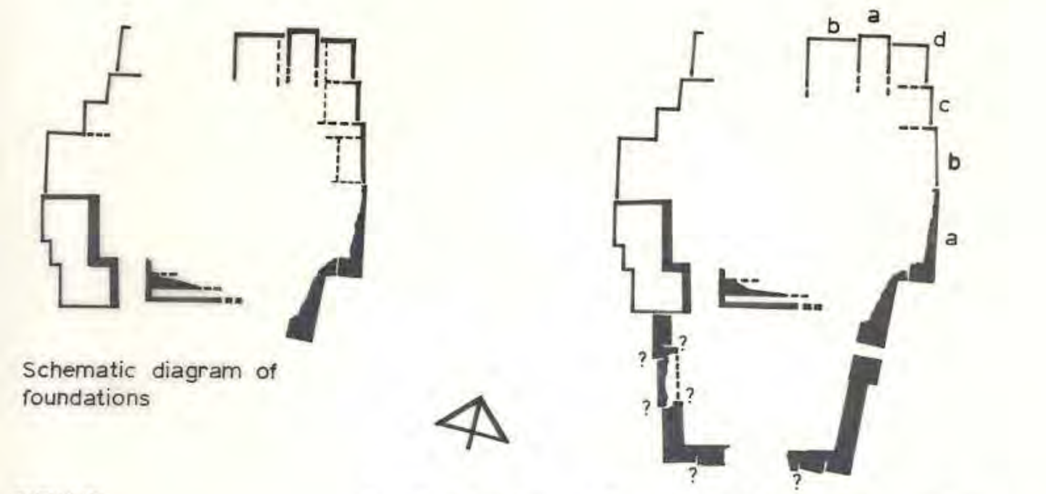


Diagram of walls
forming abutted
offset joint

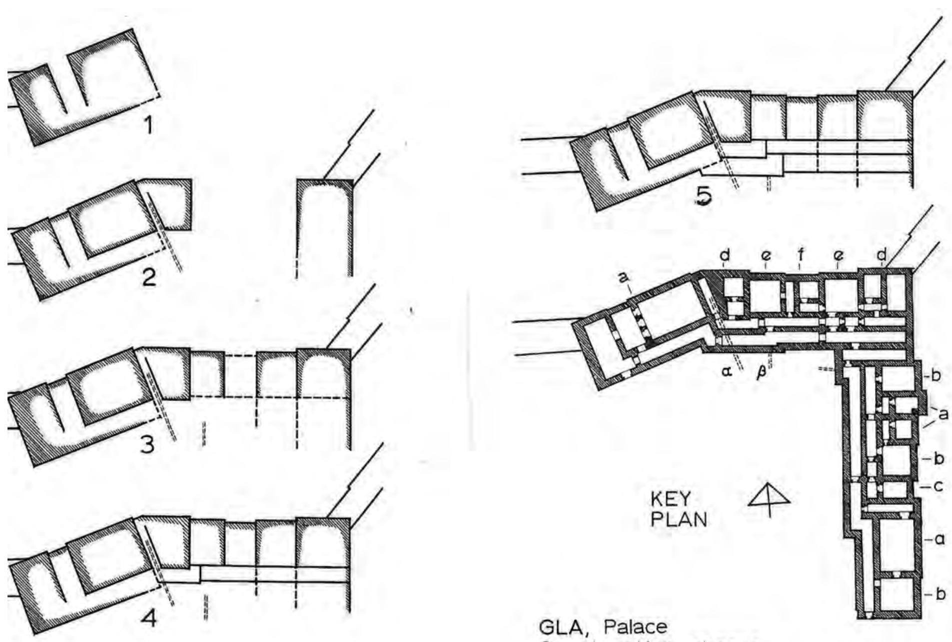
192 193



TIRYNS
I. CITADEL

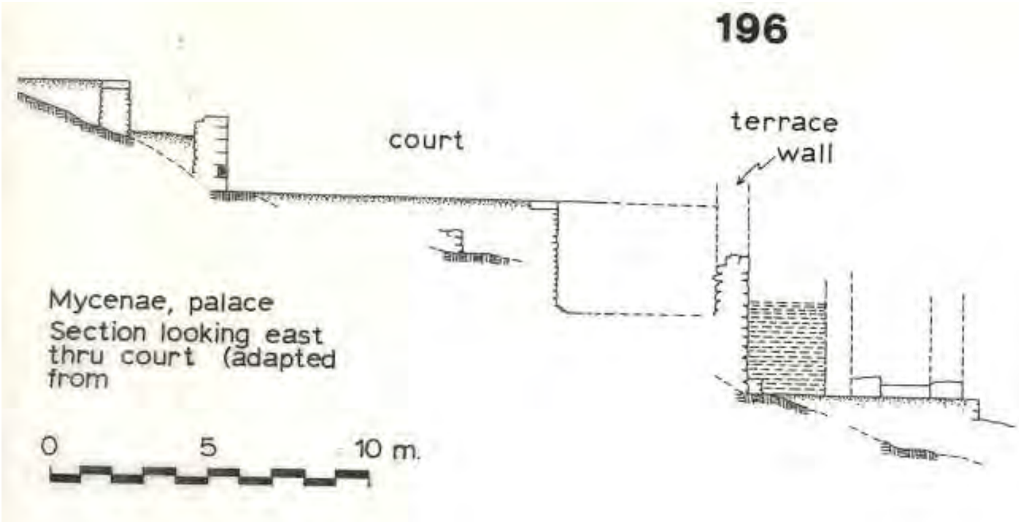
Probable order of construction of NE Quarter and possible abutted joints in circuit wall

195



GLA, Palace
Construction phases
(plan adapted from Ergon 1960)

196



197

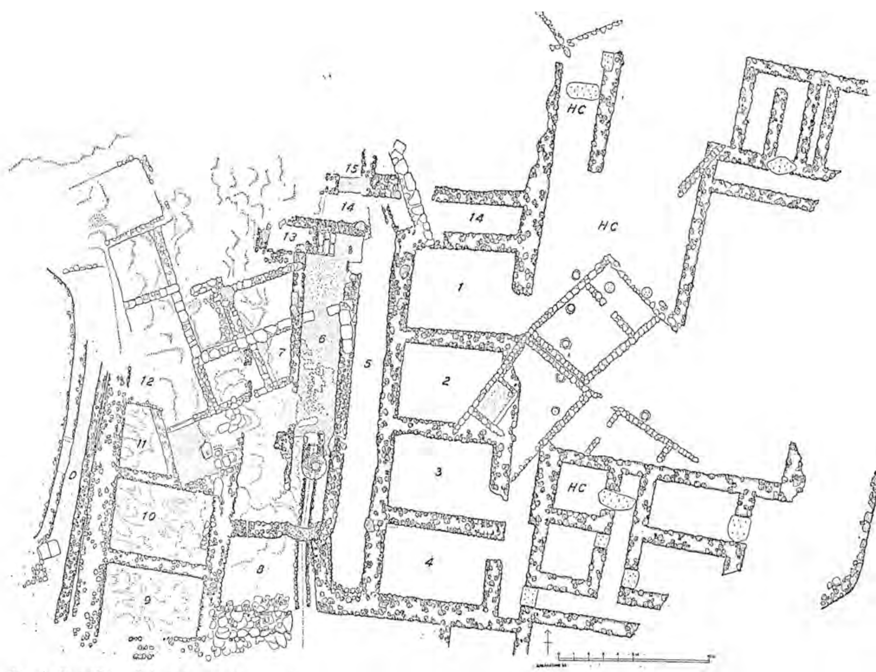


FIG. 1. East Wing of the Palace of Mycenae. Hatched Foundations: Mycenaean; Outline Foundations: Hellenistic. HC: House of Columns; D: Corridor between Terraces 2 and 3. (Drawn by J. A. Breakstone)

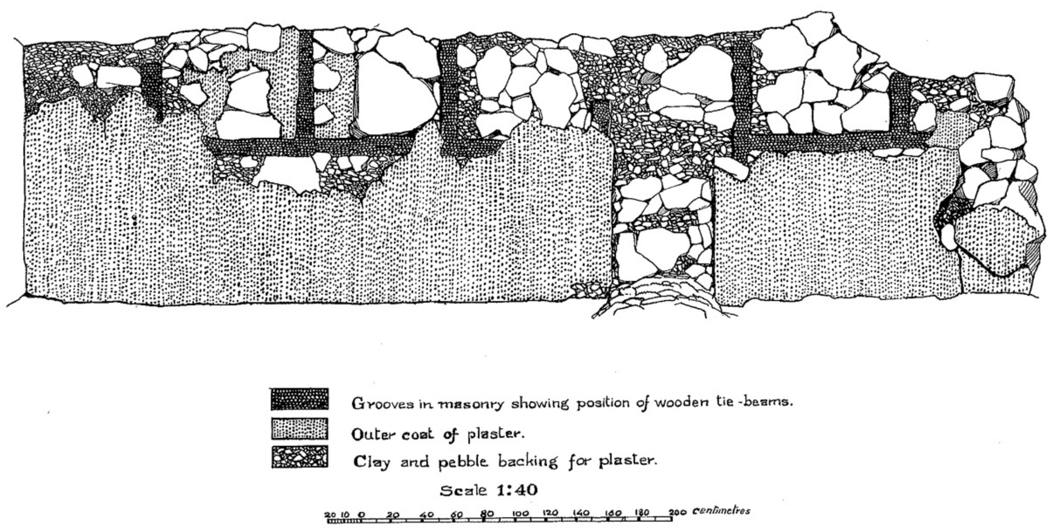


Fig 201

24. *a.* South House, timbered and plastered walls

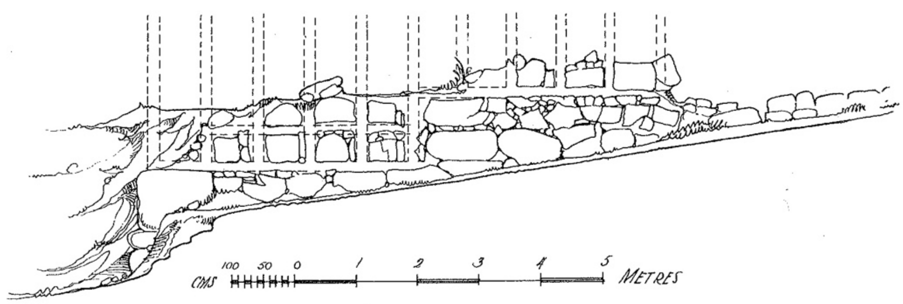
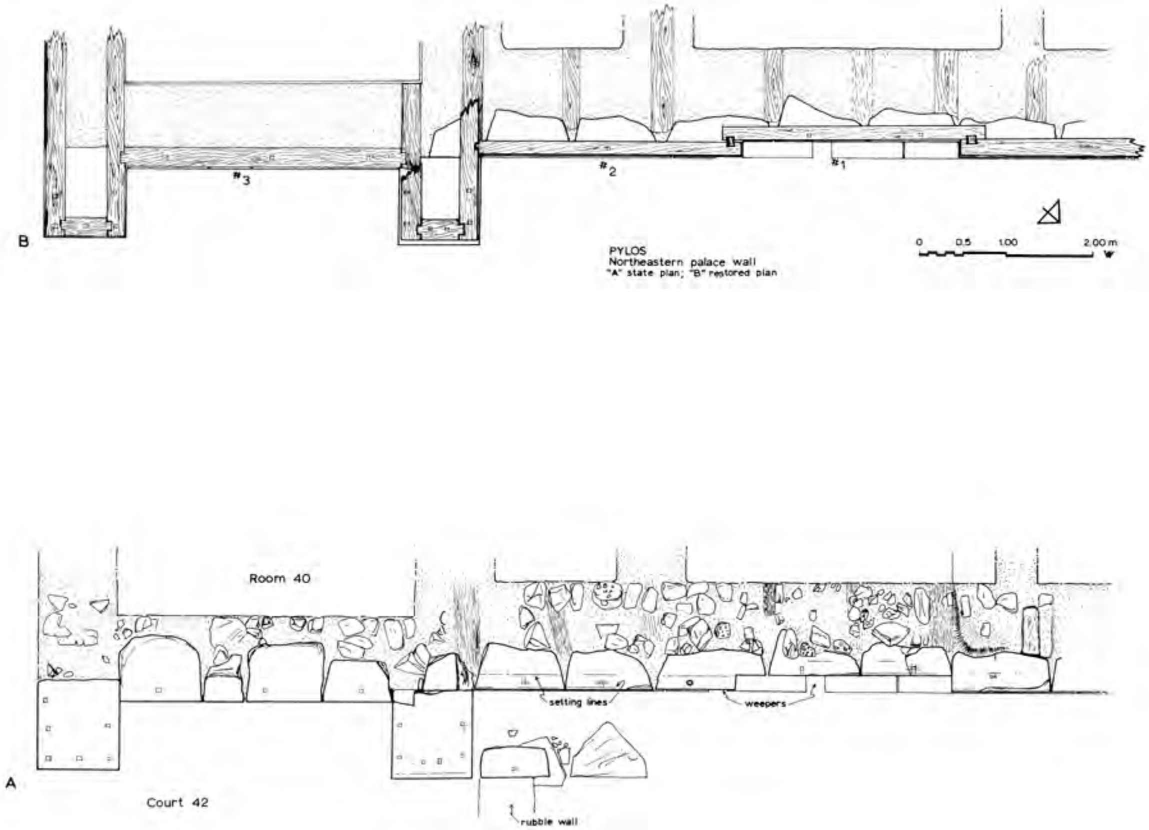


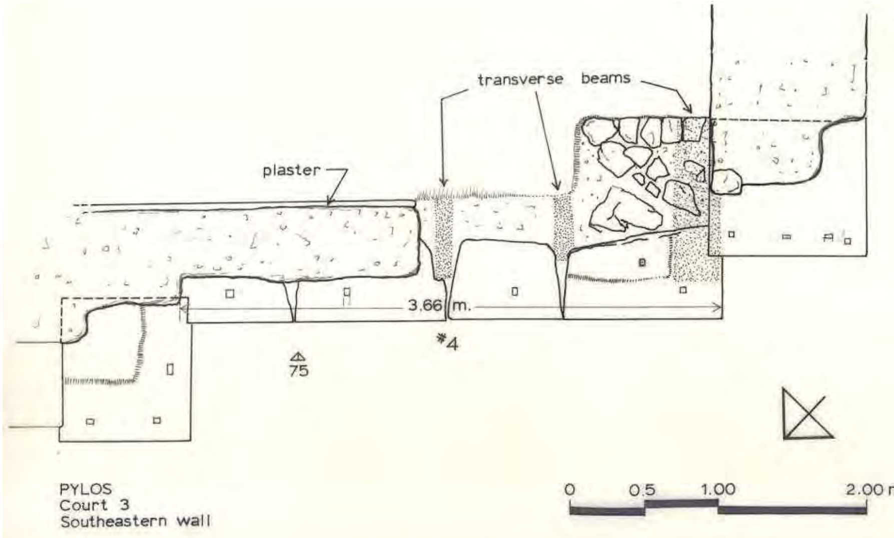
Fig. 202

24. *b.* Ramp, wall with timbering



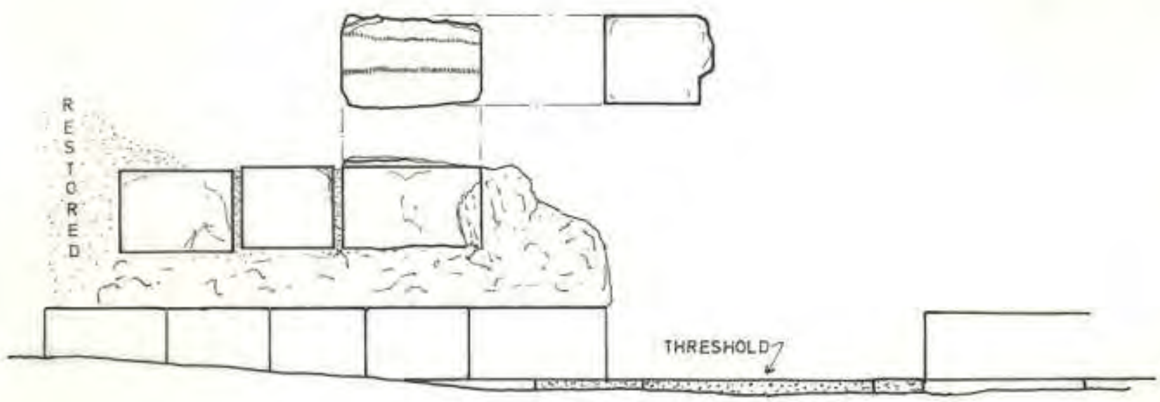
PYLOS
Northeastern palace wall
"A" state plan; "B" restored plan

205

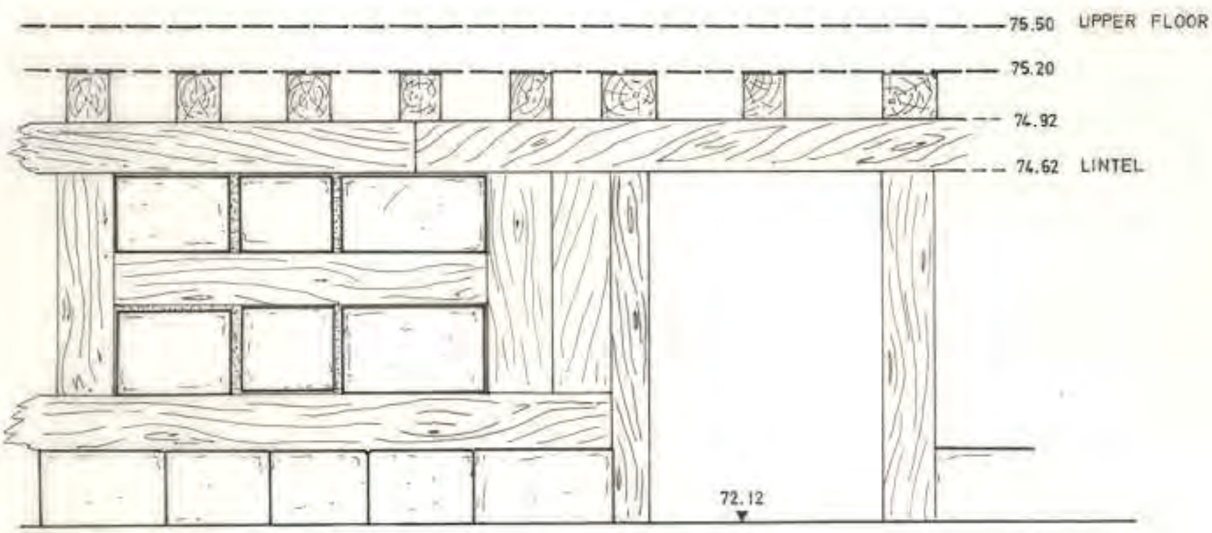


PYLOS
Court 3
Southeastern wall

207

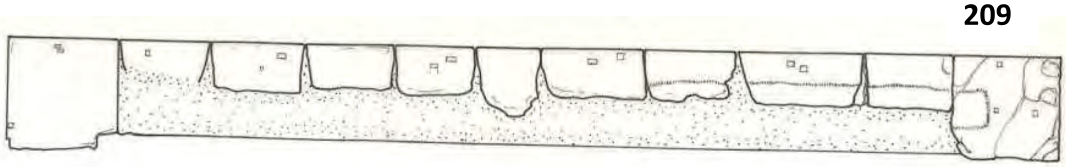


208



MYCENAE: MEGARON PORCH
Facade, elevation
actual state & possible restoration

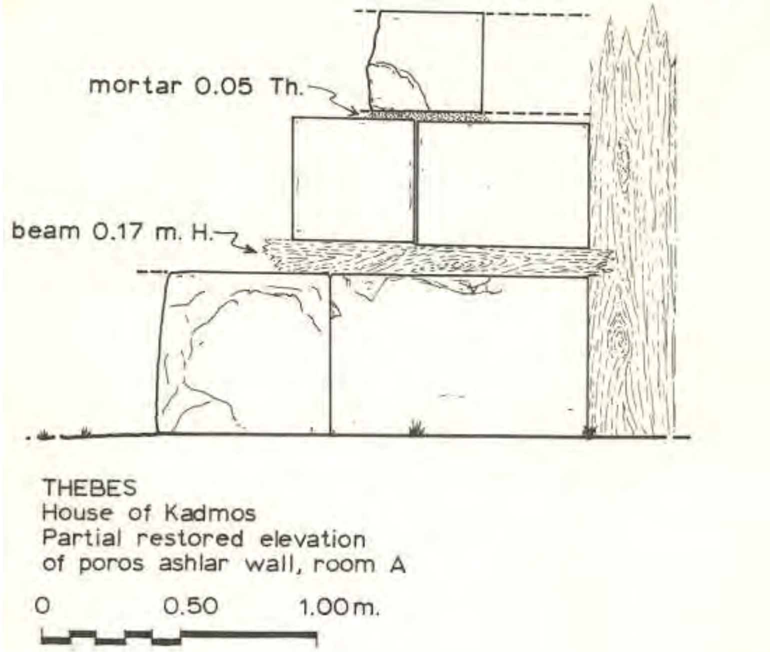
209



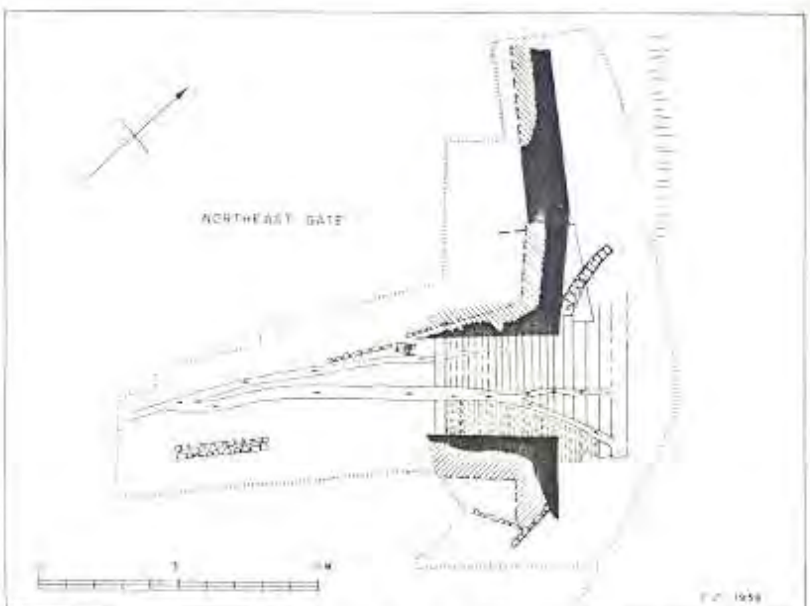
PYLOS, SW BLDG.

0 1.00 2.00 m.

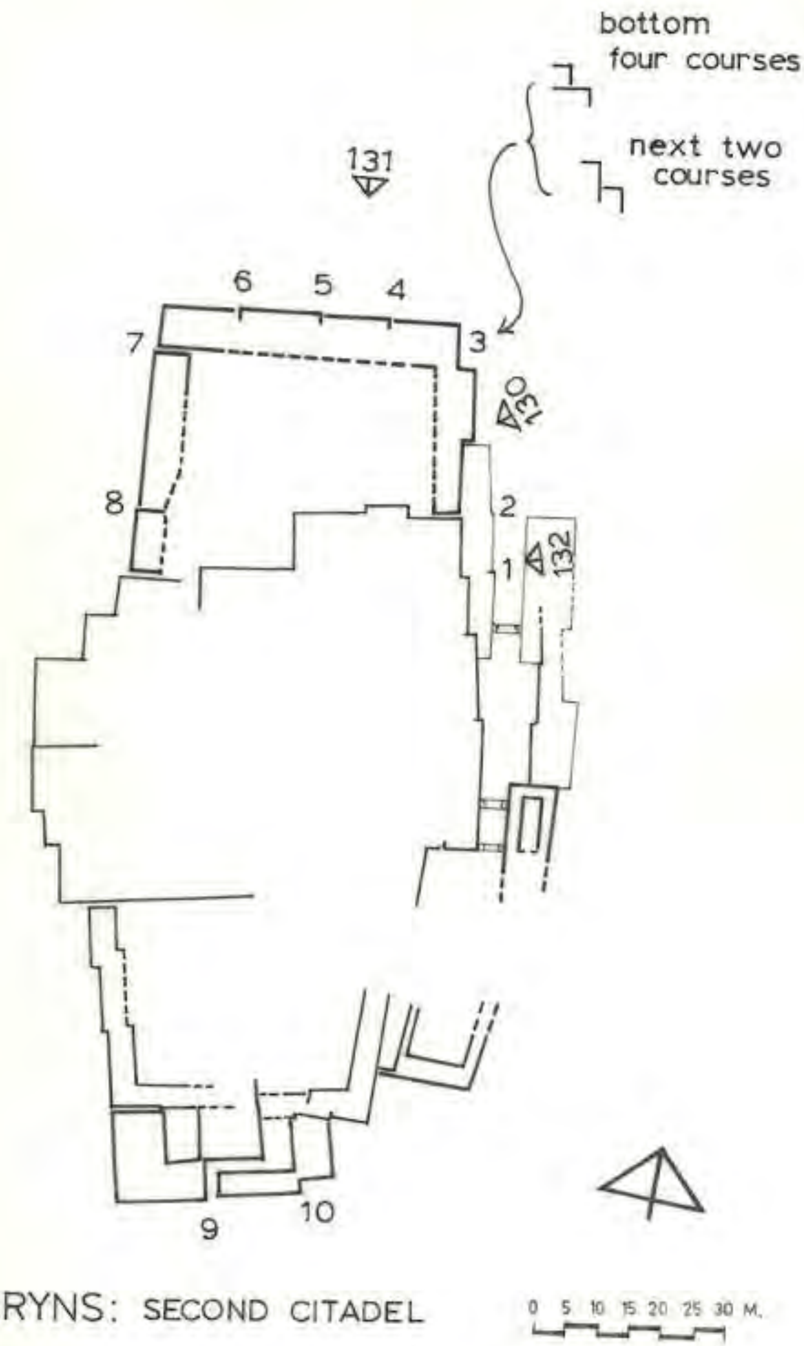
210



211

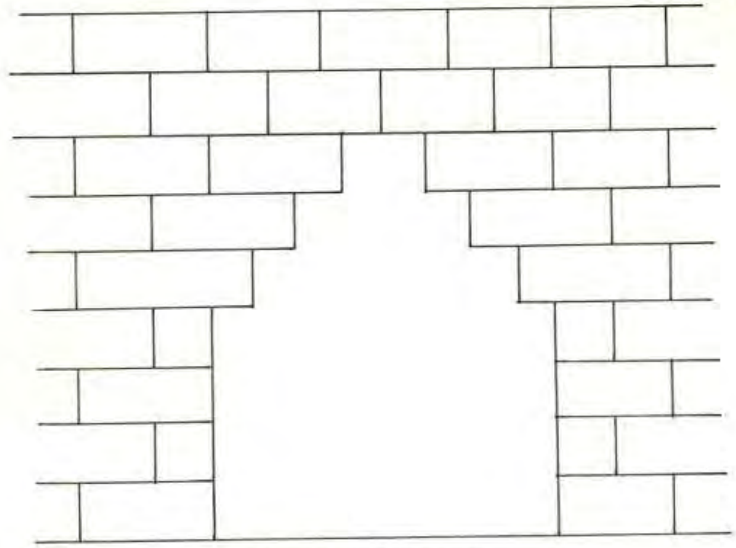


304. Northeast Gate (drawn by G. Papathanasopoulos, adapted by J. W. Shaw)



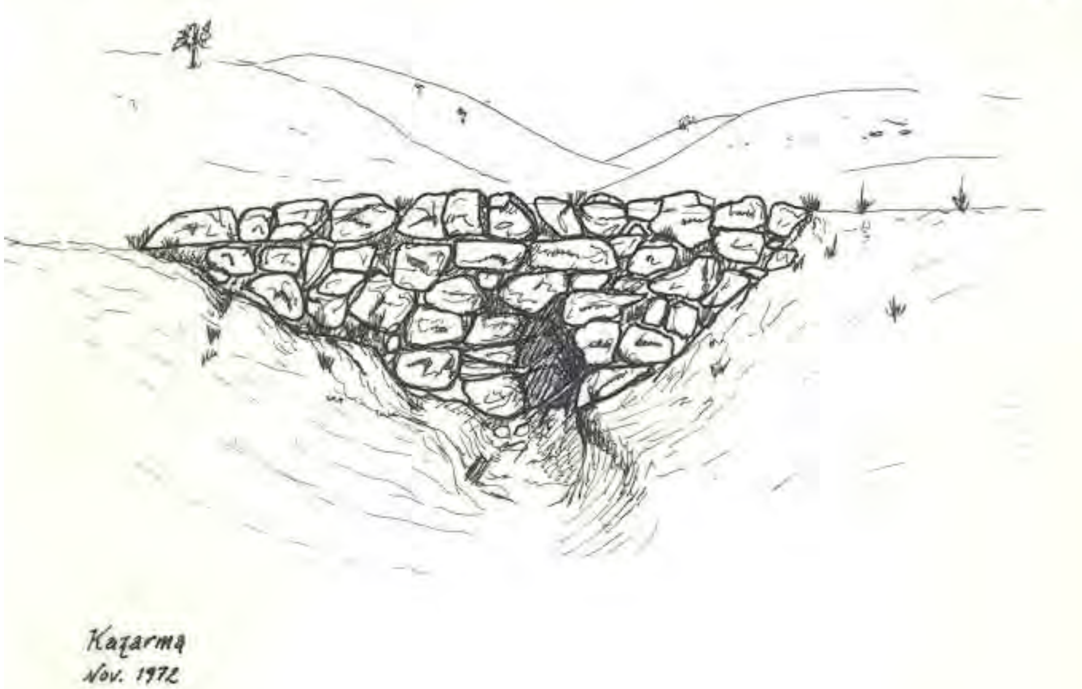
TIRYNS: SECOND CITADEL

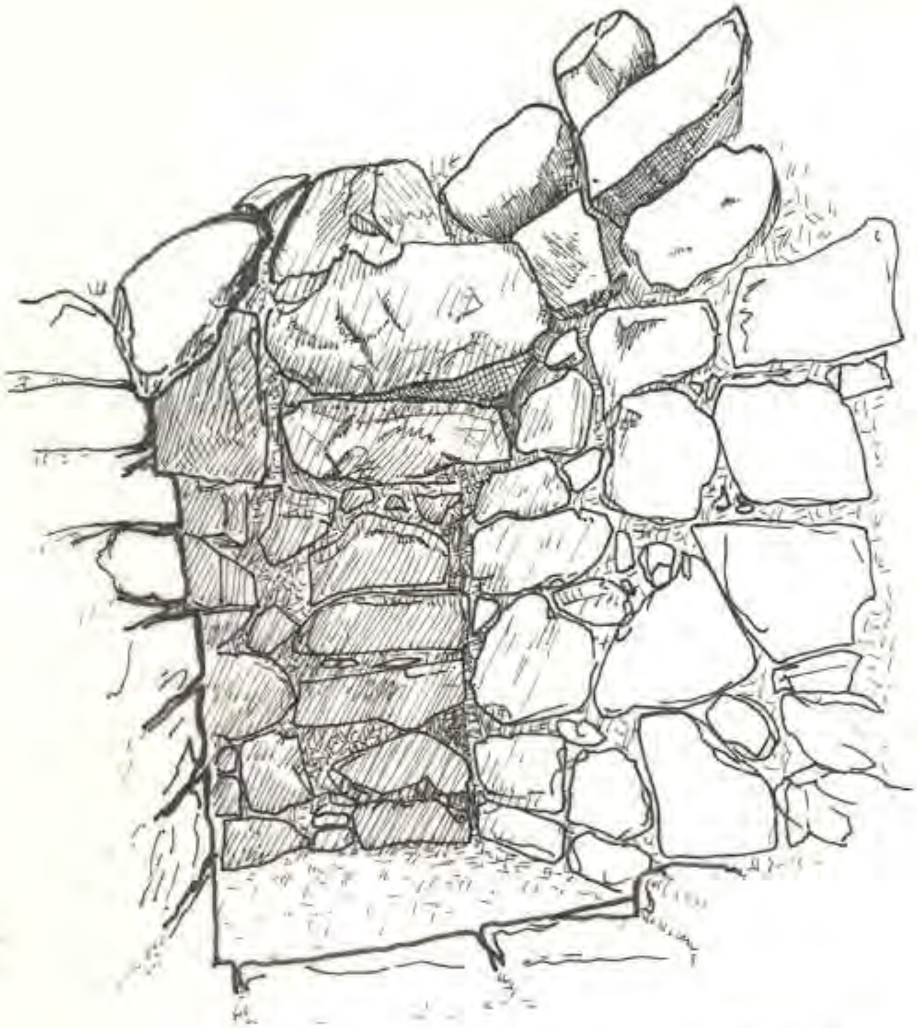
218



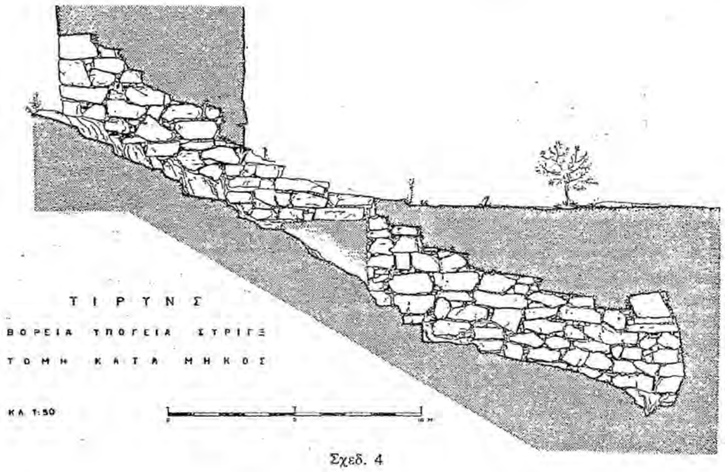
CORBELLED VAULT

219

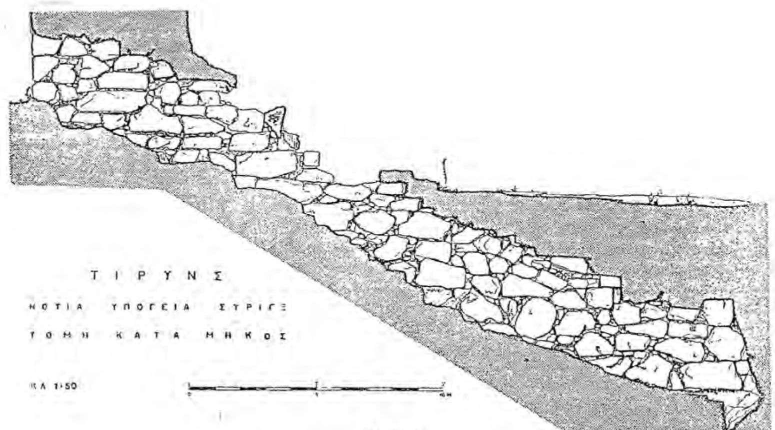




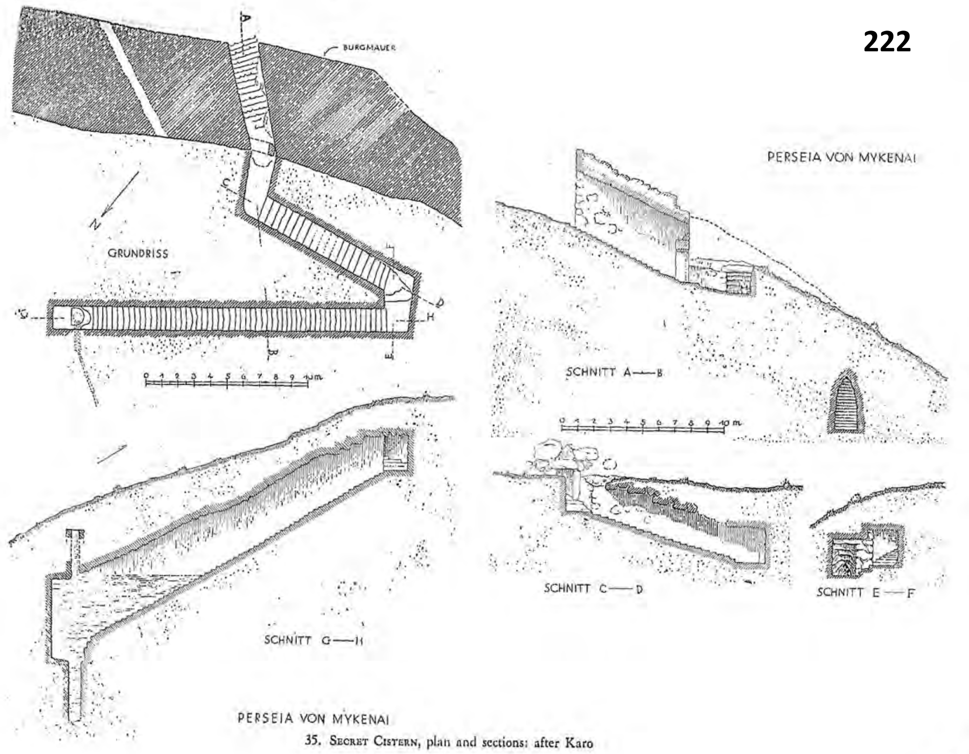
Tiryns, corbelling in stair to S. gallery


ΤΙΡΥΝΣ
ΒΟΡΕΙΑ ΥΠΟΓΕΙΑ ΣΥΡΙΓΞ
ΤΟΜΗ ΚΑΤΑ ΜΗΚΟΣ
ΚΛ 1:50

Σχεδ. 4


ΤΙΡΥΝΣ
ΝΟΤΙΑ ΥΠΟΓΕΙΑ ΣΥΡΙΓΞ
ΤΟΜΗ ΚΑΤΑ ΜΗΚΟΣ
ΚΛ 1:50

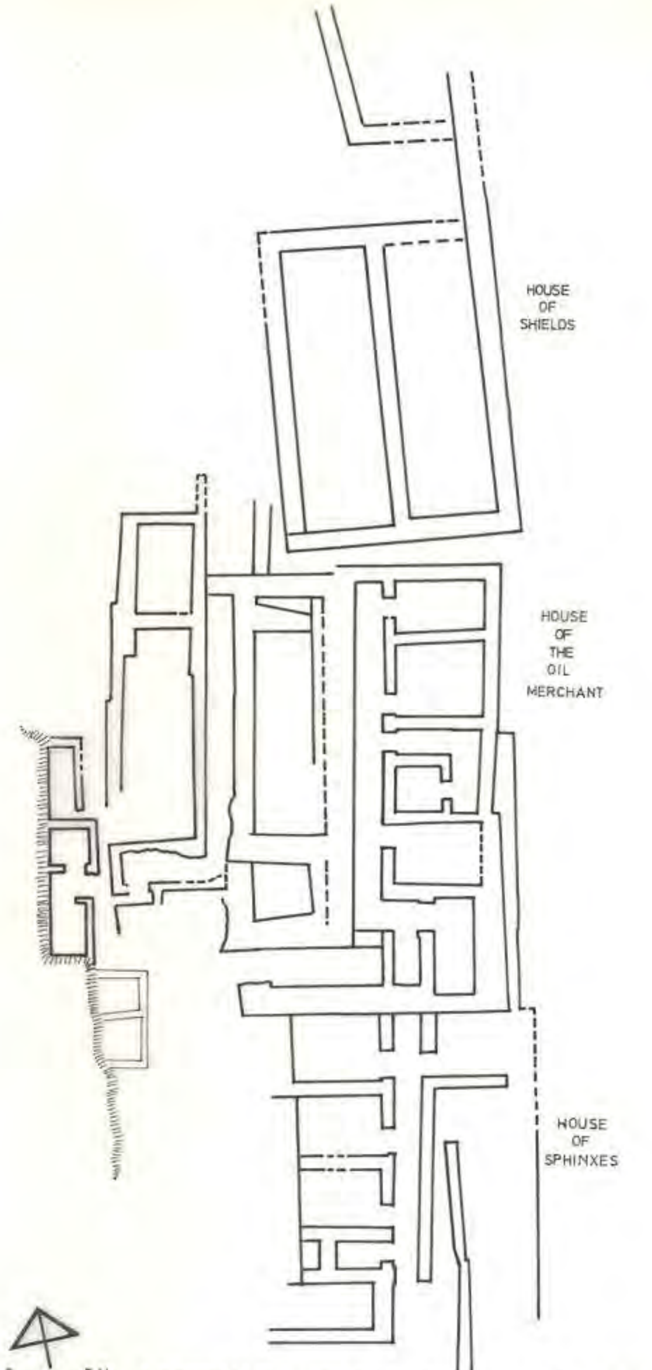
Σχεδ. 5



35. Secret Cistern, plan and sections: after Karo

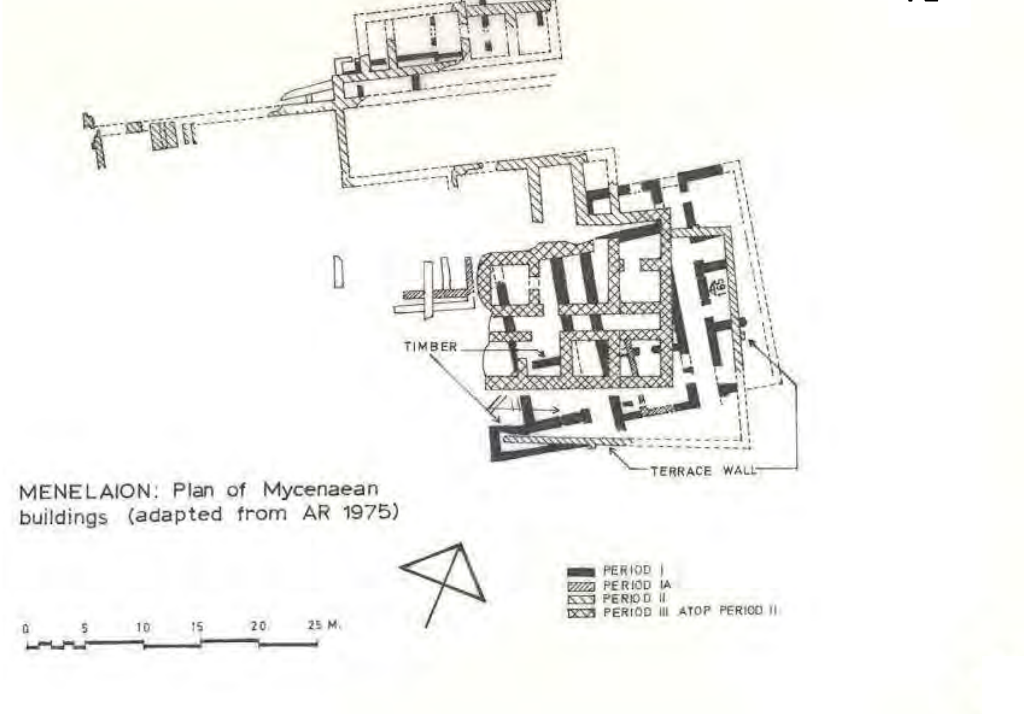
222

P1



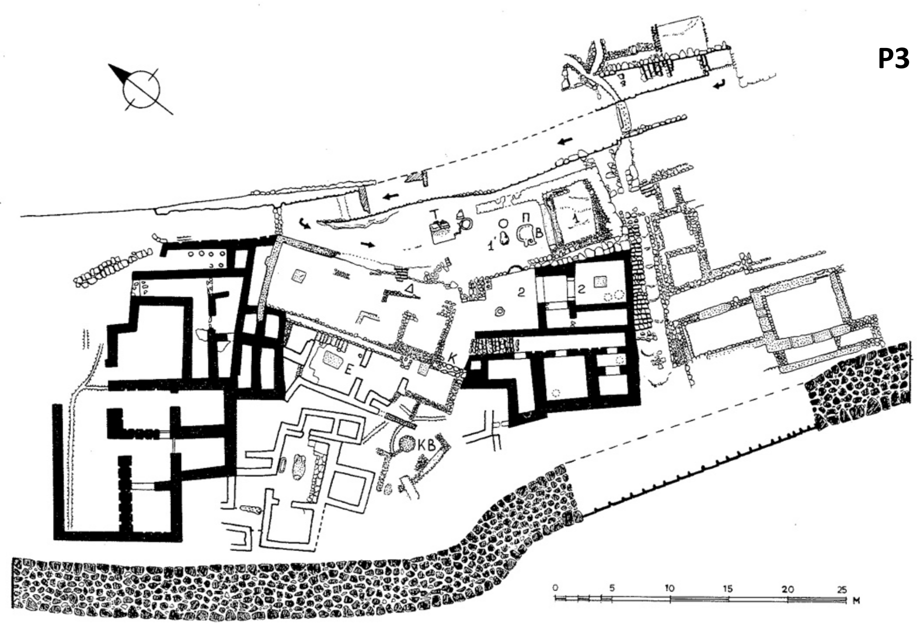
MYCENAE: HOUSES OUTSIDE THE CITADEL

P2



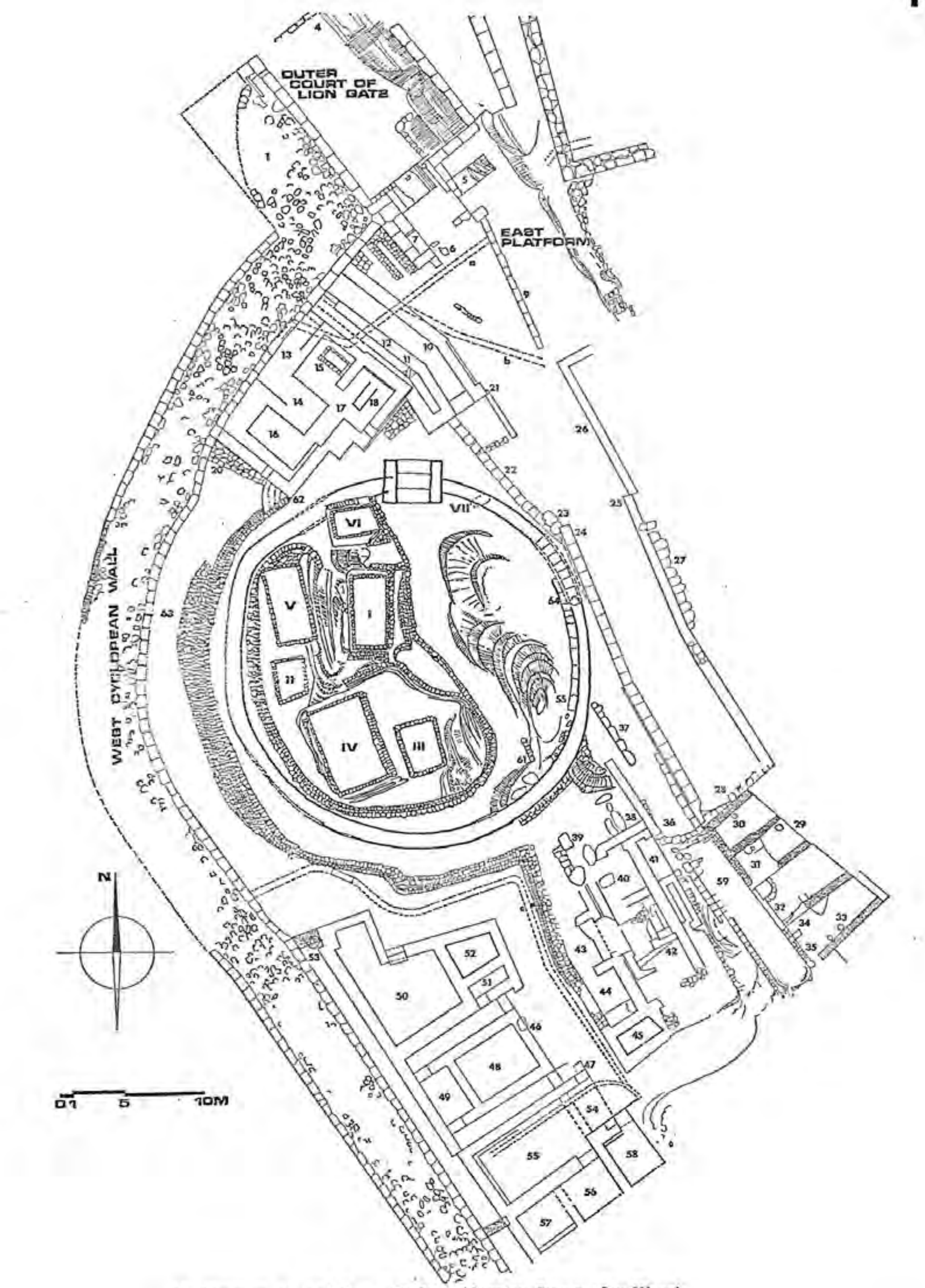
MENELAION: Plan of Mycenaean buildings (adapted from AR 1975)

P3

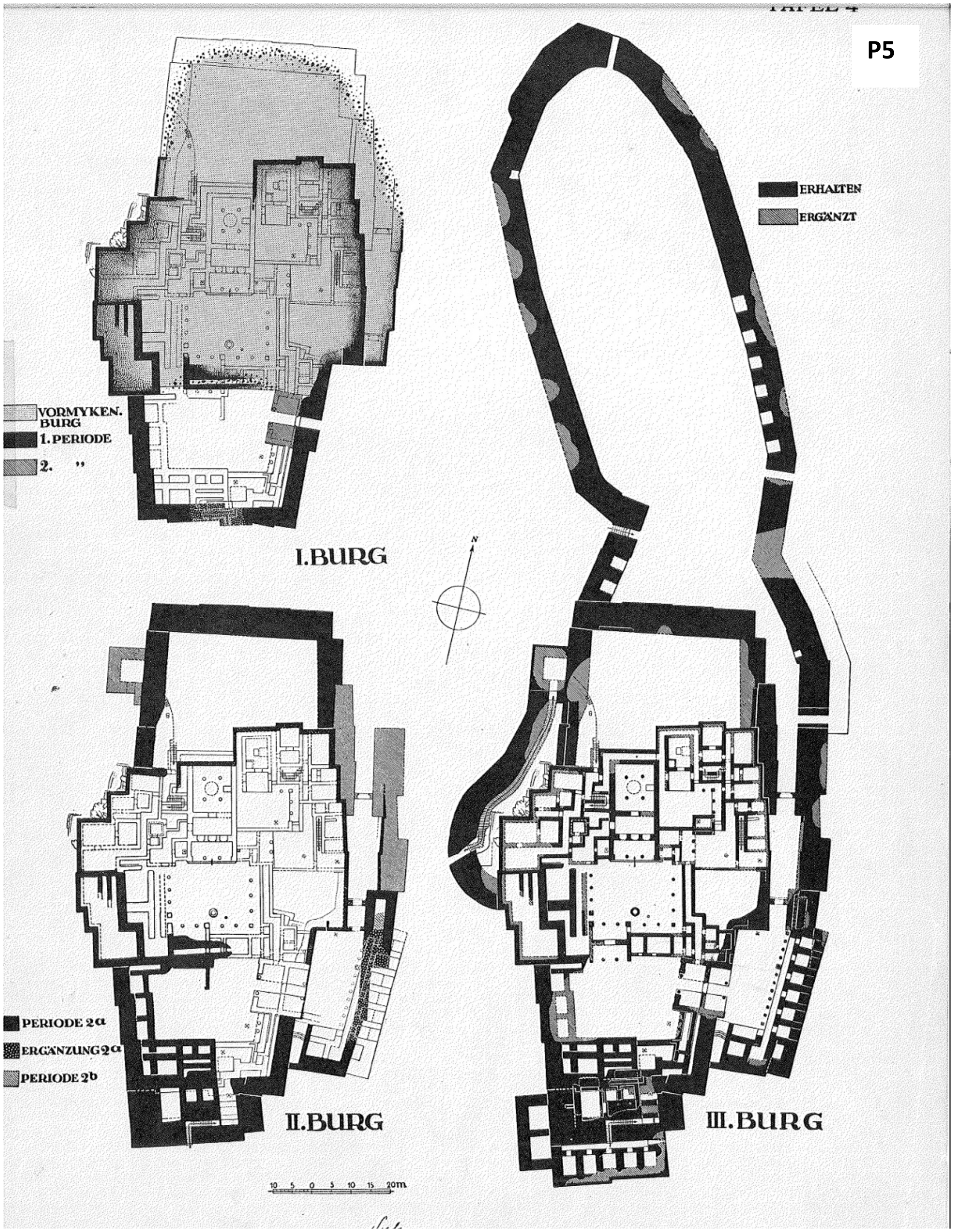


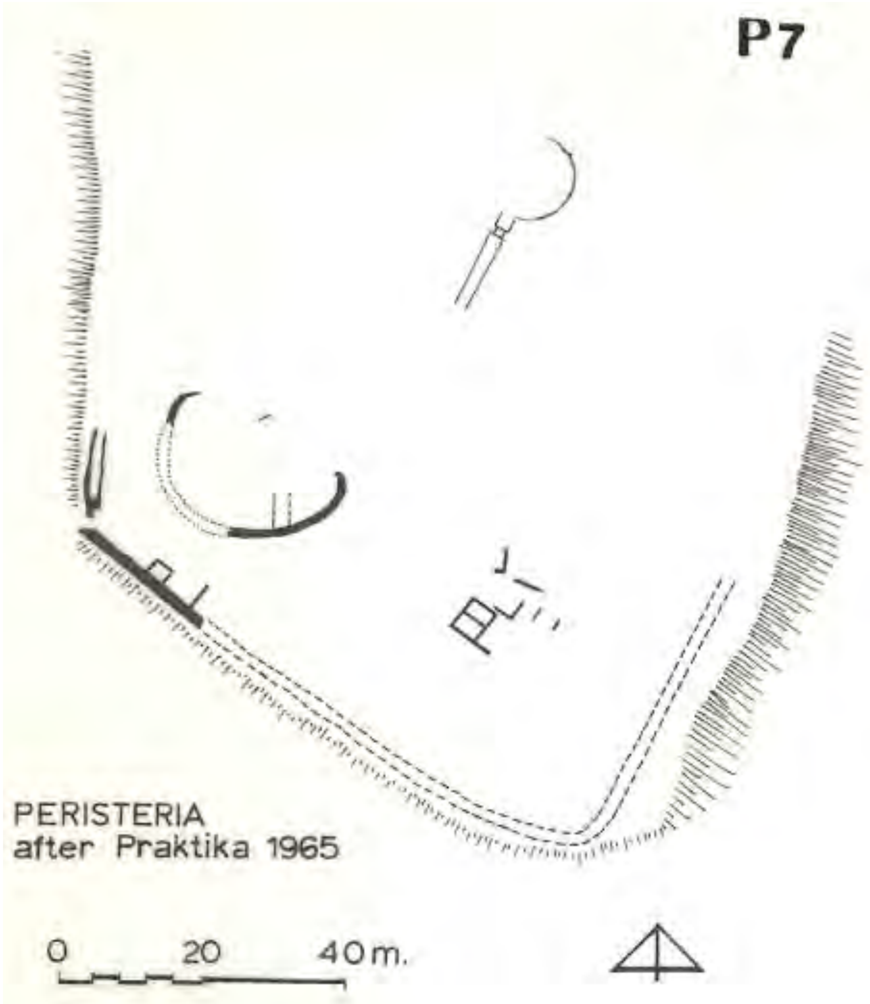
Εἰκ. 2. Μυκῆναι. Προκαταρκτικὸν σχέδιον τοῦ θρησκευτικοῦ κέντρου.

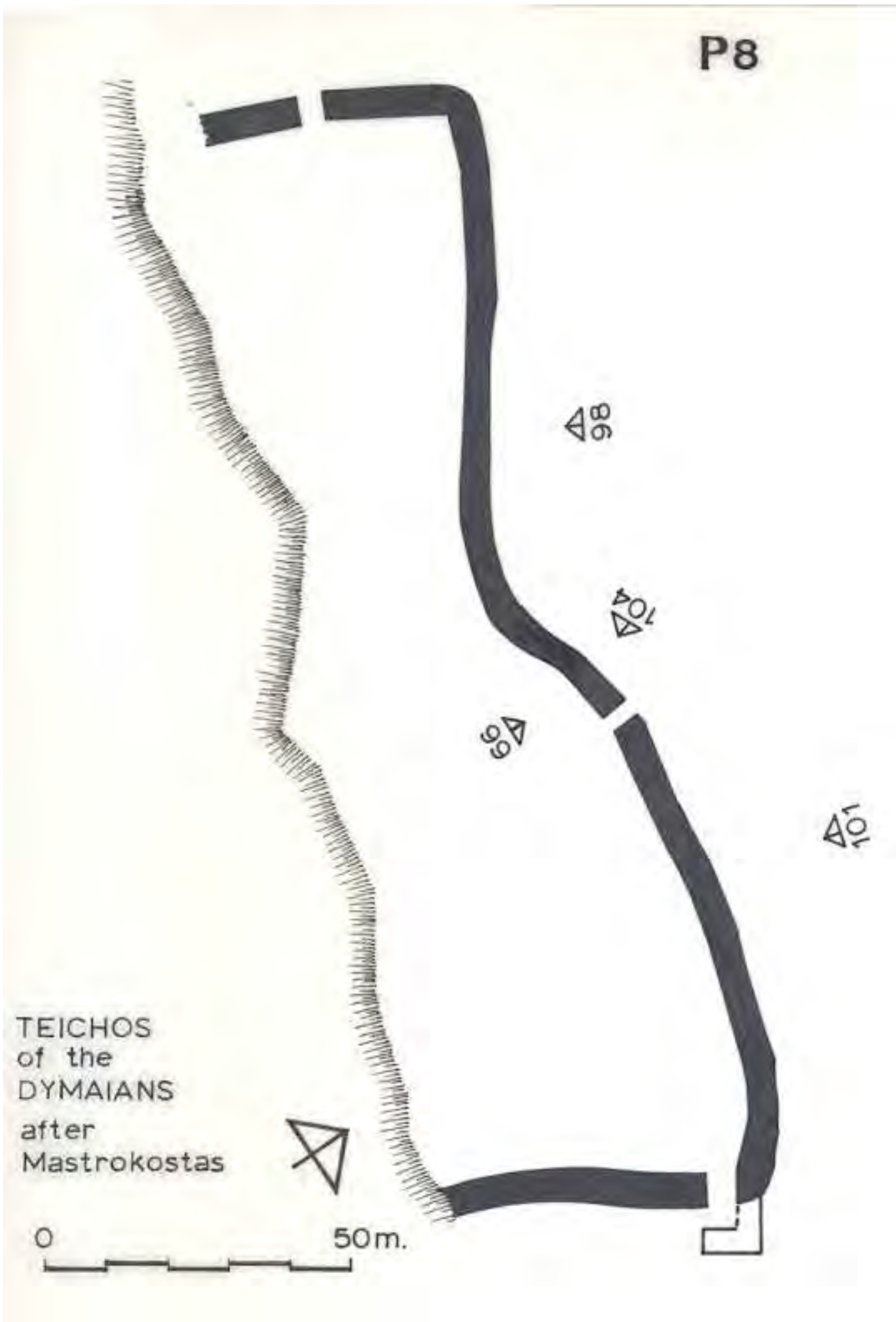
P4

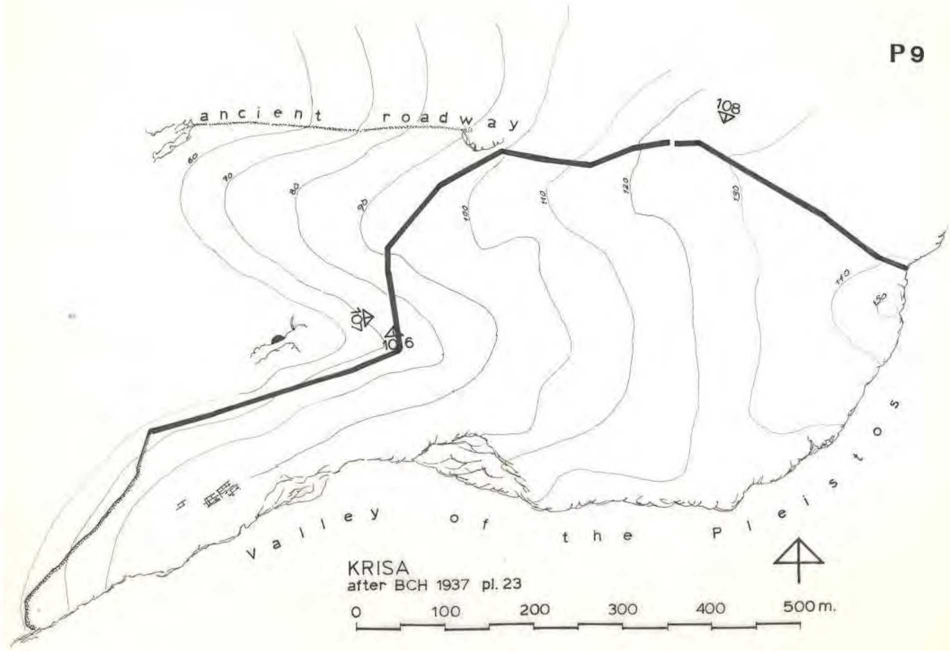


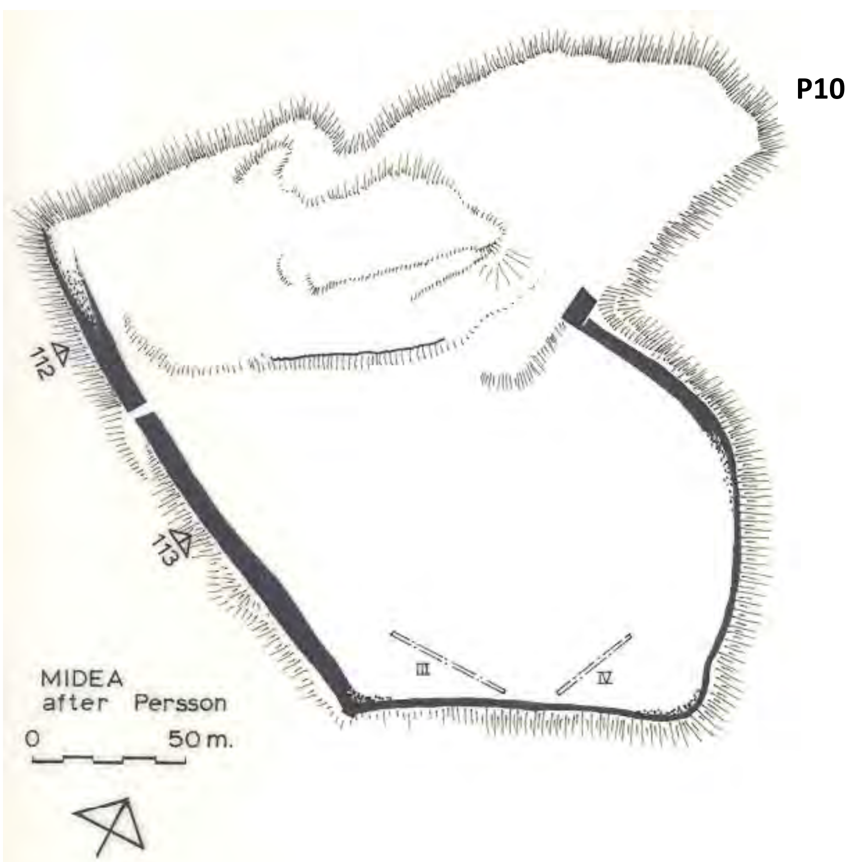
19. Mycenae, Area of Grave Circle A (drawing Garvey after Wace)


TAFEL 4
P5
ERHALTEN
ERGÄNZT
VORMYKEN. BURG
1. PERIODE
2. "
I. BURG
N
PERIODE 2a
ERGÄNZUNG 2a
PERIODE 2b
II. BURG
III. BURG
10 5 0 5 10 15 20m

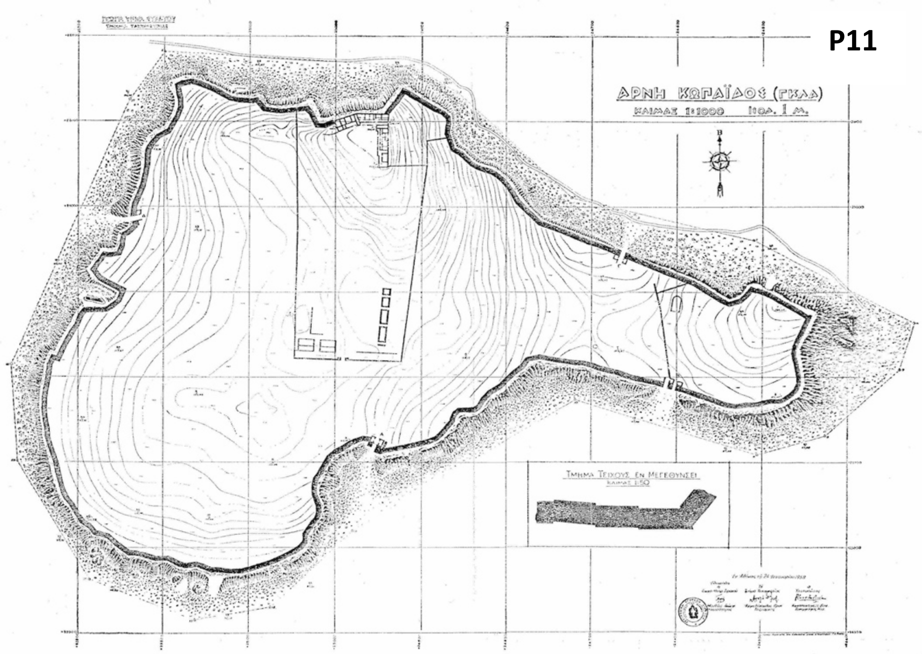

P7
PERISTERIA
after Praktika 1965
0
20
40 m.


P8
98
104
99
101
TEICHOS
of the
DYMAIANS
after
Mastrokostas
0
50m.

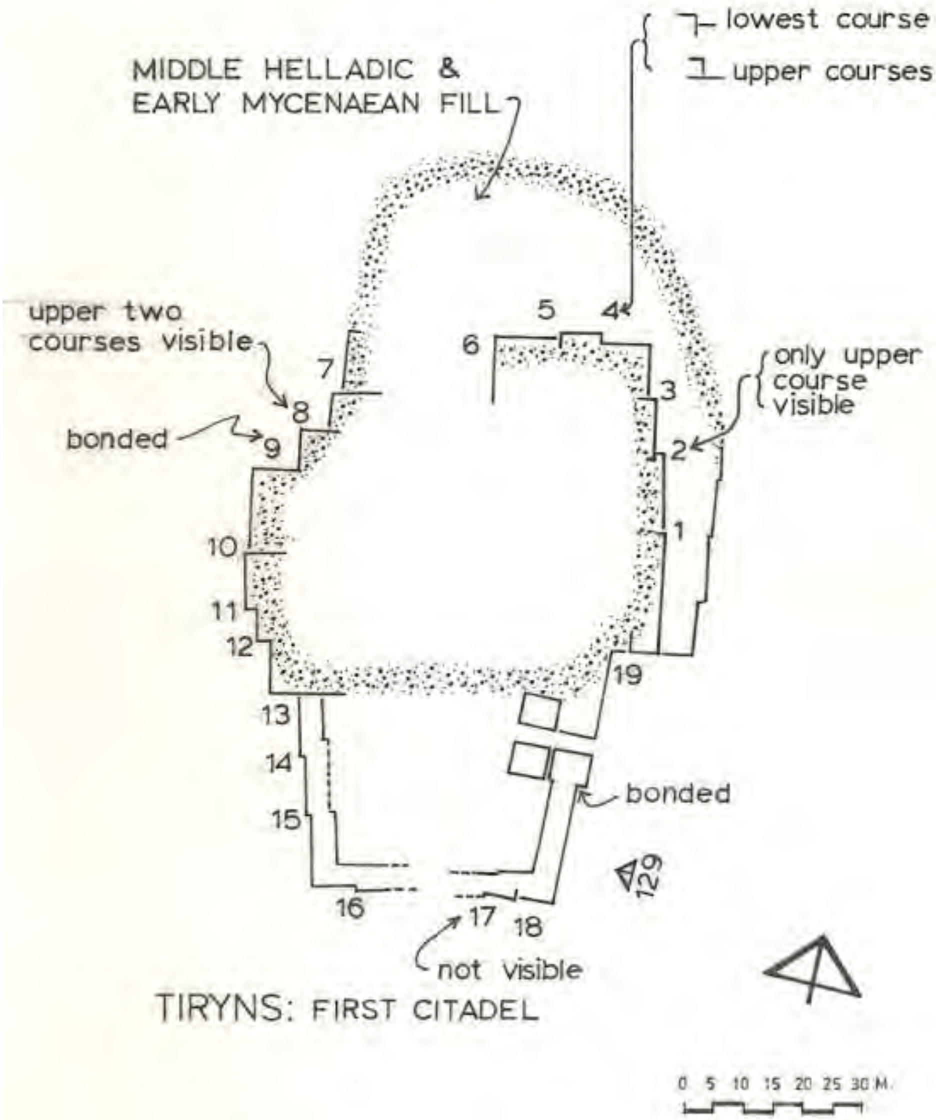

P9
ancient roadway
108
107
106
Valley of the Pleistos
KRISA
after BCH 1937 pl. 23
0 100 200 300 400 500 m.


P10
112
113
III
IV
MIDEA
after Persson
0 50 m.

P11

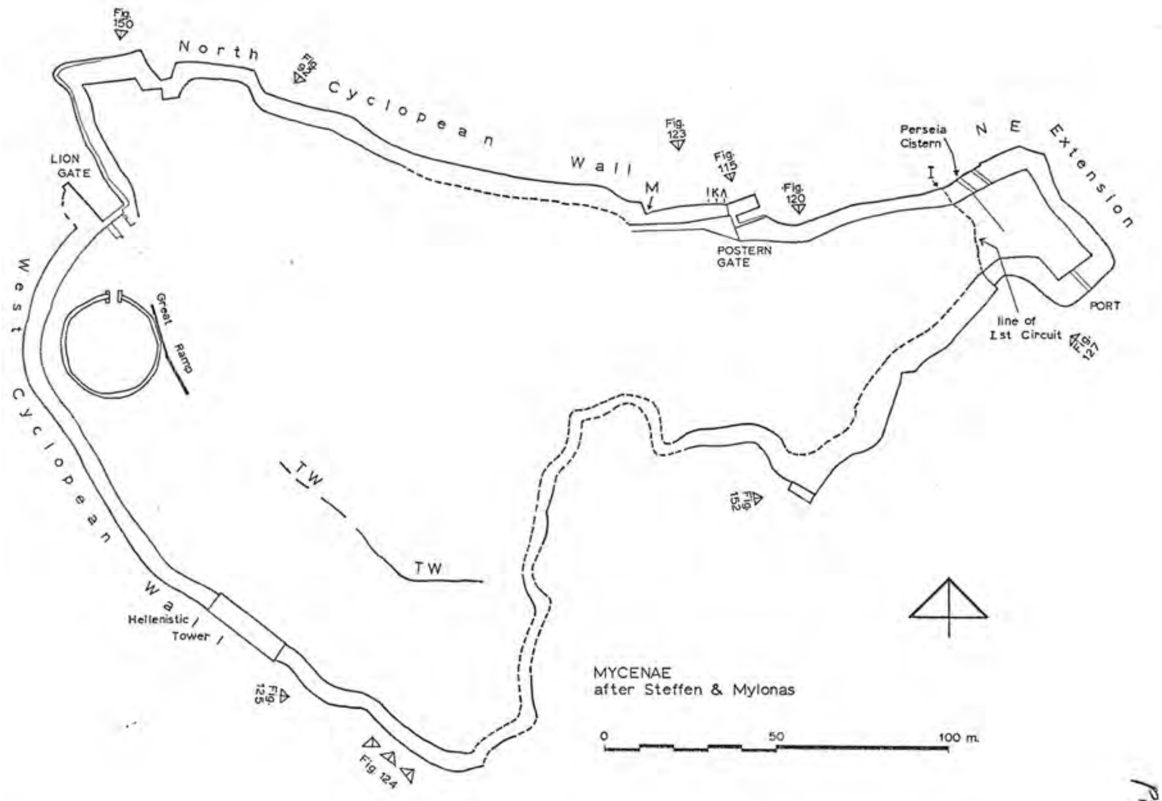


Σχεδ. 1. Γενικὸν τοπογραφικὸν διάγραμμα τοῦ περιβόλου τῆς Ἄρνης, ἐκπονηθὲν ὑπὸ τῆς Γεωγραφικῆς Ὑπηρεσίας Στρατοῦ



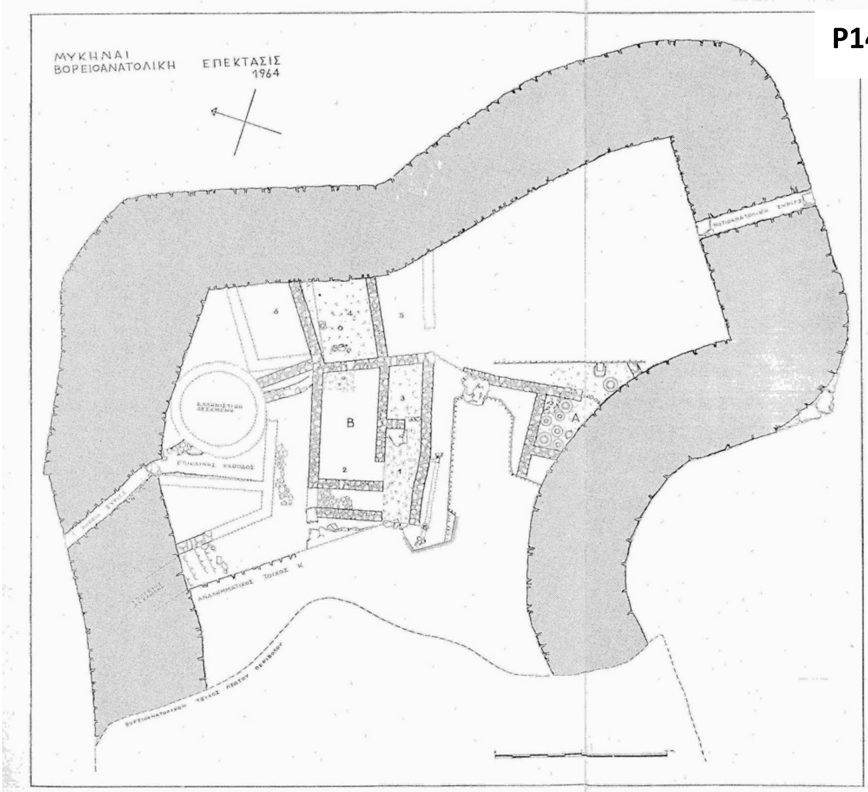
TIRYNS: FIRST CITADEL

P13

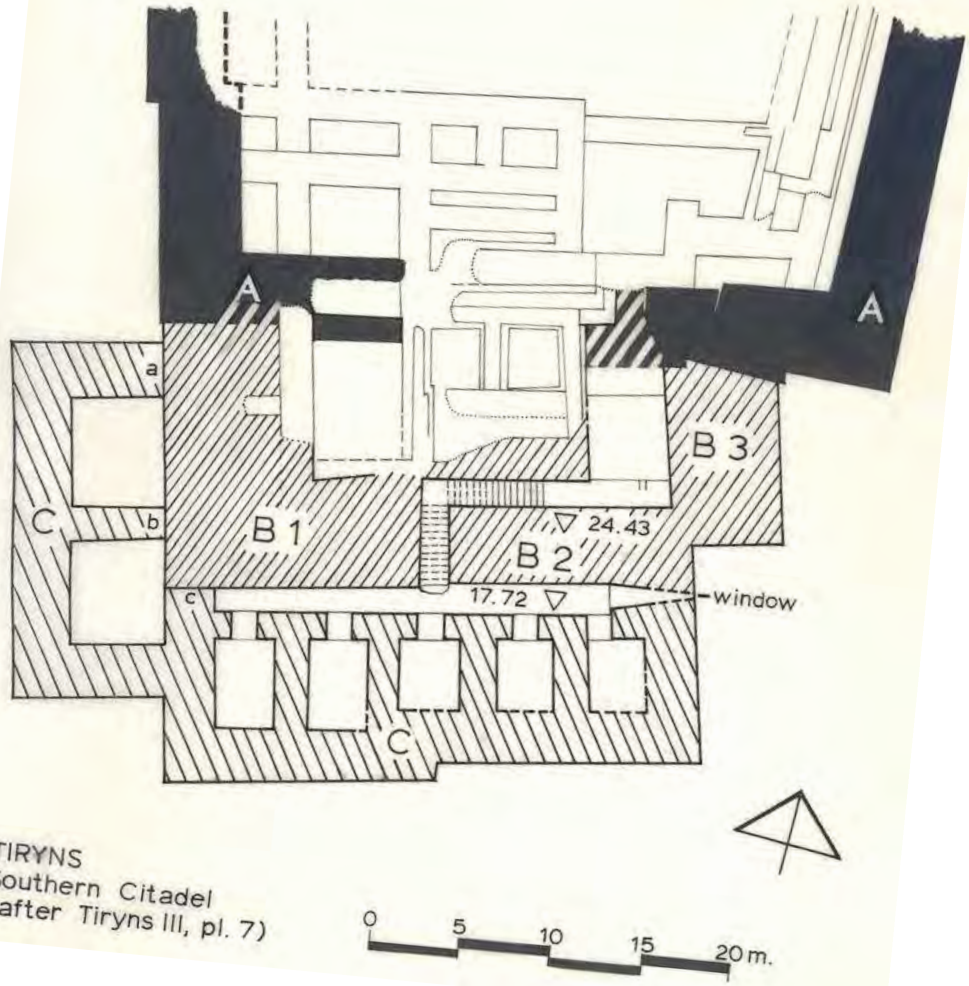

North Cyclopean Wall
West Cyclopean Wall
NE Extension
LION GATE
Great Ramp
TW
TW
Hellenistic Tower
M
IKA
POSTERN GATE
Perseia Cistern
I
PORT
line of 1st Circuit
Fig. 150
Fig. 123
Fig. 115
Fig. 120
Fig. 127
Fig. 152
Fig. 125
Fig 124
MYCENAE
after Steffen & Mylonas
0
50
100 m.

P13

P14



(Σχέδιον Κωστή Δασκαλάκι καὶ Λουκιανοῦ Παγώνη)



TIRYNS
Southern Citadel
(after Tiryns III, pl. 7)

P16

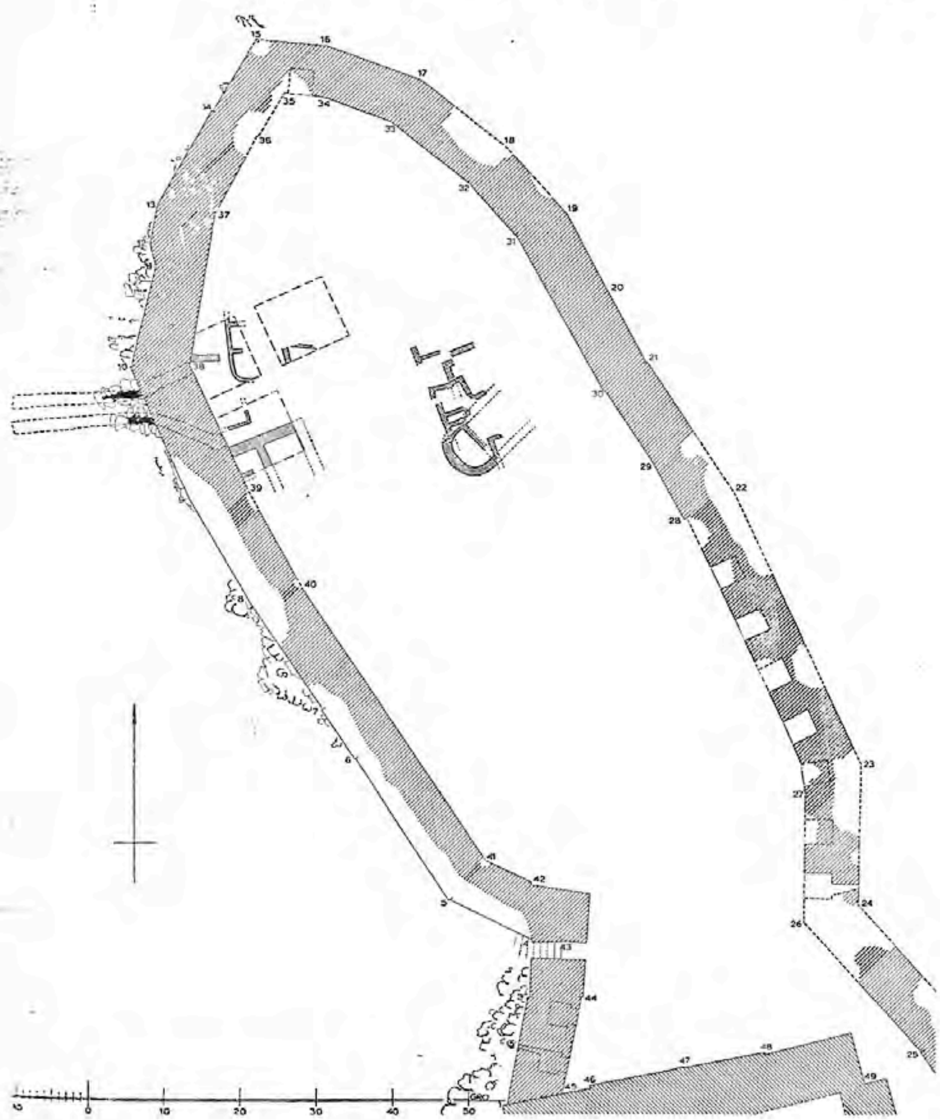
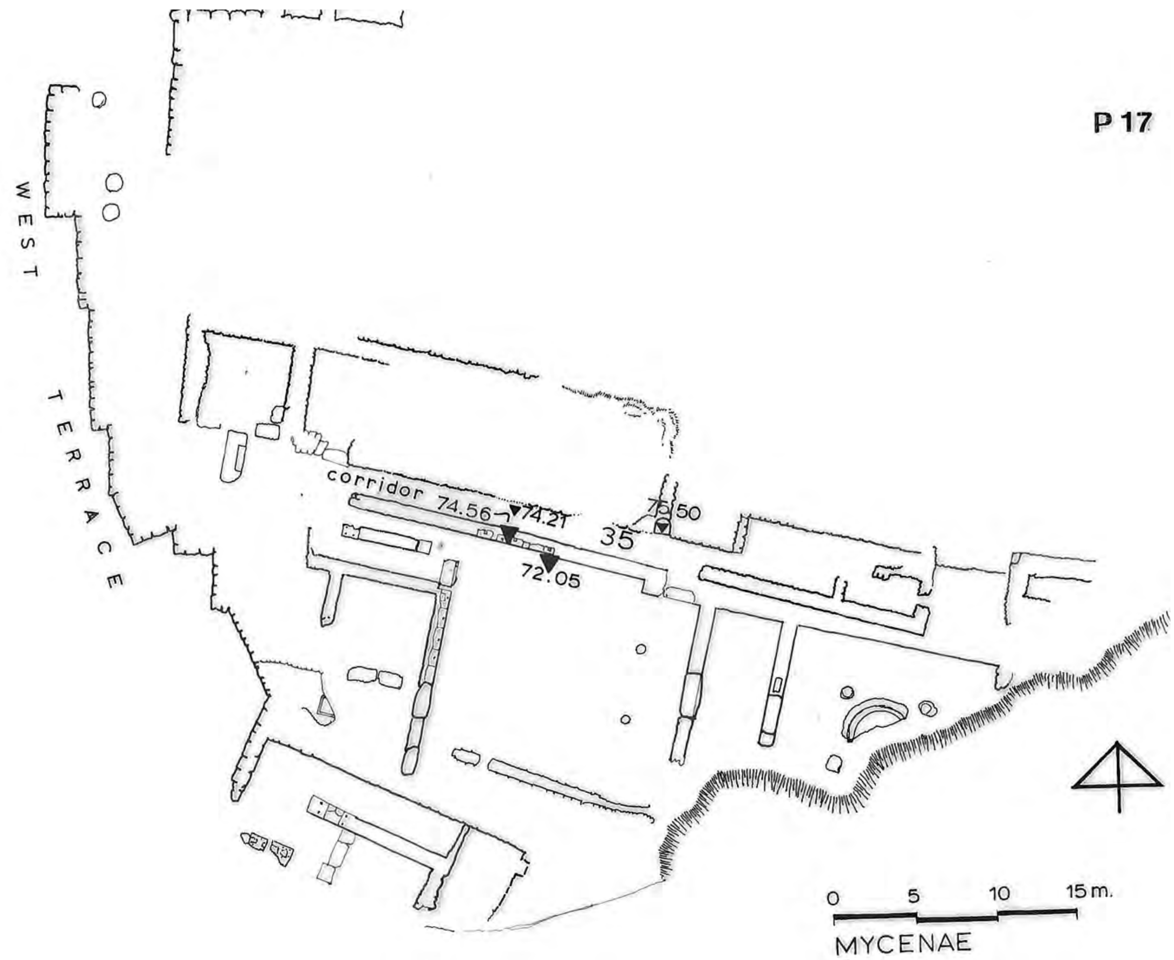


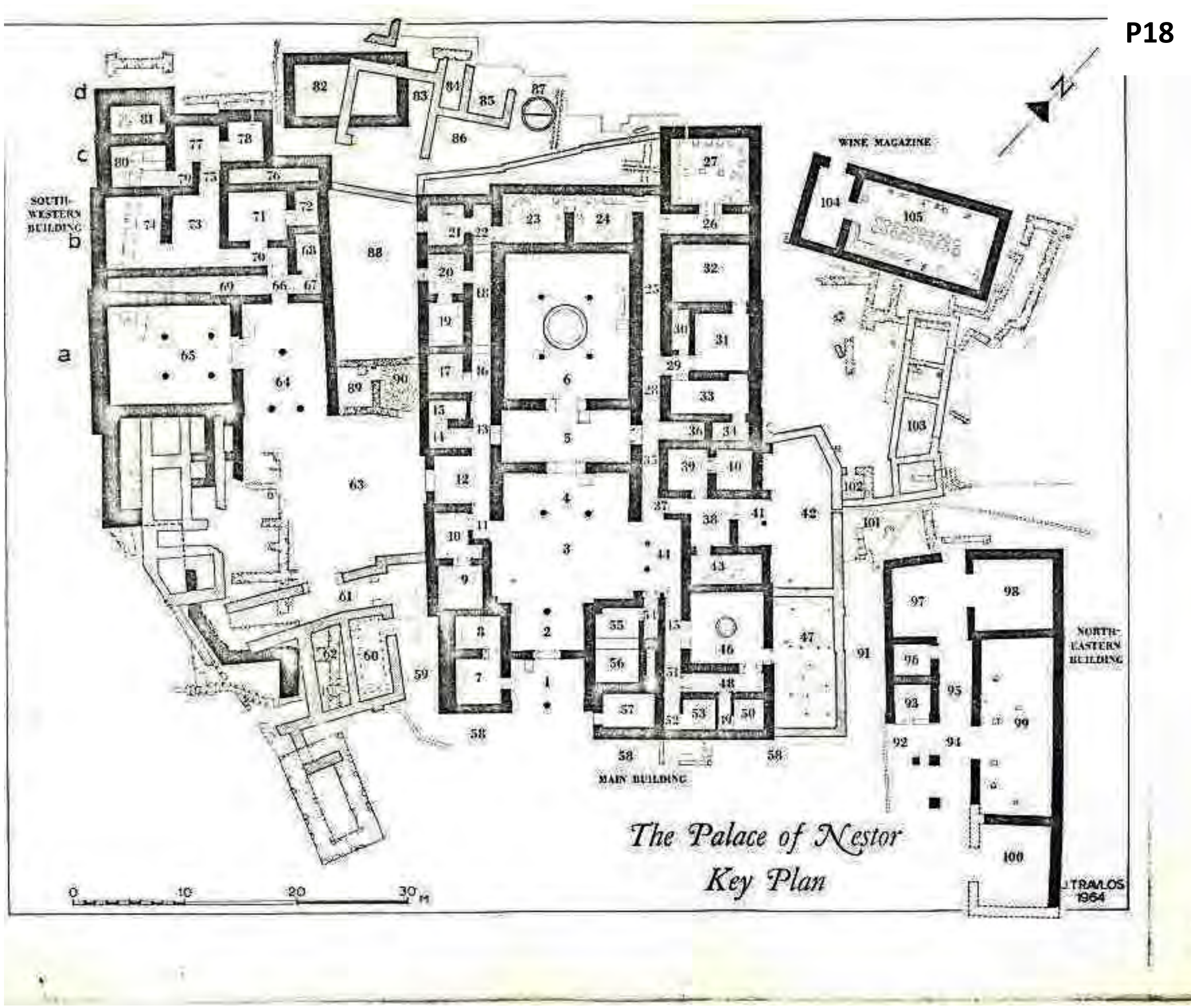
Abb. 1 Tiryns, Plan der Unterburg

P 17



WEST
TERRACE
corridor 74.56
74.21
75.50
35
72.05
0
5
10
15 m.
MYCENAE

P18


WINE MAGAZINE
SOUTH-WESTERN BUILDING
NORTH-EASTERN BUILDING
MAIN BUILDING
The Palace of Nestor
Key Plan
J. TRAVLOS
1964
0 10 20 30 M

P18