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Judean pithoi of Iron Age Eretz Israel

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JUDEAN PITHOI OF IRON AGE ERETZ ISRAEL

by

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Abstract

The excavation and analysis of pottery is an important element in the archaeology of Eretz Israel and in the development of assemblages which are representative of selected strata. The developments in ceramic research over the last century and a half have revealed that there are common characteristics among the pottery produced in a country in a single period of time. There are, however, decided differences between the pottery of various geographical regions. The character and history of the Southern Kingdom of Judah is reflective of the various geographical zones of the country through which the ubiquitous nature of ceramics provides a useful indicator of time periods and, to a degree, locales and consequently usage. This study has attempted, through statistical analysis to typologize pithoi according to dating periods and to isolate them as being predominantly from one particular area or another. Included also is an ethno-archaeological approach to pottery technology as a means to better understanding the character and role of the ceramics industry in light of the fragility and frequent replacement of pottery within a culture. This constant demand for new supplies allows for a relatively swift change in typological development. Thus the typological advantages of pottery have firmly established it as the principal source of chronology for the historic and late prehistoric periods in Eretz Israel.

In order to appreciate the circumstances in which the pithos developed the analysis takes into consideration the political and geographical environment of the Iron Age, ceramic traditions, the manner and means of manufacture of the pithos and also alternate means of storage. In light of these factors, as revealed at nineteen sites within four geographical zones, a number of pithos types are set forth as being representative of Judah in the Iron Age.

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Preface

The study of ceramics and their importance for archaeological study were introduced to me during my undergraduate years. The field work which I participated in during both my undergraduate and graduate terms only served to compound this interest.

It was during a recent and extended visit to Israel (June 1986--November 1988) where I, among other things, studied at the Hebrew University in Jerusalem and participated as an area(s) supervisor on the Lahav Research Project for two seasons, that I sought to refine my thesis proposal and came upon a topic, the study of the pithos, which captured my interest.

I had not come across any specific studies on the pithos, rather the topic and my interest evolved out of minor references to pithoi in excavation reports and conversations with professors at the Hebrew Union College and the Tel Aviv University. My interest in this particular vessel type only increased upon further research as it presented many facets for study. There was not just the analytical and typological archaeological perspective, there was also its seemingly pivotal role in historical periods of both early settlement and later expansion, and finally its potential for ethnological study.

A variety of approaches, historical, geographical, ethnological and statistical, will be employed in order to understand the place and

function of particular pithos types within the context of Judean society.

An historical-cultural perspective of Iron Age Judah (Chapter 1) outlines the political and economic position of a developing society and the subsequent and increas· need for a sure ·ood supply by an expanding population. The initial sedentarization processes of the Israelites in the transitional zones were facilitated by the introduction and use of the pithos as were the later expansionist trends into areas such as the Negev.

A study of tne geographical zones of Judah (Chapter 2) reveals uneven resources of water and fertile land varying from region to region or even from one site to another within a single zone. Settlements established under diverse conditions adapted and grew through the development and use of the cistern and silo in conjunction with the pithos. The specific manner in which the pithos was utilized will be hypothesized on the basis of particular resources unique or lacking in a noted area of the Central Hill Country, Shepheiah, Negev or the Transjordan.

To facilitate an understanding of the pivotal role of the pithos within the context of daily use in Iron Age Judah an ethnoarchaeological approach is applied (Chapter 3). This study adds to the understanding of pithos function and character by outlining the probable means of construction, from the gathering of the raw materials to the final sale of the finished product, based on ancient methods particular to this area today.

Once the historical-political, geographical and functional uses of the pitho· have been outlined the development of pithoi within Judean traditions will be set forth (Chapter 4).

The comp··ter analysis (Chapter 5) indicates which variables are valid

for typological definition as revealed by factor analysis. The results establish a basis for a "four-part" typology (Chapter 6) with which to analyze the 224 pithos samples. The variables indicated as valid through "high loadings" are employed in further comparative calculations which subsequently produced seven pithos types with associated subtypes which are illustrated on plates included at the end of the text.

In the conclusion the temporal analysis, primarily historical and geographical, and the statistical computations are taken together and hypotheses are presented concerning the role and possible storage function of the pithos in relation to geographical locale, period of history and the "type" features, such as neck height and rim profile, of the pithos.

CHAPTER ONE

Historical Introduction to the Iron Age

In order to help the reader place the following study of Judean pithoi in historical perspective a brief overview of major events in the Iron Age is presented here. This includes an analysis of the three schools of thought focusing on the Settlement phase in Israelite history and follows with a section highlighting the main events of the United and subsequently Divided Kingdoms until the end of Jewish political life in Eretz Israel (1), in the 6th century BCE.

This historical survey, in conjunction with the chapter outlining geographical and site information, provides a context in which to place the topic of this study, the pithos. The character and function of the pithos is further elaborated through an ethno-archaeological analysis of pithos-making as it would have been practiced in the Eastern Mediterranean during the Iron Age. The final chapters utilize the historical information when focusing on pithos development within the Judean ceramic tradition. The final analysis of the temporal and statistical data illustrate the creation of several types of pithoi, with associated subtypes, particular to Iron Age Judah and hypotheses concerning their role and function in Israelite society.

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(1) Eretz Israel is a term which recognizes a reference to the entire land of Israel, including the Northern Kingdom of Israel and the Southern Kingdom of Judah.

Israelite Settlement Period

The contention surrounding the subject of the Israelite Settlement process has led, during the last century, to the development of three schools of thought on this topic. The proponents of the 'unified military conquest' theory follow the line of inquiry first formulated by Albright and his students in the 1930's. The 'peaceful infiltration' theory, on the other hand, was set forth by Alt in the 1920's with a view to the political, territorial and demographic situation in Eretz Israel. The other school of thought, known as the 'sociological approach' was published by its formulator, G. Mendenhall, much more recently, in the early 1960's. The following account illustrates the rationales behind each of the aforementioned theories.

The view expounded by Albright and later notables in the field such as G.E. Wright, P.W. Lapp (1967) and Y. Yadin (1979) concedes that though some of the biblical tradition 'was evidently exaggerated' the situation in 13th century Canaan was ripe politically, economically and militarily for a conquest of the type described in the first twelve chapters of the Book of Joshua (Albright 1963:24-34). The biblical verses which open the Book of Joshua present an historical situation in which the Canaanite city-states throughout the country were subjugated and destroyed by fire. Albright places a great deal of emphasis upon a contemporary reference inscribed on the Moabite Stone that outlines the practice known as herem or 'devoting to destruction' which appears to have been quite common in the region during this period. He concludes that it would have been 'strange if the wild and warlike Israelites had not followed the custom of the day' (Albright 1957:279-280; 1963:31).

> And Chemosh said to me, "Go, take Nebo from Israel!" So I went by night and fought against it from the break of dawn until noon, taking it and slaying all, seven thousand men, boys, women, girls and maid-servants, for I had devoted them to destruction for [the god] Ashtar-Chemosh (Pritchard 1955:320).

This school draws support from a combination of biblical and archaeological resources finding proof of Israelite victory in the destruction levels of Tell Beit Mirsim, Bethel and Lachish. Then, in light of these so-called routs, the Israelites proceeded to settle on these former Canaanite strongholds (Albright 1963:27). The supporters of a unified military conquest feel that their proposal represents a positive evaluation of the archaeological evidence in light of the biblical literature. They have, however, continued to ignore the fact that many sites in the Coastal Plain, the Shephelah, also known as the Lowlands, and the northern valleys, areas crucial to the biblical account of the conquest of Canaan, all lack Late Bronze Age and Iron Age remains. Further, archaeology continues to reveal that the Central Hill Country was the apparent center of concentrated Israelite settlement during the Iron I period. The inhospitable terrain of the hills would have been an unlikely choice for settlement if the Israelites had in reality conquered the Canaanite cities located in the fertile and accessible plains and valleys.

There are also several historical possibilities for the destruction levels found in the Coastal Plain, the Shephelah and the northern regions c. 1200 BCE other than the need to attribute them to the Israelites: Egyptian military campaigns, such as the one led by Merneptah; local conflicts between rival Canaanite city-states; and the Philistine infiltration of the southern coast and Shephelah during the first half of the 12th century BCE (Finkelstein 1988:299, 301).

The theory associated with the Alt school sees the Israelite Settlement as the peaceful infiltration of pastoral groups from the desert into the sparsely populated regions of Canaan. This approach understands and recognizes the value of geography, ecology and sociology for the study of transhumance (2) (Finkelstein 1988:302-303).

The process is seen as exceedingly slow. Arising out of a seasonal pastoral routine came contacts with the sedentary population. After an unknown number of years passed the herders began to focus their attention on the settled areas. In time they switched over to agriculture, though initially not completely giving up their shepherding activities. M.B. Rowton, who has dwelt extensively on studies of pastoralism in the ancient Near East, expands on topics only touched upon by Alt. He concludes that once the tribes gained control of large areas they adversely affected both commerce and agriculture leading to a reduction in city size. Consequently, as the Canaanite sites became weaker the Israelites were able to practice an "enclosed nomadism", a term coined by Rowton, and their penetration into the settled areas became more aggressive. This latter stage in the Settlement process is seen by Alt as the factual basis upon which the biblical description of the conquest is based (Finkelstein 1988:303-304). As noted earlier the Bible or Ta'anach is a principal source for the history of Israel but, because the Ta'anach recounts a "sacred history" that was redacted centuries after the fact, it often describes, as illustrated here, events which may not be exactly reflected in the archaeological record (de Vaux 1970:68-69).

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(2) Transhumance is the seasonal movement of shepherds and livestock to and from mountain pastures.

The 'peaceful infiltration' theory was formulated on the basis of Alt's knowledge of both the physical and human aspects of the country. Thus this approach incorporated both economic and social factors into the hypotheses presented for an understanding of the process of Israelite Settlement. The basic deficiency of the theory lay in the inability to trace the origins of the pastoral groups in the steppe outside of the country. In contradistinction to Alt's formula the accumulated data does not indicate the infiltration and consequent sedentarization of major new elements from the deep eastern desert, but rather a process which involved groups of pastoralists who already, in the Late Bronze Age, lived in various marginal zones of Eretz Israel such as the desert fringe along the Transjordan and in the Central Hill Country.

The last school of thought to be examined is that which follows a sociological approach. This view rejects both the conquest and infiltration theories and proposes that the oppressed and exploited groups in the lower classes of Canaanite society rebelled against the power structures and organized themselves in new frameworks away from the large Canaanite cities of the plains and valleys (Mendenhall 1973:173; Finkelstein 1988:306). As a result the collapse of Late Bronze Age Canaan is seen as a consequence of opposing political and socio-ethical forces as they acted upon the masses. In his thesis Mendenhall proposes that while large social organizations are the source of discord within the population, they are also part of the solution! He concluded that 'large social organizations were absolutely essential for the maintenance of a large population, but that they subsequently and rapidly tended to become intolerable to the populations whose well-being they were able to control'

(Mendenhall 1973:173, 196, 219).

The discussions of the sociological approach are deficient in a number of respects. Primarily the faults lay with Mendenhall for having failed to keep abreast of archaeological findings and for treating environmental and demographic factors in a general and theoretical manner. Further, no mention is made of the possibility of drawing parallels between the process of sedentarization amongst modern Bedouin or the implications of contemporary living in the traditional Arab villages of the hill country (Finkelstein 1988:307-309, 314).

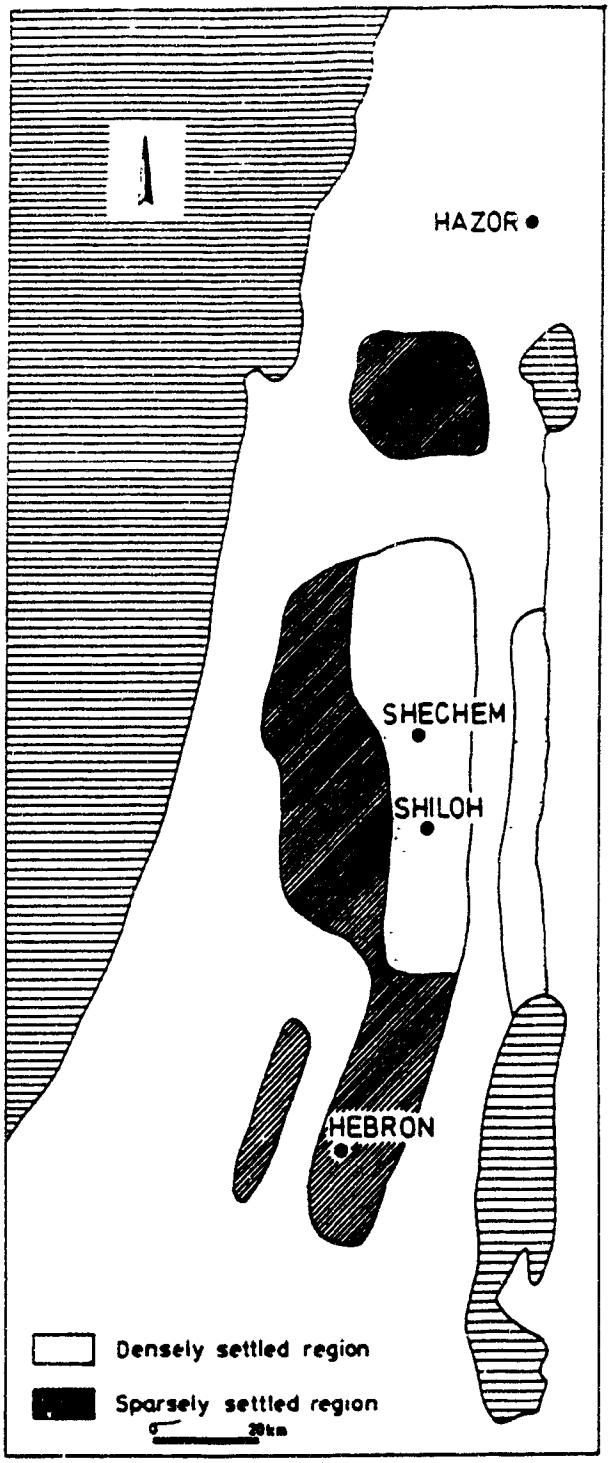
The reality of the settlement choices is at odds with the theories of the sociological school. It is unlikely that a break-off group from a Canaanite center would turn to a pastoral society and, at the same time, fail to introduce any traces of their native material culture. Though resemblances to the pottery of the Late Bronze Age are recognizable at sites near the populated fertile regions, the material culture found in the hill country, the center of Israelite settlement, is very different from that of the Lowlands in both ceramic and architectural styles.

On the basis of up-to-date archaeological findings and a recognition of the flaws in the theories of the three schools I. Finkelstein has set forth a refined version of the concept of 'peaceful infiltration'. Firstly, Finkelstein readily admits that our ignorance of this period exceeds our knowledge. Consequently we need to look at sources which seem to parallel ancient events such as comparative studies of sedentarization processes in modern cultures. Such studies supply lists of possible movement stimuli two of which, the difficulties of subsistence based on pastoralism and the breakdown of established cultures alongside whom the

nomads lived, may reflect on the Israelite Settlement process (Finkelstein 1988:345).

Finkelstein's reworking of the theory originally proposed by Alt is the most cohesive of all those expressed previously and is summarized below. During the Late Bronze Age groups of pastoralists in the frontier zones of the country had been active in a transhumant routine. By the end of the 13th or beginning of the 12th centuries BCE these groups began to settle in areas, such as the hill country, which were conducive to a combination of cereal crops and pasturage and were essentially devoid of Canaanites (see Fig. 1). In the early stages the ideal locales were within the mountainous regions for greater environmental obstacles impeded settlement in areas such as the Upper Galilee and the Beersheba Valley. The regions chosen, though isolated, were not uninhabited by Canaanites and it may have been earlier and ongoing relations with the Canaanites which encouraged sedentarization. With the passage of time these groups became less dependent upon herding and placed greater emphasis and effort into agriculture. As the Israelite population increased, and the lands available no longer sufficed, this brought the settlers into conflict with the Canaanite centers. These clashes resulted in the destruction of several cities, such as Bethel, while others may have been gradually abandoned due to pressures exerted by the Israelites (Finkelstein 1988:336-356).

As the Israelites became stronger they consolidated into tribal units which in turn joined ranks in order to face a common enemy, the Philistines, and facilitate expansion into contested areas. These unions, having been formed throughout the land, created a sense of national,



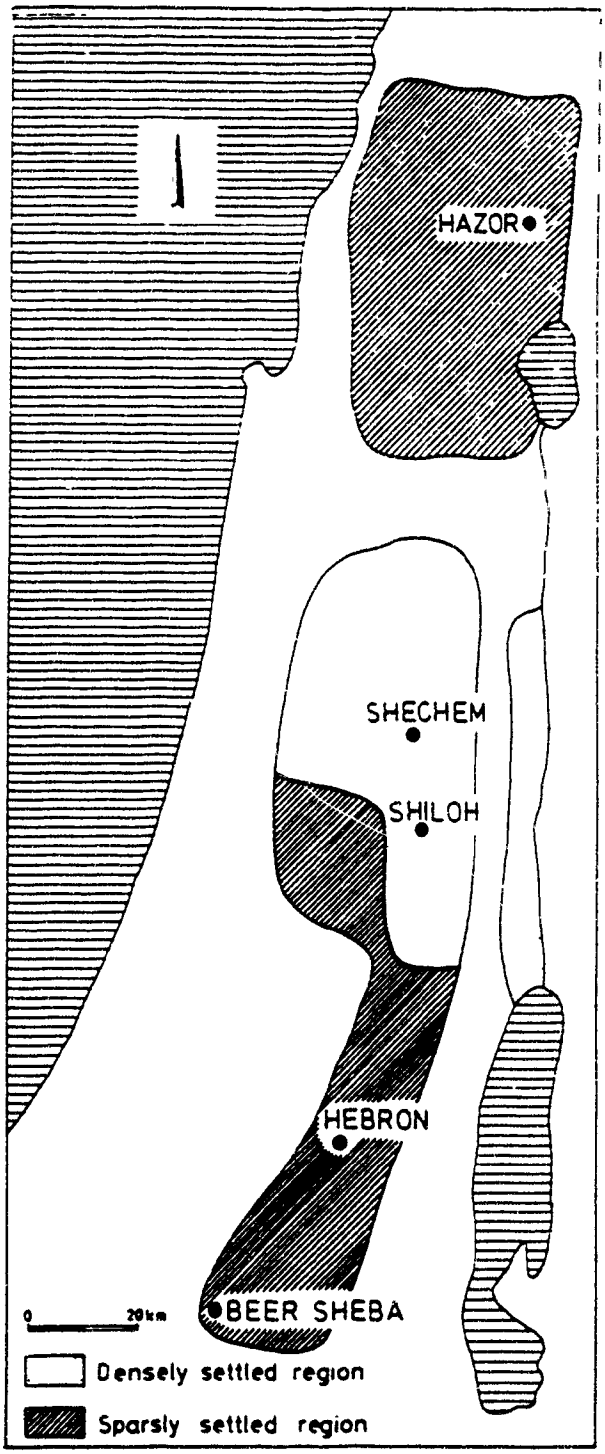


Fig. 1: Map of the Israelite Settlement--early stages.

(Finklestein 1988:325, 329)

Map of the Israelite Settlement--end of 11th century BCE.

religious, and ethnic awareness among the Israelite population which culminated in the inauguration of the Monarchy and the unification of most of the regions into a single sovereign state.

The following section surveys the historical periods known as the United and Divided Monarchies. Where specific examples are not cited the reader can presuppose some form of archaeological support for all the views expressed. The following account makes no attempt to correspond exactly to biblical accounts for it is an historical survey drawn from a variety of ancient sources, both epigraphic and archaeological.

The United Monarchy

About 1080 BCE, after over a hundred years of having lived side by side, the Philistines and Israelites came into open conflict. The period of Philistine expansion and oppression provided the stimulus needed to unite the tribes under a single leader, Saul (see Fig. 2). The struggle for nationhood began about 1030 BCE and laid the foundation upon which David was able to establish a united kingdom (Kenyon 1979:232-233).

As ruler one of David's initial acts was to annex Jerusalem and all other remaining Canaanite enclaves. The conversion of Jerusalem, a former Jebusite city which stood on the border between Israel and Judah, into the royal capital provided the cohesive element needed to truly unite the tribes. Thus during the first decade or so of the new rule the Israelite Empire was consolidated and her borders were expanded to encompass land from the Euphrates to Gaza (I Kings 5:4) (see Fig. 3). As this was still a time of weakness for Assyria and Egypt they were as yet unable to contest the extended borders of Eretz Israel. The only areas not destined to be incorporated into this United Monarchy were the coastal enclaves of

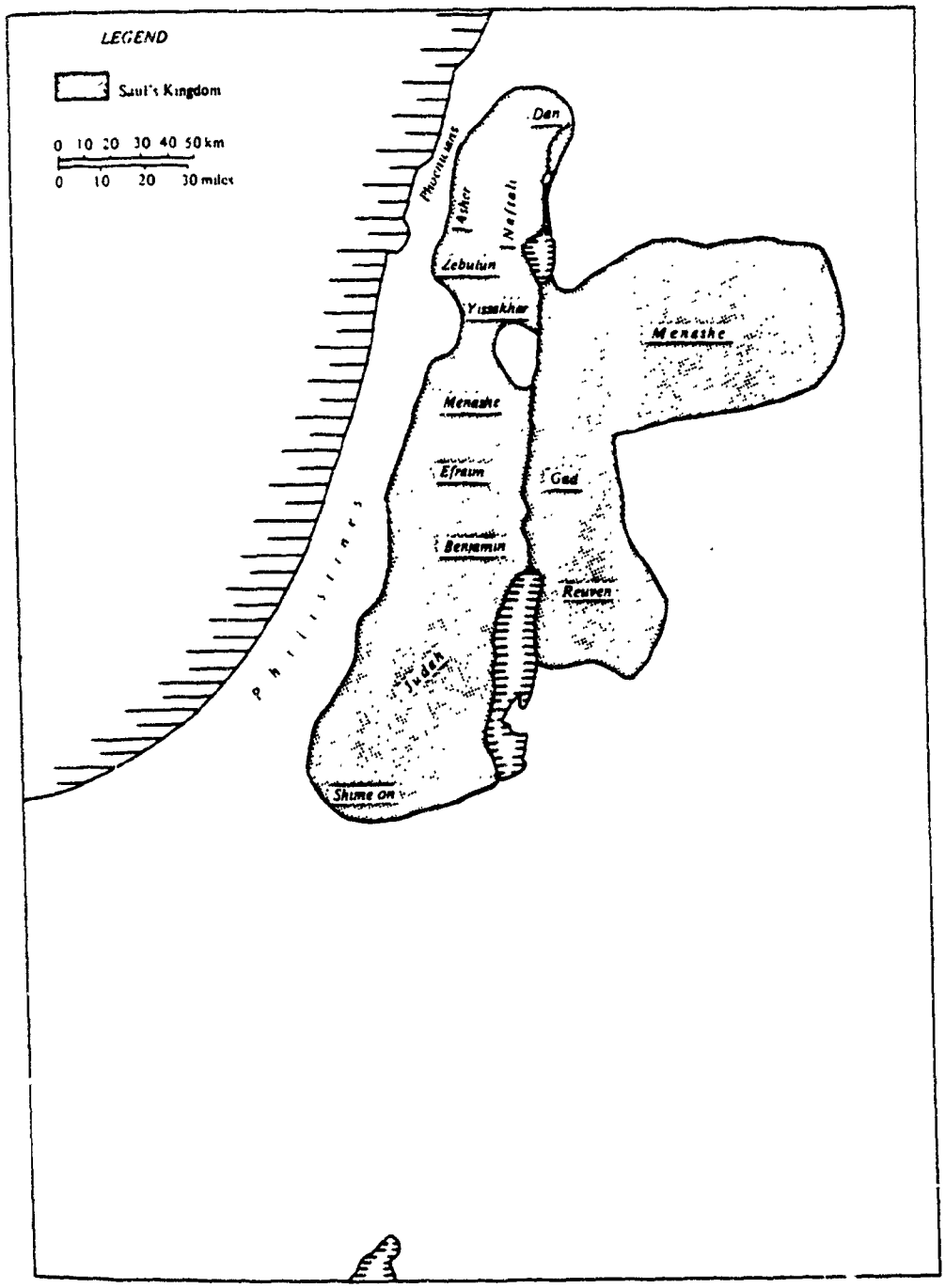


Fig. 2: The Kingdom of Israel under Saul (Orni, Efrat 1971:203).

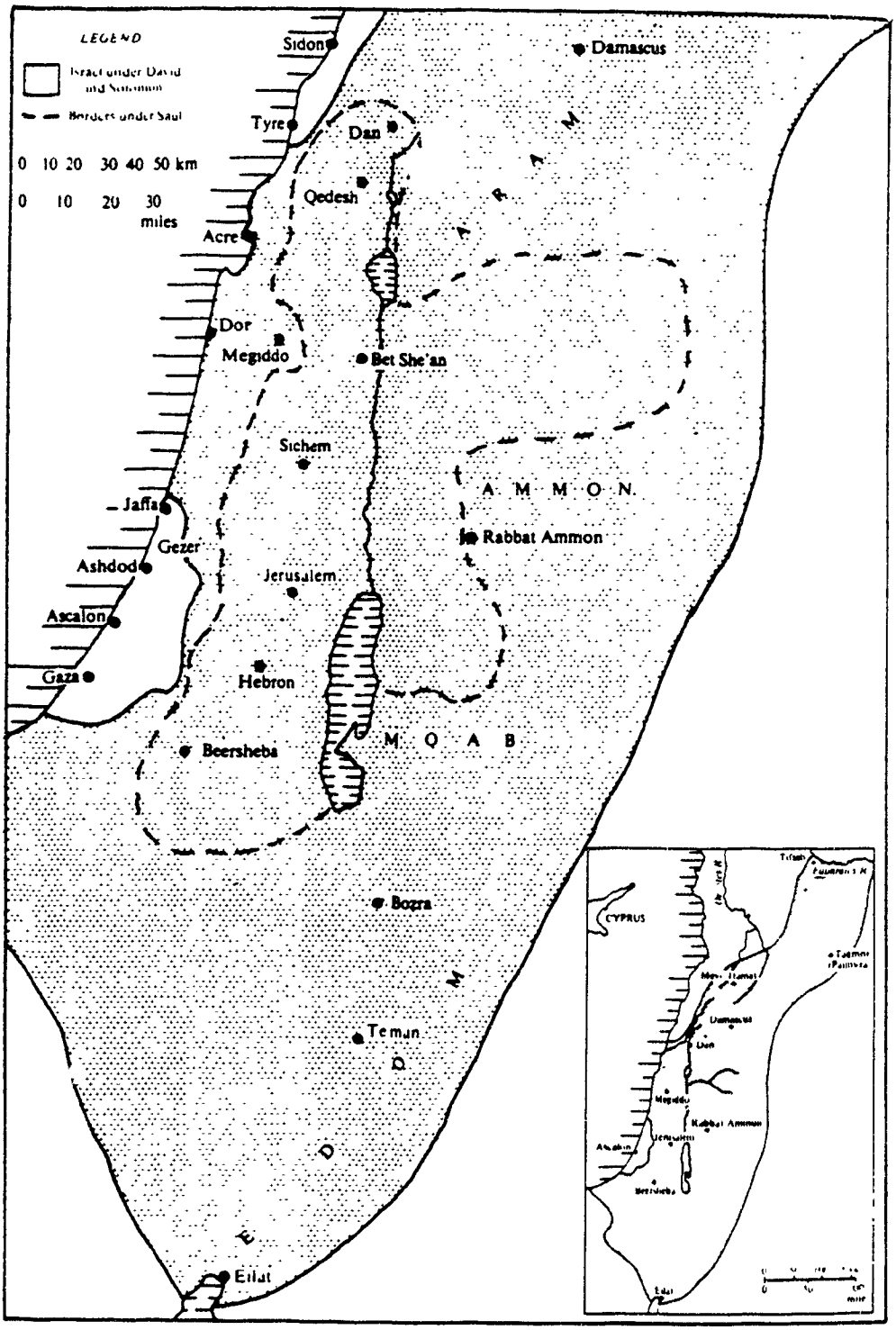


Fig. 3: The Kingdom of Israel under David and Solomon; (inset: David's territory in its full extent) (Orni, Efrat 1971:204).

the Philistines and the Phoenicians.

The international contacts developed by the monarchy brought in new and previously unknown sources of wealth in the form of tribute and commercial goods, an influx soon reflected in the material culture. This 'civilizing' of Eretz Israel and, in particular, of Judah as the dominant region of the kingdom and the chief recipient of its prosperity, was an extreme and sudden break from the lifestyles of the earlier period. This dramatic change has led scholars to mark the advent of Iron Age II with the beginning of the United Monarchy (Aharoni 1982:195).

The rule of David's successor, Solomon, was characterized by much greater extravagance than that practiced in the previous years, as seen in the building programs, such as the construction of the First Temple in Jerusalem. Solomon's material cosmopolitanism was derived in part from his merchant enterprises and also from resources exacted from his districts, the latter no doubt featuring as an underlying cause in the disintegration of the monarchy. In the end the combined effects of the original long division, ethnic differences between the tribes of the north and south, economic instability and a mounting religious tension aroused by Solomon's heterodoxy, as seen by his tolerance of foreign gods, all contributed to the kingdom's division. The growing discontent of the latter years of Solomon's rule was exemplified by circumstances which occurred within five years of Solomon's death, for in 930 BCE Jeroboam led

the northern tribes in a revolt against Rehoboam (see Appendix 1) (3). Thus, after not even three-quarters of a century, an irreparable schism had formed between the northern kingdom of Israel and the southern kingdom of Judah.

The Divided Monarchy

Ironically, though the northern kingdom instigated the revolt it was, by the nature of its location, the inheritor of much of the culture brought to Eretz Israel by Solomon. After the division Israel was initially the larger, richer and stronger of the two kingdoms for Judah, in comparison, was hemmed in on the north and east by enemies and faced the desert to the south (see Fig. 4). After about half a century the leaders of Israel, Omri and Ahab, and Judah, Asa and Jehoshaphat, managed to recoup many of their earlier political and trade-economy losses, the kingdoms having engendered mutual economic concerns through the political tool of royal intermarriage (Aharoni 1982:241-242).

In the years immediately following the division the rulers of Israel had no fixed capital. Until the rule of Omri, when a permanent capital was established at the strategically well-placed site of Samaria, the previous rulers had held court first at Shechem and then at Tirzah (Kenyon

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(3) Appendix 1 outlines the regnal chronology of Iron Age Eretz Israel. The dates employed in this paper are taken from a work by P. Wollman-Tsamir (1982:101-102); the author having considered that the "exact" dating of each king is subject to the varying opinions of scholars. Beginning with Rehoboam and Jeroboam, respectively, the regnal chronology, in addition to following the Masoretic System, based largely on calculations of A.A. Akivia and others, conforms to modern research. The works of Aharoni (1982), Bright (1981) and Negev (1972) were among those considered for dates pertaining to Israel and Judah while Oppenheim (1964), G. Roux's Ancient Iraq and Stern (1975) were studied for the Mesopotamian chronology.

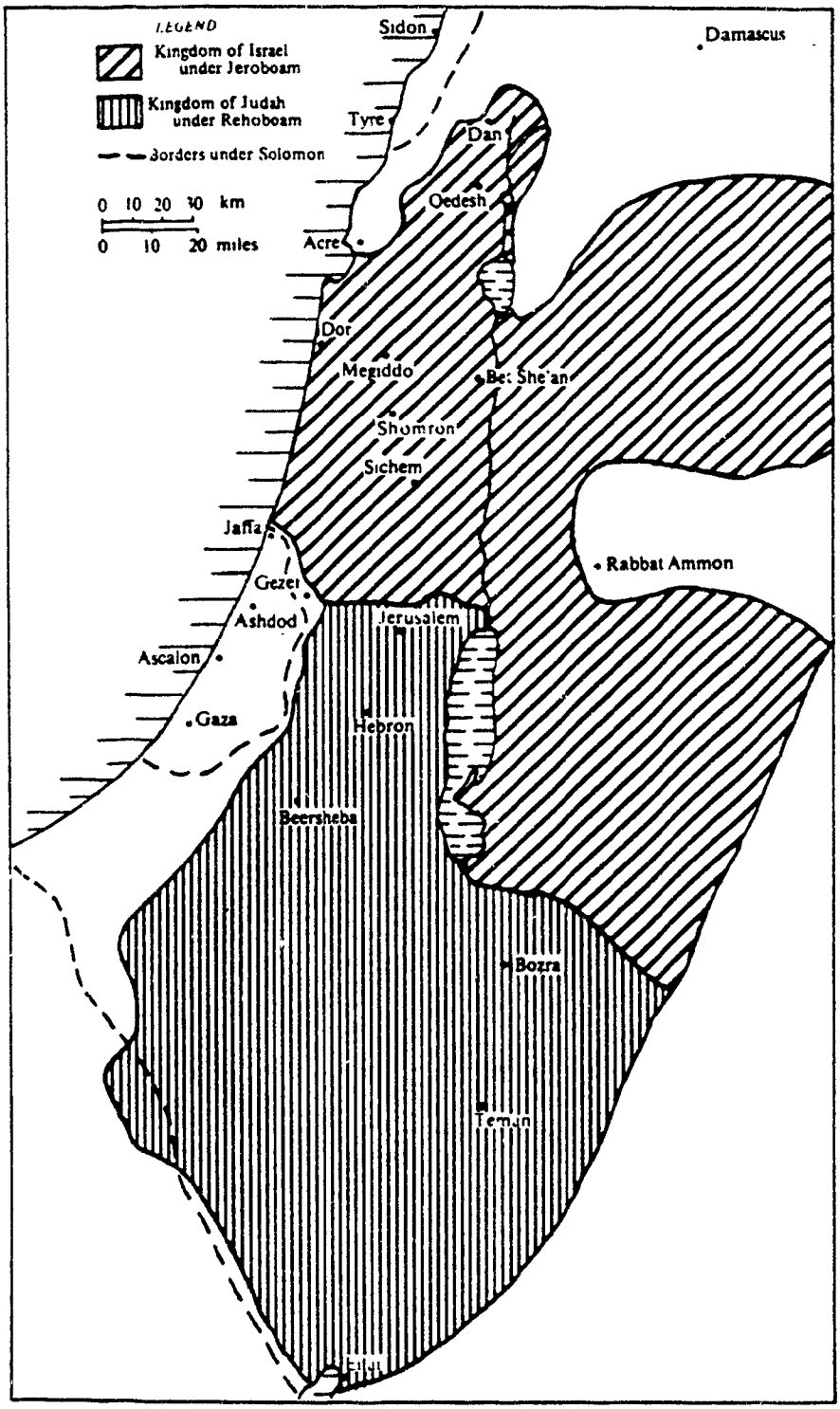

Fig. 4: The divided kingdoms of Israel and Judah after Solomon's death (Orni, Efrat 1971: 206).

1979:258-259).

Upon Ahab's succession to the northern throne relations were fostered with Tyre which were realized with the marriage of Ahab to Jezebel, the daughter of Ittobaal, king of Tyre. Judah also benefited from these renewed contacts with the Phoenicians and attempts were even made to renew maritime trade from Ezion-geber (I Kings 22:49), modern Eilat, on the Red Sea. Aside from shipping ventures Judah's newly found prosperity displayed itself in building and restoration projects at sites as far apart as Mizpah, Beersheba and the aforementioned Ezion-geber (Aharoni 1982:241-249).

The end of the second and beginning of the first millennia BCE represent the formative period in which Assyria developed concepts of foreign policy for defensive and offensive purposes. An offensive policy was established with regard to the western nations and the Mediterranean, referred to by the Assyrians as the "Upper Sea" areas. This advance to the sea was completed in several stages and posed a vital threat to the kingdoms in Syria and Palestine (4) (Oppenheim 1964:167). By means of institutionalized annual campaigns, the Assyrian kings, beginning with Arik-den-ili (1319-1308 BCE) succeeded in building a series of more or less short-lived empires (Oppenheim 1964:167). As a result, all fluctuations in Assyrian military might, beginning with Tiglath-pileser II (967-935 BCE) were reflected in the political stability of this area. Thus regnal and military events in Judah and Israel are reflected both in

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(4) Palestine is the ancient designation for Eretz Israel, the land of Israel, prior to and following the existence of the United and Divided Kingdoms, respectively. The term Palestine was derived from the ancient Philistine name for this area Pelestu.

biblical and Assyrian literary sources, and archaeologically in the debris levels of Iron Age sites.

Contact between the kingdom of Israel and the Assyrians first occurred in the mid-9th century when Ahab took part in the Battle of Qarqar in Syria in 853 BCE. The southern kingdom of Judah was spared this initial contact. During the 841 BCE campaign of Shalmaneser III the Assyrian king received tribute from Jehu while the former camped on the border between Tyre and Israel (Aharoni 1982:249-250).

The biblical record, supplemented by other epigraphic materials of the Near East and archaeological remains, reveals that peaceful conditions existed for only very short periods throughout the dual monarchy. This deterioration is an obvious reflection of political events which are excellently encapsulized by K.M. Kenyon as follows:

> Between the Hebrew kingdoms and Assyria lay the Aramaic kingdom of Damascus. When Assyria was weak, Damascus was apt to be a thorn in the flesh of Israel. When Assyria was threatening Damascus, Israel was freed from pressure, and could recover her lost possessions. When Israel was at grips with Damascus, Judah would free herself from Israelite control. When Judah was suffering at the hands of Israel, Edom could revolt from her, and when Israel in turn was weak, the other kingdoms east of the Jordan could likewise break away, or attack in their turn. And so the train of events went on, with now one country and now another in the ascendent (1979:286-287).

The northern and southern kingdoms recovered under Jeroboam II and Uzziah, respectively, following a weakening of Damascus in the early 8th century BCE. The beginning of the end for the north was heralded, however, by the ascension to the Assyrian throne of Tiglath-pileser III whose campaign in 733/2 BCE transformed the Transjordan, Galilee and the coastal area into three Assyrian provinces with much of the population being exiled and the cities destroyed (Aharoni 1982:250-251).

In 724/3 BCE the Assyrian armies once more revisited Israel and after a two year siege Samaria fell to Shalmaneser in 722/1 BCE. This signalled the end of the northern kingdom of Israel for it was transformed into an Assyrian province.

Judah, on the other hand, maintained her independence and enjoyed twenty years of relative prosperity before succumbing to the superior military tactics and numbers of the Assyrian troops. During these two decades Hezekiah was an active king and his development of the trade routes and economy enabled the strengthening of the royal cities and their fortifications. Aharoni feels that the administrative innovation indicated by the lmlk (belonging to the king) handles should be attributed to Hezekiah. In an attempt to streamline his administration the king united the twelve former districts into four districts with capitals, as noted in the seal impressions, at Socoh in the Shephelah, Ziph in the Southern Hill Country, Hebron in the center of the hills, and in the Northern Hill Country, Jerusalem. The royal capital was designated in the seals as mmst, a possible abbreviation for mmslt, "government" or "administration", and a ted as both the royal and the district capital (Aharoni 1982:254-259). Hezekiah's establishment of an anti-Assyrian league, however, led to the advance of the Assyrian army of Sennacherib into Judah in 701 BCE (Stern 1975:27). Nadav Na'aman, in an article entitled "Sennacherib's 'Letter to God' on his campaign to Judah", examines two cuneiform fragments (K 6205 and BM 82-3-23, 131) which describe Sennacherib's use of the "awe inspiring splendour of the 'Weapon' of Ashur"(1974). The effectiveness with which Sennacherib ravaged the land is illustrated in the following instance of biblical understatement:

> In the fourteenth year of king Hezekiah, Sennacherib king of Assyria came up against all the fortified cities of Judah and took them (Isaiah 36:1).

The historical and archaeological accounts indicate that the armies of Nineveh always sought to capture the royal city, among others, of the country in which they were campaigning. However, despite Sennacherib's having made Hezekiah "a prisoner in Jerusalem, his royal residence, like a bird in a cage" the city was not taken and some form of deliverance can be assumed (Pritchard 1955:288a). This deliverance may be explained by two suggestions; either that an epidemic (II Kings 19:35) ravaged the army of Assyria, or that news came indicating that Sennacherib's presence was required at home (II Kings 19:7).

Following these campaigns Judah enjoyed a century of relative independence and flourished under Josiah who took advantage of the disintegration of the Assyrian empire to extend Judean hegemony over Samaria, Megiddo, Dor, Gilead and Hashavyahu, a fort on the seacoast between Yavneh-yam and Ashdod (Aharoni 1982:269-271). This indicates that by the time Ashurbanapal and his brother, Shamash-shun-ukin, inherited the thrones of Assyria and Babylon, respectively, the hold of Assyria upon her empire had slipped. The omens which once pronounced the auspicious times for military expeditions having lost their effectiveness and the long lines of troops, followed by the chariots and siege engines had, in the face of constant insurrection throughout the widespread empire, lost their original might.

Josiah's son Jehoiakim ruled mainly under the yoke of Babylon. In 626 BCE Nabopolassar was able to rally Babylon and the Neo-Babylonian era was founded. At this point the Medes no longer considered themselves

bound by a treaty made with Esarhaddon and in 614 BCE the Mede Cyazares took the city of Ashur. In 612 BCE, with the fall of Calah and Nineveh to the Medes and Babylonians, the fall of Assyria became fact; it was no longer a Near Eastern power (Laessoe 1963:124).

The reign of Jehoiakim saw the advent of Babylonian armies into Judah but in his ignorance this king soon forgot the might of Babylon and in the later years of his reign he rebelled. This revolt was a fatal error which had permanent repercussions for the history of Judah (II Kings 24:1). Immediately Babylonian contingents in the area and guerrilla bands of Arameans, Moabites and Ammonites were sent to harry the land (Bright 1981:327). It may be events such as these which are reflected in the Arad ostraca (5). With the death of Jehoiakim in 598/7 BCE his son, Jehoichin, was enthroned in Judah (II Kings 24:8) but within three months the city had surrendered to the Babylonians. The deported king's uncle, Mattaniah/Zedekiah, was raised up in his stead (Bright 1981:327).

By 589 BCE a revival of Judean patriotism once again saw Nebuchadnezzar in Palestine and Jerusalem under siege (II Kings 25:1; Jer. 52:4, 21:3-7). Once the capital was under siege the systematic destruction of outlying fortresses began, until only Lachish and Azekah remained:

> ...when the army of the king of Babylon was fighting against Jerusalem and against all the cities of Judah that were left, Lachish and Azekah; for they were the only fortified cities of Judah that remained (Jer. 34:7).

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(5) These ostraca were part of an important find from the excavations of 7th century BCE Tel Arad. The accounts noted on the ostraca indicate how the royal storehouse of Arad supplied provisions of bread and wine to various transient units in the area and thus reflect economic, trade and military trends of the 7th century BCE in Judah (Aharoni 1982:278-279).

The fall of Azekah, in turn, is illustrated in Lachish Ostracon IV (6):

> And let him (my lord) know that we are watching for the signals of Lachish, according to all the signs which my lord gave, for we cannot see Azekah (lines 10-13)

To further complicate the circumstances of the era the prophet Jeremiah continued his predictions for the demise of Judah (37:6-10; 34:21ff), never wavering in his conviction that the only course of action was surrender to Babylon. With his proclamations concerning futile military resistance and desertion to Babylon, Jeremiah's words may be those attributed to the 'princes of the city' and referred to in lines 6-7 of Ostracon VI which work to "weaken the hands of the (men) of the city".

After the destruction of Jerusalem in 587/6 BCE and the mass deportation of the population Judah lost forever her independence and was organized into the provincial system of the empire and an official, Gedaliah, was appointed as governor (Bright 1981:331).

The reign of Nabonidus saw the final years of the Babylonian empire and the contemporaneous rise of Persia under the leadership of Cyrus II thus signalling the advent of a new era of foreign occupation in Eretz Israel. In 540 BCE the Persians annexed the Babylonian empire. In his dealings with Palestine Cyrus issued an Edict (Ezra 1:2-4; 6:3-5) in 538 BCE allowing the Jewish population to return to Eretz Israel. While the immediate response was limited, undoubtedly many Jews returned to Palestine between 538 BCE and the death of the Persian king Cambyses in 522 BCE (Albright 1963:87). The Persian policy of relative tolerance

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(6) The Lachish ostraca, discovered in the Lachish excavations of the 1930's, are documents, primarily in letter form, from an individual, Hoshiyahu, to his lord, Yaosh. A translation indicates that Hoshiyahu was the commander of a fortified outpost, possibly Mareshah, while Yaosh was the authority at Lachish and possibly for the surrounding district.

enabled national cultures and religions, such as that of the Jews, to exist and revive. This is testified by Zerubbabel's rebuilding in 520 BCE of the Temple, and in 444 BCE Nehemiah's restoration of the city walls. Judging from the results of excavation, however, the widespread resettlement of Judah was a slow process, and it is not until the 3rd century BCE that the country recovered anything like its old density of population (Kenyon 1979:306).

CHAPTER TWO

Selected Sites and their Environmental Context within Judah and the Transjordan

> And Judah and Israel dwelt safely, everyman under his vine and under his fig tree, from Dan to Beersheba... (I Kings 5:5).

Although small in area, Eretz Israel is composed of a large number of regions and subregions. The climate of the land and its effects are reflected in the landscape features, vegetation and settlement conditions which clearly differentiate the arid south from the typically Mediterranean zones of the central and northern regions.

The approach taken here looks at the environment in view of its potential for ancient man. Information on past environments is provided by geological and palaeobotanical data, primarily organic remains recovered in archaeological investigations. However, for a proper understanding of the situation of the past, as a starting point for reconstructing prehistoric environments, the present-day environment is of paramount importance.

Agriculture was the mainstay of ancient Eretz Israel throughout her history. Though the Israelites lived off the soil, the availability of agricultural land was limited by topography, climatic conditions and water resources. The Israelite solution to these problems was found in the development and combined implementation of two land-use systems: terracing and run-off farming. Both systems enabled the ancient farmers to work land never before cultivated and consequently influenced future agricultural practices.

Included in this chapter is not only a survey of the geological and geographical features of Eretz Israel but also mention of notable climatic and ecological features that illustrate the factors which influenced the life of the ancient inhabitants in this area of the Near East.

To form the backbone of this study nineteen sites were chosen from the available and published Iron Age sites located in Judah (see Fig. 1). Judah or in modern terminology, the southern regions of the modern State of Israel, contains the geographical locales of the Central Hill Country, the Negev, and the Shephelah. The inclusion of two Transjordanian sites was made on the basis of ancient connections between the Iron Age cultures of the east and west banks of the Jordan River.

The decision to limit this study to Judean sites was based on a primary consideration. A study of pithoi particular to a unified area within a single period, the Iron Age, would provide more controlled and conclusive results than a general study of pithoi particular to both the northern and southern kingdoms.

The final selection of sites was made on the basis of textual references, personal communiques, and on the availability and quality of the publications and drawings in print. The processed material provided 224 examples of pithoi and revealed an emphasis on the latter half of the Iron Age. There are included, however, a number of sites and examples pertaining to the Iron Age I in Judah. With few exceptions the pithoi were found only in storerooms, private dwellings and industrial areas. There is little doubt that there is a correlation between the function and design of the pithos in relation to the needs of the community.

In this chapter the sites, which functioned variously as Settlement

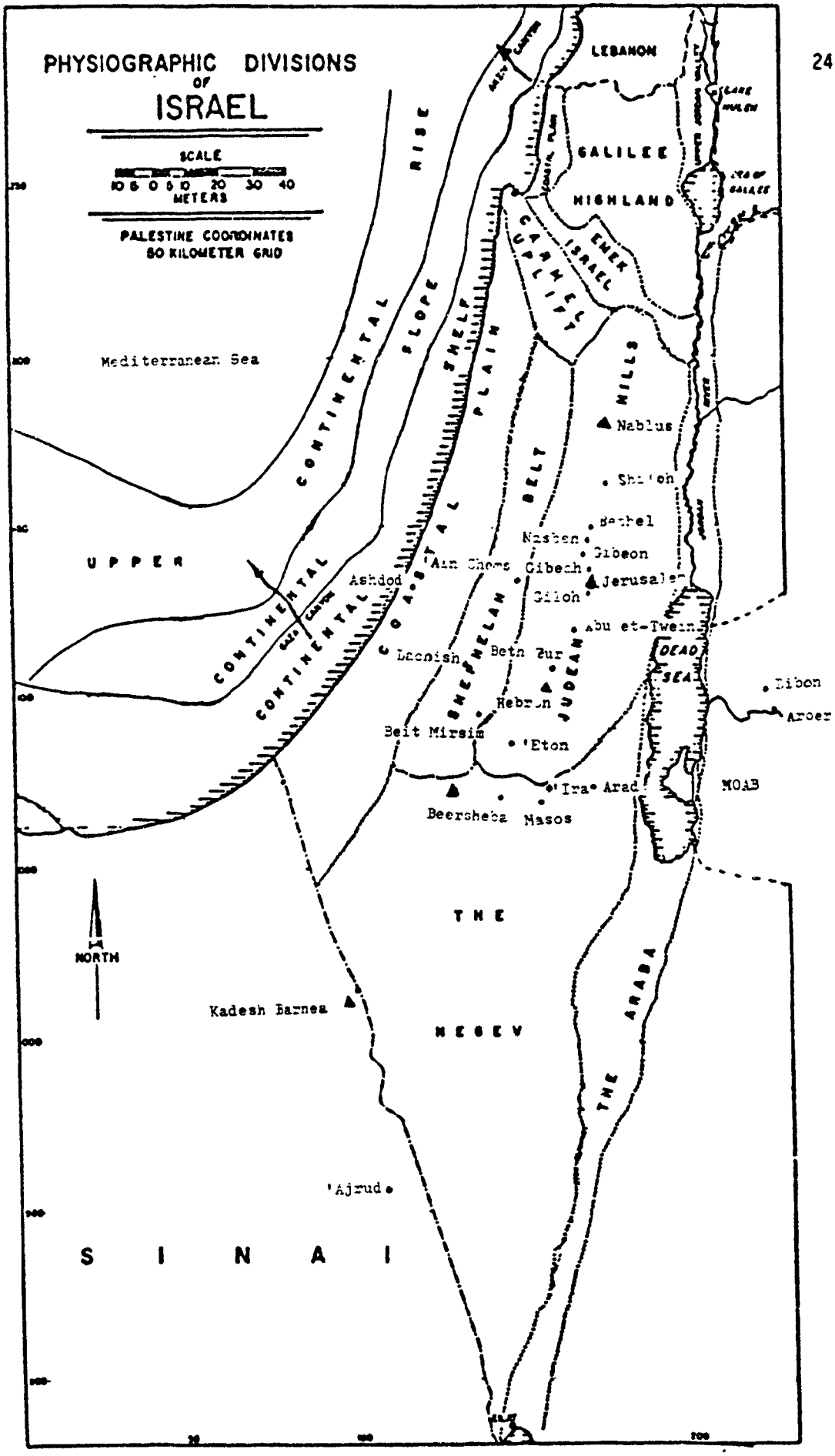

Fig. 1: Pysiographic Divisions of Israel (adapted from Bullard 1969:3).

sites, cities, towns, and/or military establishments, have been grouped according to their geographical units and discussed in terms of location, excavations, and relevant historical data.

Central Hill Country

The Central Hill Country is composed of a variety of regions named after the tribes who once inhabited the land. The territory of Ephraim is located in the midst of the hill country in a region not particularly conducive to habitation. The areas that had been allocated to Judah and Benjamin, on the other hand, are characterized by broad plateaus while the widespread territory of Manasseh is noted for its large valleys and easily-worked chalk beds. This geographical zone provided nine sites for inclusion in this study--Shiloh, Bethel, Tell en-Nasbeh, Gibeon, Gibeah, Giloh, Abu et-Twein, Beth Zur and 'Eton.

Each of these former tribal territories of the hill country can be further subdivided into more distinct topographical units. For the purpose of this chapter, however, a general approach which describes the Central Hill Country as a whole will serve to introduce the reader to the environment which faced the Israelites during the Settlement period and in later stages of the Iron Age (see Fig. 2).

The mountains and hills of Eretz Israel were formed during the last great mountain-building phase of the earth known as the Alpine-Himalayan revolution. Though the folding movements were strongest during the Miocene, it was during subsequent geologic periods that faulting, volcanic activity and erosion produced the final characteristics of the hill regions (see Appendix 2) (Orni, Efrat 1971:53).

The area of specific interest within the mountain regions is that of

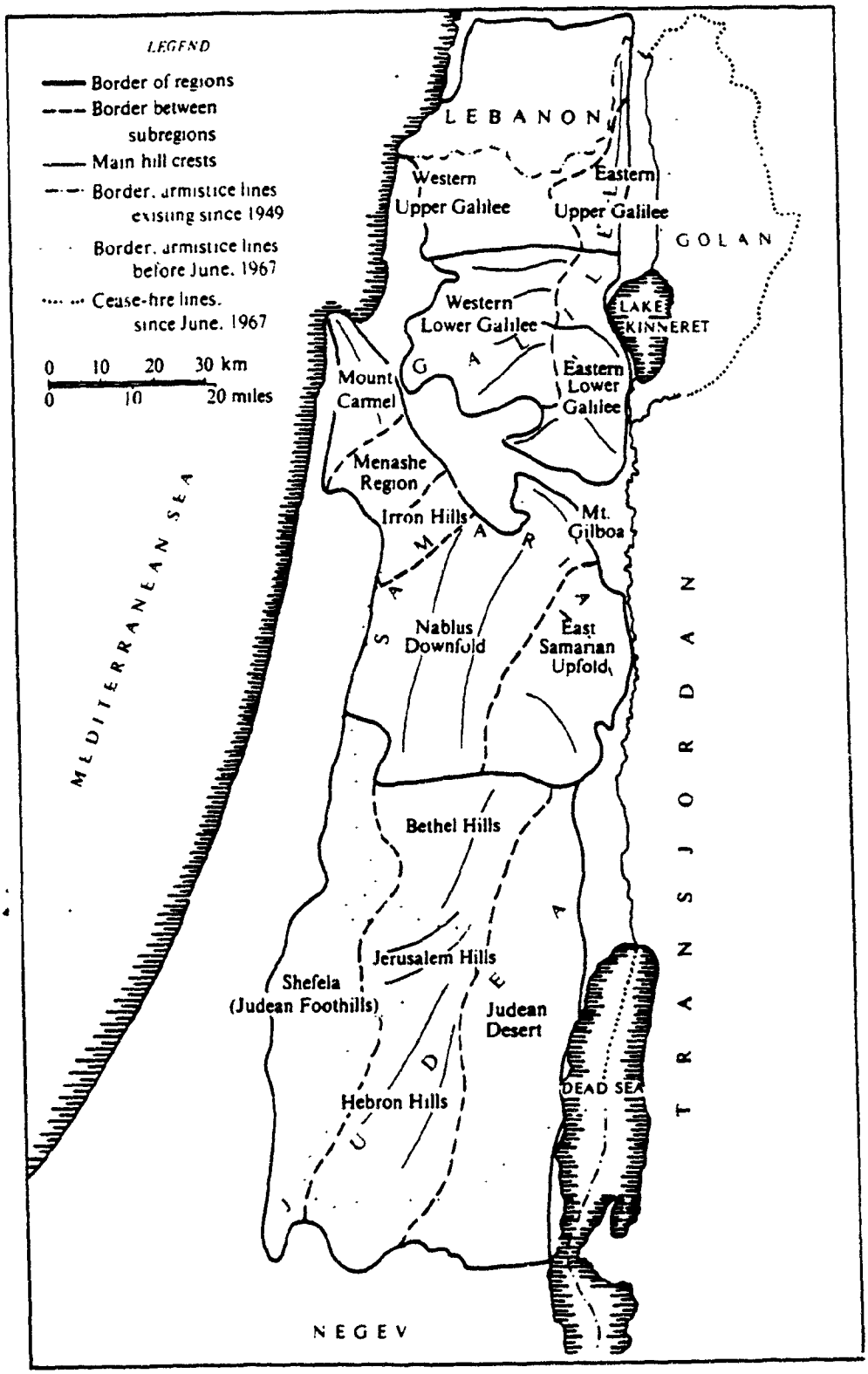

Fig. 2: Subregions of the Hills and Shephelah/Lowlands (Orni, Efrat 1971:54).

the Judean-Ephraim Uplift. This range is a northward trending anticlinal mountain belt comprising three north-northeast en echelon structural components (7). The components are the Hebron anticline on the south, the Judean anticline in the central area, and the Ephraim anticline in the north. The system is bounded on the east by a rift valley fault system and on the west by the Shephelah or Lowlands (Bullard 1969:36). The anticlines or domes to the north and south of Jerusalem, the Bethel and Hebron Hills respectively, reach altitudes above 1000m in their highest reaches thus creating a 'saddle' in which Jerusalem is located. This saddle or crest is compact and broad and has been conducive to the development of important towns in the area since antiquity (Fisher 1961:388).

The differences in rock type and exposure to be found in the Central Hill Country have given rise to stark differences in morphology and subsequently in land use. The higher parts of Judah are composed of limestone that in many places is dolomitic and thus highly resistant to erosion. These rock types are, however, vulnerable to a form of chemical destruction which ultimately results in escarpments, steep slopes and gorges. Thin layers of chalky marl which do not suffer from the aforementioned chemical breakdown are usually interposed between the limestone hill strata. This results in slopes which have a steplike appearance (Fisher 1961:388; Orni, Efrat 1971:55).

In the summer of 1988, during the course of interviews and a visit to the site of 'Ain Yael, Dr. G. Edelstein, a member of the Department of

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(7) An anticline is an arch of stratified rock in which the layers bend downward in opposite directions from the crest.

Antiquities, outlined his views on the terracing approach taken by former inhabitants of the hill country. Edelstein concluded that it was terracing which made farming possible on a broad scale. The steps created by erosion prompted man to complete the work of nature by reinforcing the outer edge of each 'step' with a stone wall. The space behind was then filled with alternating layers of soil fill and gravel, on top of which a thin layer of rich soil would gradually accumulate. The porous nature of the beds then permitted the terraces to withstand heavy winter rains and consequently could last for generations. In general, scholars feel that it may have been the Israelites who began terracing the hills in the 10th century BCE, the practice becoming widespread by the 8th century BCE. On the basis of numerous surveys Edelstein has concluded that, in the vicinity west of Jerusalem, at least sixty percent of the hills are covered with agricultural terraces, most of them ancient and many still being used today.

The phytogeographic type predominantly associated with the Central Hill Country is the Mediterranean zone of hill vegetation, characterized by strong winter rains and summer drought. This is bordered on the east and southeast by a Mediterranean zone of transitional vegetation types and bordering these areas are regions associated with the Irano-Turanian zone (see Fig. 3).

The Mediterranean zone of vegetation covers, in general, those areas which receive an annual precipitation of 350mm or more. In the hills proper, however, this can reach an annual average of 600-700mm or higher. This lack of homogeneity in the rainfall map results from the variety of topographical relief in the hill country (Orni, Efrat 1971:154). The

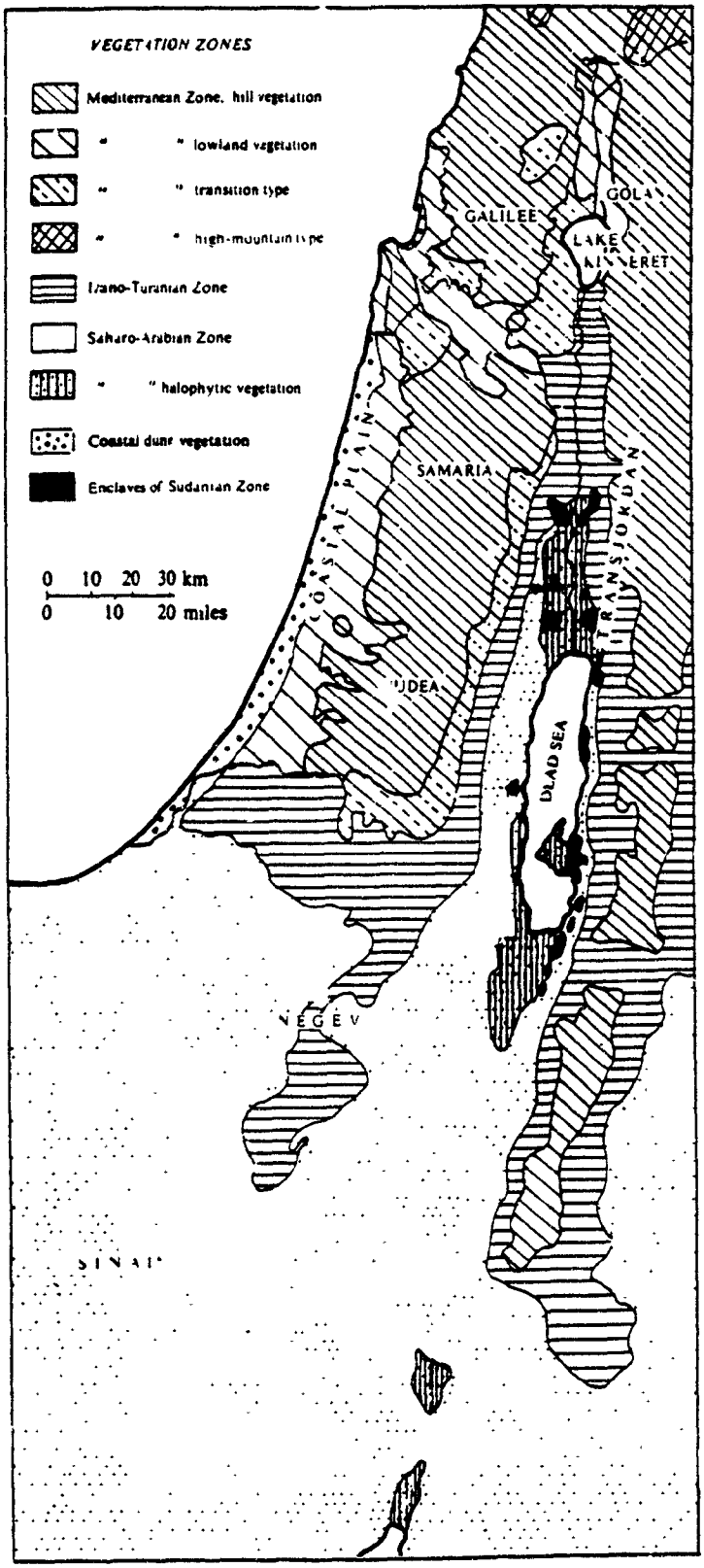

Fig. 3: Main phytogeographic regions in the country (Orni, Efrat 1971:165).

varied rainfall distribution combined with the properties of the rock determine a drainage network for Judah which is rather limited, with only relatively few streams and springs in relation to the populated area (Orni, Efrat 1971:58-59). Thus a solution to the problem of water supply in ancient settlements, particularly in the Settlement period, may be found in the early use of the "collared-rim" pithos and the cistern. The traditional farm in the mountains of today uses the zir which is similar in size and shape to the pithos. These mountain farmers use the zir for water storage, the vessel holding anywhere from 150 to 250 litres of water. The vessel is filled with water brought from the source by pack animals (8). Present day farmers, and in the past settlers, needed the convenience of such vessels even if the source of water was nearby. The close proximity of these vessels and their water supply was useful during emergency situations, intransigent weather and for the needs and circumstances of daily water usage.

The geographical landscape of the Central Hill Country expresses itself in various forms: desert fringe, mountain ranges from north to south; western, northern and southern slopes; and the eastern side of the foothills of the Shephelah. Thus in the vegetation of the hills different plant associations are to be discerned in accordance with the local variations in rainfall, bedrock types and soil depths (Orni, Efrat 1971:167-169).

In order to understand the economic and agricultural potential of these areas several researchers with whom I spoke, E. Ayalon, Z. Meshal,

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(8) This particular model was explained during a discussion with E. Ayalon in the summer of 1988.

and Y. Beit-Arieh, stressed the importance of a settlement model for which the majority of existing environmental data may be applied. The obvious and only reasonably complete model available is that of the Arab village at the beginning of the 20th century. In the early years of this century the factors which determined the choice of a particular locale and branch of agriculture were still predominantly dictated by the natural conditions of the country: a circumstance not greatly changed since antiquity (Finkelstein 1988:129-130).

A comprehensive survey of the principal geographical regions, as they are found in the territory of Ephraim, led Finkelstein to conclude that the hill country economy was based on three principal branches: cereals; horticulture; and animal husbandry (1988:139) (see Fig. 4).

The field crops, such as wheat, were found to have been cultivated predominantly in the desert fringe, the central range and the foothills.

Horticultural activities emphasize olives but in the past, before the Moslem Occupation, this also included grapevines. Grape-growing is known to be of ancient Israelite tradition and has been found to be best suited to the conditions of the hills and the Shephelah although it also thrives well on the heavy soils of the eastern coastal plain. The deep roots of the vine act to deter erosion and, further, enable its subsistence on small amounts of water. The olive, like the vine, has occupied a central place in farming in Eretz Israel for millennia and as it requires no irrigation it supports itself very well, especially on the southern and northern slopes of the hills (Orni, Efrat 1971:465). Olives and vines were also found in the desert fringe and in the villages of the eastern central range, but they were only of minor importance in these locales.

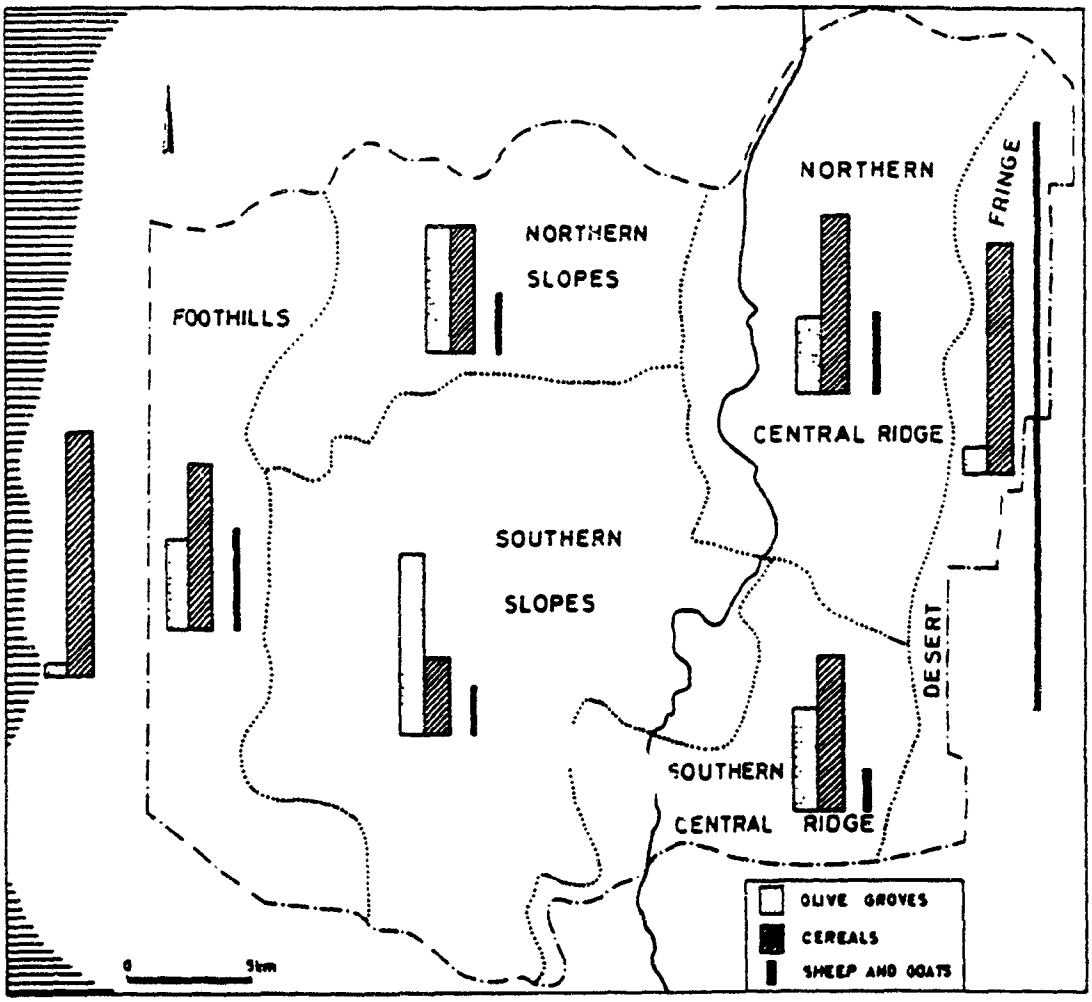

Fig. 4: The proportion of cereal to olive growing areas and the relative number of sheep and goats in the various topographical units of the Territory of Ephraim (Finklestein 1988:135).

Grapevines and olives along with fruit trees such as the fig, pomegranate, date and sycamore trees were an important element in the agricultural economy of Eretz Israel and their presence as a component in the diet of the Iron Age populace is based on passages in the Hebrew Bible which are supported by archaeological botanical finds (Borowski 1987:101-102).

The third economic base is that of animal husbandry. The pasture lands of the desert fringe and of the villages in the eastern central range were particularly extensive. Elsewhere there is very little land for grazing. As regards the composition of the herds Finkelstein's survey revealed that the number of cattle per person was very high in the desert fringe. Sheep, however, predominated in most areas, having been found in the desert fringe, the Eastern Hill Country and the northern central range. Goats also comprise a large percentage of the herd membership in the desert fringe and the foothills.

The inhabitants of the hill country, past and present, derived their existence from a combination of farming and animal husbandry. The Mediterranean terra rossa soil, typical of these regions, is in texture and composition well-suited for farming (Orni, Efrat 1971:57). Despite the soil's suitability for agriculture, farmers, during all the periods of occupation in this land, had to exercise a variety of methods and choices in their cultivation practices. The terraces were built and maintained in order to secure cultivable soil on the slopes after which they were planted with perennial crops such as deciduous fruit trees and vines which held the soil in place with their deep roots. Further, in order to maintain and replenish the fertility of the soil in all regions of the

country a system of fallowing and crop rotation in conjunction with the use of organic fertilizer was developed and employed. On the basis of biblical accounts it appears that the Iron Age farmers cared for their land with just such methods (Borowski 1987:144-149). Grain crop cultivation, on the other hand, hastened erosion and was therefore practiced predominantly on the lower slopes and in the desert fringe along with the grazing of cattle, sheep and goats.

The following section will outline the main features of history, geography and archaeology associated with the selected Central Hill Country sites.

Shiloh

Shiloh was correctly identified by E. Robinson in 1838 as a site at the northern end of a fertile valley about 30 km north of Jerusalem (Kempinski 1978:1098). The proximity of this fertile valley, a perennial water source, the installation of cisterns and silos and, especially, the site's easily defensible topographic position were all factors favouring Shiloh's regional importance (Finkelstein 1985:125).

Initial investigations were made by A. Schmidt in 1915 when trial soundings were conducted and several test pits were dug. The first systematic excavations were carried out in the years 1926-1932 by a Danish team under the direction of H. Kjaer. Seven of the pithoi uncovered during those years are included in this study and are located on Plates 2:1-3 and 3:1-4 at the end of this thesis. Excavation ended and publication was delayed, however, as a result of Kjaer's sudden death in the field in 1932. In 1963 a new Danish excavation was organized in order to glean any new facts which might aid in the clarification and

correlation of the data found in Kjaer's field notes (Finkelstei 1985:125). In 1969 the first report was published but unfortunately it lacked many details and contained several fundamental dating errors (9).

Another reexamination of the site was conducted during the years 1981-1984 by the Department of Eretz-Israel Studies of Bar Ilan University under the direction of I. Finkelstein. Among other contributors to the expedition were the National Council for Research and Development and the Israel Defence Forces (Finkelstein 1985:124).

According to biblical tradition Shiloh's greatest importance was as the amphictyonic centre for the population of the hill country during the Settlement Period. Shiloh's floruit, however, was short-lived lasting only about fifty years at the end of the 12th and mainly in the first half of the 11th centuries BCE. The site was destroyed by the Philistines in the Battle of Eben-ezer. This destruction is attested archaeologically in a burned level clearly visible in Areas C and E and in the biblical tradition of Jeremiah 7:12-14 (Finkelstein 1985:168, 173). After a period of abandonment the site was reoccupied in Iron II but aside from scant traces of village life there are no significant remains from this period (Finkelstein 1985:174). The next notable period of occupation does not occur until the Roman-Byzantine period (Buhl 1969:61).

Bethel

Located about 17 km north of Jerusalem, the neighbourhood of Bethel, modern Beitin, is rich in springs and suitable for the cultivation of orchards and vineyards. These factors, in conjunction with Bethel's

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(9) See Buhl's statements in Buhl, M.-L., and Holm-Nielsen, S. (1969).

proximity to major highways, enabled flourishing towns to develop here at various times in history (Kelso 1968:3; 1975:190).

In 1934 a small area of the site was excavated by W.F. Albright on behalf of the American Schools of Oriental Research (ASOR) in Jerusalem. The Kyle Memorial Excavations initiated a campaign in 1954 which was continued in 1957 and again in 1960. The latter excavations were conducted by ASOR and the Pittsburgh-Xenia Theological Seminary (now the Pittsburgh Theological Seminary) (Kelso 1975:191). Two pithoi uncovered in the excavations are included in this analysis and are found on Plates 14:2 and 22:9.

The site was particularly well built in the Late Bronze Age but after its destruction in the early years of the 13th century, probably by the Israelites, it was reoccupied by a much poorer culture (Kenyon 1979:320). A striking feature uncovered at Iron Age Bethel, in contrast to the Canaanite culture, was the dominance of storage jar usage by the ancient Israelites (Kelso 1975:192).

Excavation confirms that Bethel suffered a destruction at the hands of the Assyrian army at about the same time as Samaria, in c. 721 BCE. The city was rebuilt and, though it managed to survive the military onslaught of Nebuchadnezzar in the 6th century BCE, it was subsequently levelled during the transitional period between Babylonian and Persian rules. By the time of Ezra's return to Eretz Israel the site was occupied by a small town (Kelso 1968:37).

Tell en-Nasbeh

Tell en-Nasbeh, biblical Mizpah, lies beside the main north-south route between Judah and Israel, about 12 km north of Jerusalem (Broshi

1977:912).

The site was excavated under the direction of W.F. Bade on behalf of the Pacific Institute of Religion in Berkeley, California, during five seasons between 1926-1935. The death of Bade in 1936 left the responsibility of interpretation and publication to C. McCown and J.C. Wampler (Wright 1947:70).

Excavation revealed that, aside from a brief Early Bronze Age occupation c. 3000 BCE, the main occupation levels fall in the Iron and Persian Ages, c. 1100-300 BCE. Included among the important discoveries of the Iron Age are a wide variety of pithoi or zirs, eighty-seven of which are included in this study (10), numerous private cisterns, and three long-roomed miskenoth (I Kings 9:19) or "cities of store" which probably acted as granaries. After the destruction of Jerusalem by the Chaldean armies, Gedaliah, the newly appointed Judean governor, established his residence at Mizpah where, unfortunately, he was also murdered. This act of violence signaled the end of a Jewish nation in Eretz Israel for another 2500 years. Though occupation continued until c. 300 BCE the Post-Exilic remains are of decreasing importance (Broshi 1977:912, 916).

Gibeon

It was in 1838 that E. Robinson identified the village of el-Jib, 9 km north of Jerusalem, as the site of ancient Gibeon. Fifty years later C. Schick explored and drew plans of the rock-cut tunnel associated with

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(10) These pithoi are located on the following plates included in this study: Plates 4:4-6; 5:1-4, 10-13; 6:2, 6; 7:4-6, 12; 8:3-4; 10:9-10; 11:5-6; 12:9; 13:4-8; 14:7; 15:4-5; 16:5; 17:7-11; 18:1-14; 19:9-11; 20:6; 21:5, 8; 22:17-45.

the site's spring. It was approximately another sixty years, in 1950, before A. Dajani discovered an Iron Age tomb within the site's vicinity. It was not until 1956, however, before the first major excavation was undertaken by J.B. Pritchard. The first season was sponsored by the University Museum of the University of Pennsylvania and the Church Divinity School of the Pacific with the cooperation of ASOR. Further seasons, 1957, 1959, 1960, and 1962, continued under the directorship of Pritchard and the sponsorship of the University Museum (Pritchard 1976:447). Three pithoi discovered at this site are included in the study sample and may be found on Plates 5:8, 12:1 and 17:6.

Ancient peoples realized the value of this site during the Middle Bronze Age at which time this site was first occupied. Gibeon reached its peak of prosperity during the Iron II when massive water systems were excavated, building construction flourished, and the Gibeonites exploited the fertile land and engaged in the production and trade of wine on a large scale (Pritchard 1976:449-450). After this Iron II hiatus of prosperity there is a period of abandonment from the end of the 6th century BCE until the beginning of the 1st century BCE at which point, as excavation reveals, a Roman settlement was established (Pritchard 1964:42).

Gibeah

The site of Tell el-Ful, ancient Gibeah, is located near the Jerusalem-Nablus road about 5 km north of Jerusalem (Sinclair 1976:444). In relation to the sites discussed so far Gibeah was, in comparison, less ideally situated, nevertheless, the site was occupied through the Israelite Period and into the Persian Era. Though the site lacked an

efficient water supply and the land produced only a poor grain yield, the pithoi and silos, without doubt, accommodated the supplies of food and water transported to the site along the nearby roadway.

Gibeah was dominated by a fort-like building whose four stages all belong to the Iron Age. The earlier stages were accompanied by a small village but the final stage seemingly acted as an isolated watchtower (Kenyon 1979:328). Biblical literature indicates that the town was abandoned twice. The first, a destruction, was documented as an act of revenge and cleansing by the Israelites of the tribe of Benjamin in reaction to a personal slur (Judges 19-20). The second incident, an abandonment, was made in the face of the advancing Assyrian army (Isaiah 10:29). There is little information about Gibeah from the later periods, after her destruction by the Chaldeans in the 6th century BCE, aside from a few indications of a small re-banded settlement in the late 6th-5th centuries BCE.

ASOR sponsored excavations at this site in 1922-1923 and again in 1933 under the direction of Prof. Albright. The 1964 excavations were led by Paul Lapp, assisted by J. Kelso, and were under the joint sponsorship of ASOR and the Pittsburgh Theological Seminary (Sinclair 1976:444). Twelve examples of pithoi were derived from the Gibeah site reports and may be found on Plates 4:3, 7; 6:1; 7:8-10; 11:1-2, 8-9; 17:5 and 21:2 in this study.

Giloh

Giloh, now a suburb of modern Jerusalem, is situated on the summit of a long ridge called Shluhat which overlooks the surroundings of Jerusalem. This location, chosen for initial occupation as a village settlement, is

unusual for the normal prerequisite needs of a ready water supply, fertile land, and an easily accessible traffic artery are all absent. The decision to form an early settlement here, c. 1200 BCE, indicates that despite the aforementioned drawbacks including the need to import and store all supplies, the natural defensive character and extensive views from the site apparently satisfied the strategic needs of a group of Israelites from the early Settlement Period (Mazar 1981a:2,4). Thirteen pithoi were produced by this site for inclusion in this study and they are located on Plates 1:1-5 and 19:1-8.

Giloh was discovered by M. Kochavi during a survey of the Judean mountains in 1968 and has remained the only site in the northern part of Judah which can be related to the early period of Israelite Settlement in this area (Mazar 1981a:2).

Salvage excavations were carried out on behalf of the Department of Antiquities and Museums and the Institute of Archaeology of the Hebrew University of Jerusalem during three seasons in the years 1978 and 1979 (Mazar 1981a:5).

The site was inhabited for only short periods of time with the first settlement having been abandoned before the period of the monarchy. As a result of the time and duration of the occupation the excavated pithoi provide an important indicator for pithos types particular to the transitional period from the Late Bronze Age to the early Iron I. After this first occupation and desertion the site was not occupied again for centuries no doubt because the remote location did not bode well for the future development of any proposed settlement (Mazar 1981a:4, 32-33).

Khirbet Abu et-Twein

The ancient site of Abu et-Twein, bordered on the east by the Wadi el-Abhara, is located north-east of the modern village of Kfar Etzion. The mound peaks at 679m above sea level (ASL) and as an observation point provides good views in all directions. To the west one can view sites in the Judean Plain and Haelah Valley, while to the south-west Mareshah and Lachish of the Shephelah region are visible. The northern view includes the hills of Beitar and the eastern view includes sections of the Hebron Hills (Mazar 1981b:229).

The site was first noted during a study survey made by Moshe Kochavi in 1968. A brief expedition was undertaken in 1974 by Z. Kalai. During the work a fort-like structure located on the summit of this rocky hill was excavated and drawn as were the remains of a settlement located on the shoulder of the hill (Mazar 1981b:229).

The dating of the six pithoi included in this study, which are located on Plates 5:5-6, 7:1, 14:1 and 22:1-2, and other pottery finds indicates an occupation in the Iron II period, c. 8th-7th century BCE. These dates are further substantiated as a result of parallels drawn with the pottery of other sites (11) (Mazar 1981b:242).

Beth Zur

Beth Zur's location on the old Jerusalem-Hebron road, about 30 km south of Jerusalem and about 6 km north of Hebron, gave the site extreme strategic importance in acting as a bulwark for Jerusalem and in providing

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(11) A. Mazar (1981b:242) studied the following sites in order to draw his dating conclusions: Beersheba II; 'Ajrud; Beit Zur III; 'Ein Gedi V; Samaria VII; Lachish III, example 466; Debir; Tell en-Nasbeh; and Ashdod D IIIb.

access to important routes to the Shephelah (Funk 1975:263).

Beth Zur was first excavated in the summer of 1931 under the directorship of O.R. Sellers and the sponsorship of the Presbyterian (McCormick) Theological Seminary and ASOR. The next campaign, though not conducted until 26 years later, was again led by O.R. Sellers (Funk 1975:263). Eight pithoi from the Beth Zur expeditions are included in this analysis and may be found on Plates 6:3-4, 7:7, 11:7, 12:7, 17:4 and 22:10-11.

An available water supply and fertile land made Beth Zur an attractive site for occupation through various periods. The site was a Hyksos settlement in the Middle Bronze Age but, after its destruction in an Egyptian reconquest of Palestine, it remained unoccupied until the beginning of the Israelite period (Sellers 1958:72; Funk 1975:263). The quantity of pottery associated with the latter occupation indicates a considerable population of some prosperity but for unknown reasons the settlement came to an end about 1000 BCE (Sellers 1958:74). Further, the ceramic evidence indicates that the site lay fallow for two centuries until its reoccupation by an Iron II population in c. 800 BCE. The absence of fortifications at this time led the late Paul Lapp to conclude that this was a small, peaceful and prosperous community. The non-aggressive appearance of an unfortified town may also provide an explanation for the only scattered evidence of destruction at the site at a time when Nebuchadnezzar was laying waste to the towns of the country (Funk 1968:8).

Tel 'Eton

Tel 'Eton (Tell 'Aitun) is located 18 km south-west of Hebron and 11

km south-east of Lachish in a valley which runs between the Hebron Hills and the Shephelah (Ayalon 1985b:54). This 60 dunam (15 acre) site was well positioned for settlement as it benefited from fertile soil, Senonian rock, a type ideal for the hewing of cisterns, and also a commanding position near the junction of several important roads (Ayalon 1985b:54).

A salvage excavation was undertaken for two weeks in August 1976 in response to the discovery of illicit digging in the area by antiquities thieves. The project was conducted within the framework of the Lachish Excavation Project on behalf of the Tel Aviv University Institute of Archaeology and the Department of Antiquities and Museums (Ayalon 1985b:54). Any knowledge of the Iron Age pottery associated with this site had, prior to this excavation, been gleaned from the tombs excavated by D. Ussishkin in 1974 and later by V. Tzaferis in 1982. Recently, however, a limited surface survey had been carried out by Y. Dagan which revealed that the majority of surface finds were very similar to those previously uncovered in the excavations (Zimhoni 1985:63). Four pithoi from Tel 'Eton were selected for inclusion in this study and they are found on Plates 5:7, 9:19, 12:8 and 22:15.

Tel 'Eton, with its accompanying cemetery, is one of a group of Iron II settlements of the Judean monarchy. While only two phases of occupation, Strata I-II, both dating to the 9th-8th centuries BCE were uncovered, excavation indicates that there was an upper stratum and also additional strata below, but the latter have yet to be excavated (Zimhoni 1985:87). While only a small part of an Iron Age structure was exposed, it can be determined that it is a large building based on the construction style of the "four-room house" type and was probably employed as an

administrative building, official residence or storehouse (Ayalon 1985b:61).

The Central Hill Country was always generously occupied but especially so during the Iron Ages. No doubt the ancient settlers were drawn to this area for any number of reasons: the strategic and defence capabilities; the proximity to major travel routes; the abundance of water; and the soil's propensity, then and now, for vine and olive cultivation. One exception to this, noted here, was the site of Giloh. Giloh benefited from none of the aforementioned features, and though only briefly occupied, left behind an important sample of pithoi from the Settlement Period.

Negev and Sinai

The Negev can be seen as a major transition between the Sinai and the regions to the north of it, primarily the Central Hill Country and Shephelah (see Fig. 5). While more than half of the Negev is composed of upland, the central zone rises to even higher altitudes and is characterized by sediments which have folded into shallow anticlines and synclines. The eastern plateau zone, however, is comprised of relatively horizontal sedimentary layers (Fisher 1961:389). The triangular area of the Negev is essentially a rocky desert which is characterized by ridges, mesas, buttes and mountains which alternate with dry wadis or riverbeds and canyons. This zone has extremes in elevation which range from 397m below sea level (BSL) at the southern end of the Dead Sea to 1033m ASL at Mount Ramon in the western-central Negev (Bullard 1969:5).

Since the end of the Pliocene (see Appendix 2) the Beersheba Region

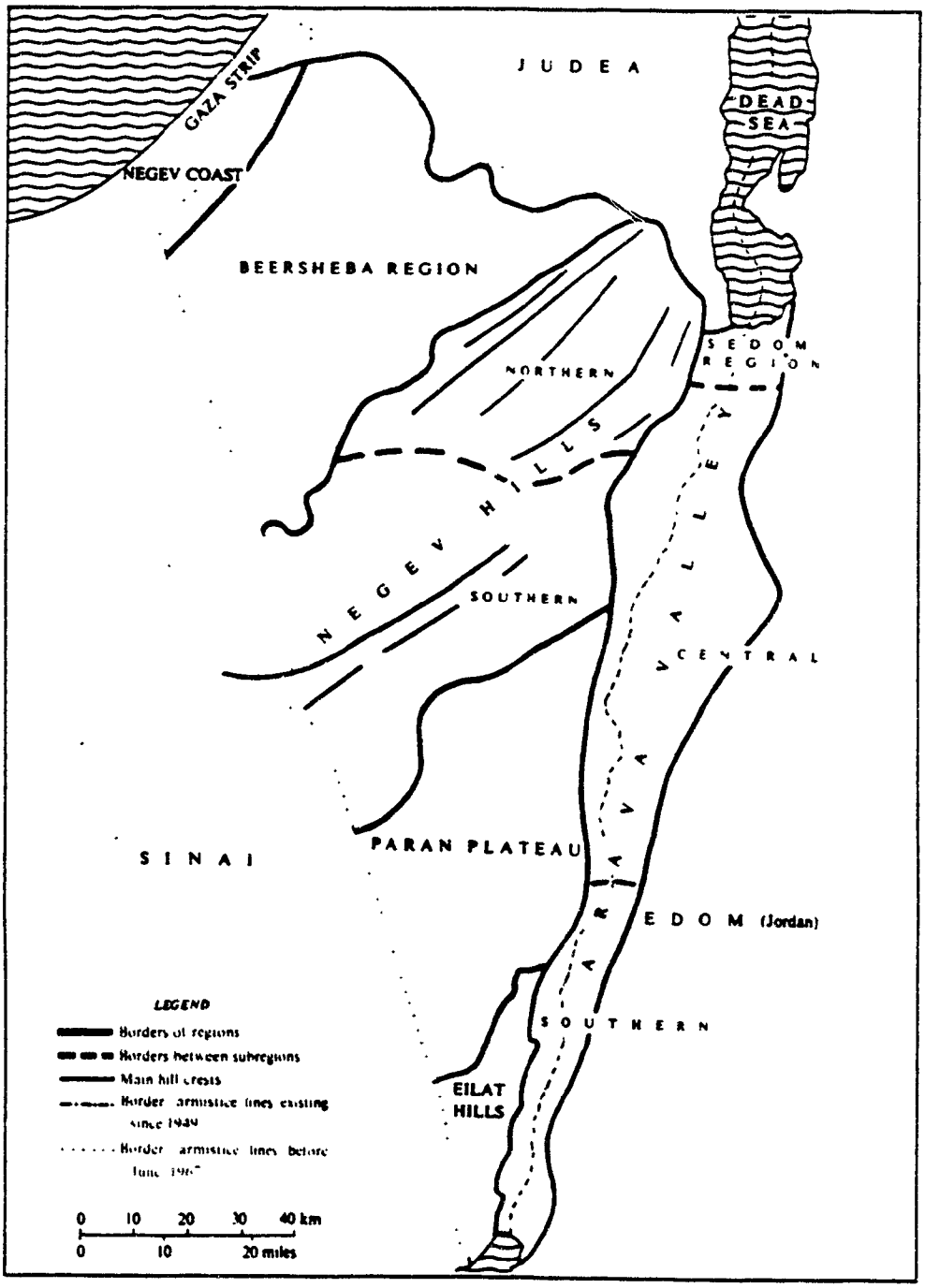

Fig. 5: Subregions of the Negev (Orni, Efrat 1971:16).

has accumulated extensive loess deposits which in a few places exceed 30m in thickness. The yellowish-brown loess is a fine-grained soil type which, due to the aridity of the area, is easily transported by winds over large distances. An unfortunate property of these soils, located in an area characterized by alternating winter rains and summer drought, is their predilection for hardening at the surface after the first rain of the season. The crust which forms is then impenetrable to the seepage of additional rain water which consequently concentrates into 'flash floods' that erode deep gullies. The cycle continues when the soil crumbles into the wadi beds in the summer thus forming obstructions for the winter floodwaters. These barriers cause the winter torrents to break out of the wadi beds and to open additional gullies which, in turn, unite in a number of main wadis. In its final stage gullying restores a rolling topography of low, rounded hillocks which today are typical of large parts of the Beersheba Region (Fisher 1961:389; Orni, Efrat 1971:28-29). Despite these soil traits the loess of the Negev offered considerable agricultural potential to the ancient settlers, as it does today, for it contains many minerals necessary to plant life which can be activated when provided with water through irrigation.

The Negev is comprised of two phytogeographic regions (see Fig. 3 of this chapter). The Irano-Turanian zone is principally located in the Beersheba Region and is best described as semiarid for the annual rainfall average is between 200 to 300mm. The southern reaches of the Negev, including the Sinai, are part of the Saharo-Arabian zone. The latter is pure desert vegetation which survives where rainfall does not exceed 200mm annually. The low rainfall averages of these areas has resulted in a

vegetation cover which primarily consists of low bushes with thickened leaves, the most common of which is the bean caper. The combined scarcity of water and vegetation, along with the limitations of farming in wadi beds, together explain the extremely low population density of these vast areas at all times in history (Orni, Efrat 1971:172-173).

During the Iron Age there was a strong emphasis upon settlement in the Negev; a time during which fortresses and farms were established. The present-day farming methods of the nomadic Bedouin (12), the cultivation of foods in the arable lands of the wadi bottoms, was no doubt also a practice of the Israelites. After a time, however, it would appear that the Israelites became the first settlers to develop a crop system based on flood-water irrigation. Through a process of irrigation the Iron II population was able to extend sedentary agriculture as far south as the Ramon depression. A combination of terracing and irrigation solved the lack of suitable watered land. Through the development of water catchment systems the runoff water was directed by walls and channels into cisterns for drinking and watering animals, and for irrigation to agricultural terraces for crops and trees. Redirecting a quantity of the runoff waters to the terraced fields 'not only complemented the small amount of rain water falling directly on the fields, but also furnished them with a new layer of topsoil eroded and picked up from the surrounding hills thus enriching the soil with each flood' (Borowski 1987:18). It has been hypothesized that this type of sedentary agriculture may have been a consequence of a state policy of the Judean kings which desired the domination of the southern areas for defence purposes. The initial

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(12) Bedouin/Bedui is a nomadic Arab "dweller in the desert".

enterprises may possibly be attributed to Uzziah who was one of the most powerful Judean kings and among whose endeavours appears the hewing out of many cisterns as noted in 2 Chr. 26:10 (Evenari et al. 1958:238-239; Danin 1983:17).

Particular attention was paid to the botanical yield of the Tel Masos excavations, a site in the Beersheba Region. In the samples studied the botanists identified ten species of trees including cedar, olive, pistachio and oak. Other samples were collected which provided finds of dates, grapes, wheat, barley and vetch. Though these fruits and seeds reveal the type of diet maintained by the population they do not specifically indicate the composition of the natural vegetation or the climatic conditions of the time as many of the fruits may have reached the site through trade (Liphschitz 1983:209-210).

The archaeological remains, in the form of corrals and pens attached to many of the houses of the Israelite period, indicate that animal husbandry provided a means of livelihood. The faunal remains tell us which animals were housed in the pens and, further, shed light on the economic, cultural and environmental conditions of the Iron Age.

The faunal studies from Tel Masos have indicated that one of the main problems facing the early Israelites was their transition from a nomadic and seminomadic way of life to that of a sedentary existence. During the early phases of settlement cattle played an important role in the economic system but as time passed this emphasis waned. As usual for Iron I, goat and sheep represent the majority of total remains and therefore presumably constitute the main dietary components of the populace. Certain remains also indicate that the limited hunting of fallow deer and gazelles was

practiced. Considering the natural habitats of these animals it suggests that the area was characterized in Iron I by 'a mixed and patchy habitat' of woods and treeless steppes. Further, the remains of ass indicate that it was the principal beast of burden and, finally, the quantity of pidgeon fossils indicates that pidgeon husbandry probably played some role in the economy (Tchernov, Drori 1983:213-218).

The faunal and bo anical remains give some indication of the environment which prevailed in the northern Negev in the Iron Age. Tchernov and Drori conclude that the existence of fallow deer and the intensive raising of cattle in Iron I indicate climatic conditions that were more humid than those found at present. The poorer Iron II settlement at this site with its particularly high percentage of sheep and goat remains indicates a deterioration in the ecosystem which may have resulted from an influx of settlers during the Iron I and the impact of agriculture on the natural habitats. The result was that an economy based on hardy animals, sheep and goats, was characteristic of the economic system of the Iron II Period (Tchernov, Drori 1983:219).

The Negev is of considerable interest since it is a typical peripheral zone which, as indicated, is influenced by climatic, political and population changes. Despite the extensive plains and <u>loess</u> soil the potential for agricultural growth was limited by frequent years of drought and the need to irrigate.

Eretz Israel is marked by several abrupt landscape changes. The Negev, which takes up the southern regions of the country, is of particular note. The five Negebite sites chosen for study--Beersheba, 'Ira, Arad, Masos and 'Ajrud--are all found in the northern Negev with the

exception of Kuntillet 'Ajrud which, technically, is located just over the southern border of the Negev and into the Sinai.

Tel Beersheba

Tel Beersheba is situated east of the modern city of the same name and lies between the Beersheba and Hebron Valleys. These valleys merge in the west thus providing an extensive and strategic view of the area (Aharoni 1975b:160).

The excavations at Tel Beersheba were sponsored by the Institute of Archaeolo y of the Tel Aviv University under the direction of Y. Aharoni during the years 1969-1972 (Aharoni 1975b:161). Sixteen pithoi were selected for analysis from the Beersheba pottery corpus and they are noted on Plates 9:2-15, 15:2 and 21:6.

The earliest evidence of Israelite occupation at Beersheba was uncovered in the unwalled city of Stratum VI which belonged to the 12th-11th centuries BCE. It was not until the mid-10th century BCE that the site began to experience a hiatus of occupation. This period was marked by a unique change in city planning. Architects began to incorporate the needs of the various administrative, military and economic units of the town into their 'blueprints'. This prosperous period was marked, however, by three clear-cut destructions which, despite the absence of epigraphic finds referring to Beersheba, can be paralleled to historic events which were occurring in Judah at this time. Pottery dates the final destruction of Stratum II to the end of the 8th century BCE thus indicating that the site was sacked during Sennacherib's campaign of 701 BCE after which the settlement was not reestablished (Aharoni 1973:106; 1975b:162-167).

Tel 'Ira

Tel 'Ira, also known as Khirbet Gharreh, is located on a high mountain ridge 2.5 km northeast of Tel Masos (Aharoni 1975b:119).

To date, three seasons of excavation have been undertaken at Tel 'Ira, the latest having been in 1980. The excavations were a joint effort carried out on behalf of the Institute of Archaeology of the Tel Aviv University under Y. Beit-Arieh and the Department of Eretz-Israel Studies at Bar Ilan University under I. Finkelstein (Beit-Arieh 1981:243).

The project's central discovery was a large store-building, 11.5m by 16.0m, uncovered in the area between the gate and the northern casemate wall (see Fig. 6). The structure, primarily composed of a courtyard and four rectangular rooms (Beit-Arieh 1981:243), provided a rich find of thirty hole-mouth pithoi which are found on Plates 5:9; 6:5; 7:3, 11; 8:1; 10:2-8; 11:3-4, 10-11; 12:2-5; 13:3; 14:3-6; 15:3; 16:2-4 and 22:16.

Tel 'Ira is now considered one of the principal sites of the northern Negev from the period of the Israelite Monarchy along with Tel Arad, Tel Malhata, Tel Masos, and Tel Beersheba (Aharoni, et al. 1974:65).

The pottery uncovered thus far dates the site to the late 8th or early 7th centuries BCE after which the site was destroyed by a large conflagration which the excavators have attributed to the campaigns of the Assyrians (Beit-Arieh 1981:243).

Tel Arad

The mound of Arad stands on a rocky hill about 30 km east-northeast of Beersheba. This site, which dominates the plains of the eastern Negev, was excavated annually from 1962 to 1967. The projects were sponsored by the Israel Exploration Society, The Hebrew University in Jerusalem, and

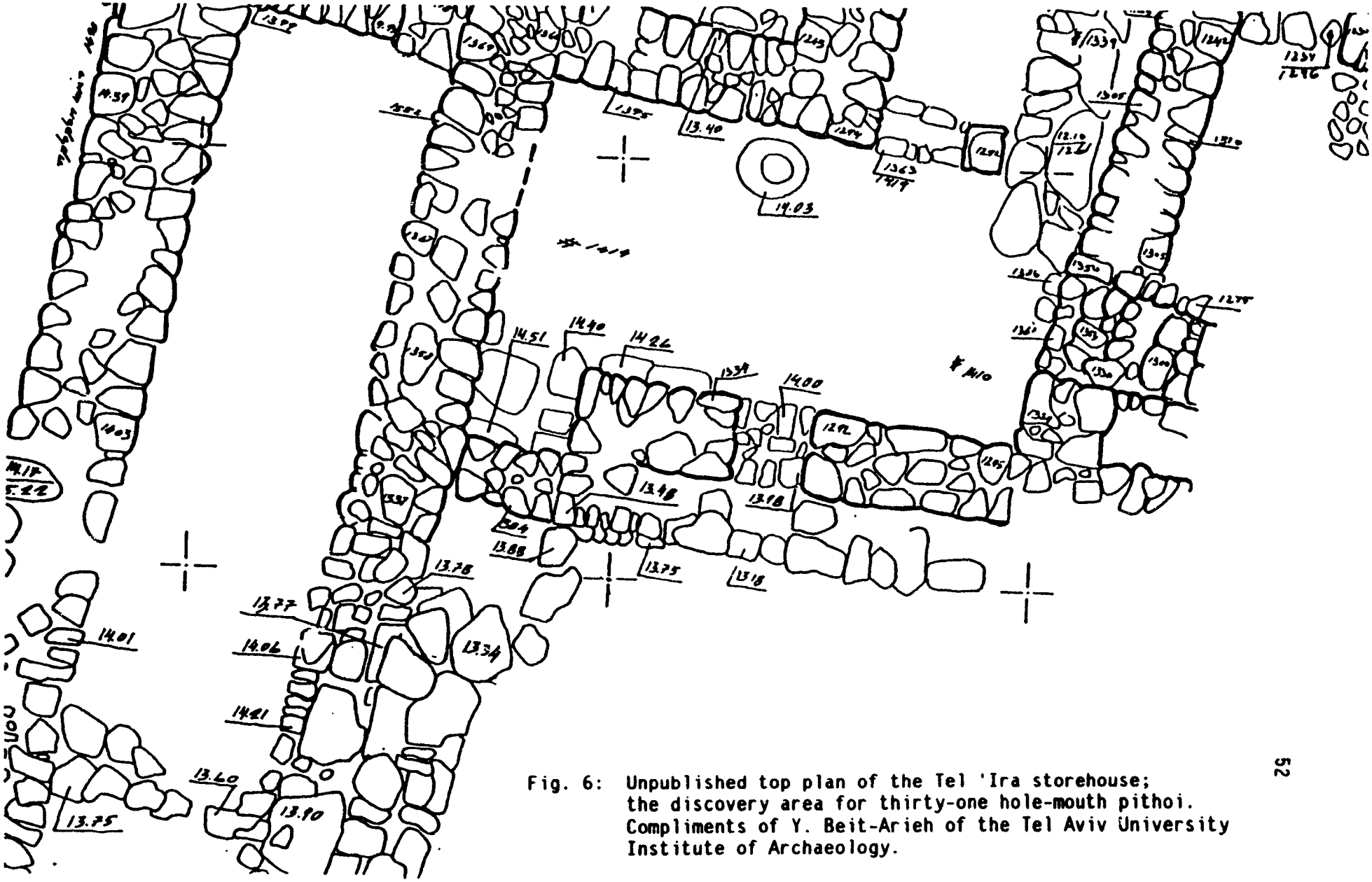

Fig. 6: Unpublished top plan of the Tel 'Ira storehouse; the discovery area for thirty-one hole-mouth pithoi. Compliments of Y. Beit-Arieh of the Tel Aviv University Institute of Archaeology.

the Department of Antiquities and Museums. The initial season of excavation was under the joint direction of Y. Aharoni and R. Amiran. During the second season Aharoni was sole director but in the third and following seasons Aharoni supervised work on the mound while Amiran monitored the excavation of the Early Bronze Age city (Aharoni 1975a:74-75). Four pithoi from Tel Arad are included in this study and are found on Plates 9:1, 15:1, 21:1 and 22:8.

Arad's strategic location made it an important city in the Negev in both the Canaanite and Israelite periods; the first traces of Israelite settlement are dated to the 12th-11th centuries BCE. From the time of Solomon to the end of the Southern Kingdom the six Israelite citadels of Arad formed part of the southern frontier of Judah (Kenyon 1979:316). Traces of conflagration between the strata indicate that each of the citadels suffered a violent destruction. After the final destruction in the 6th century BCE the site was abandoned and not reoccupied until the 5th century BCE (Aharoni 1975a:85).

Special mention should be made of the epigraphic material uncovered in the various strata. The contents of the ostraca, addressed to 'Eliashib', deal with the distribution of assorted supplies thus presuming, amongst other things, the presence of an agricultural community. This supposition is further supported by finds of querns, stone weights, industrial installations and so on, which indicated the activities of not only farmers but also merchants, artisans and soldiers (Aharoni, Amiran 1962:144).

Tel Masos

Tel Masos (Khirbet el-Meshash) is located about 12 km east of

Beersheba (Kempinski 1977:816). Though Aharoni proposed this site as biblical Hormah (Joshua 15:30) the occupational gap between the 10th and 7th centuries BCE render this identification improbable (Kempinski, Fritz 1977:156).

Excavations were carried out as a joint Israeli-German project during the years 1972, 1974 and 1975. They were conducted on behalf of the Tel Aviv University Institute of Archaeology and the Seminar of Old Testament Studies and Biblical Archaeology of the University of Mainz sponsored by the Deutsche Forschungsgemeinschaft (Kempinski, Fritz 1977:136). Ten pithoi uncovered in the excavations of Tel Masos are included in this study and are found on Plates 1:6, 4:1-2, 20:1-5 and 21:3-4.

Though initially a small village (Stratum I) Masos became, during the Israelite Settlement of the Negev in the Iron I Period, the largest center in the northern Negev. The floruit of the site lasted from the mid-12th until the mid-11th centuries BCE and ended with a total destruction after which a sharp and immediate decline set in. When the site was abandoned in the early 10th century BCE it appears as though the natives of Masos moved to nearby Tel 'Ira for the site of Masos was uninhabited for most of the period of the Kingdom of Judah while occupation carried on at both Tel 'Ira and Tell el-Milh, both in the vicinity of Masos (Kempinski, Fritz 1977:156; Fritz, Kempinski 1983a:8).

The Iron II Period saw the building of a fort about 150m south of the site and the excavators, after having worked through a metre of debris, came upon a thick layer of ash containing sherds typical of the late 7th and early 6th centuries BCE. Thus the ceramics would seem to indicate that the brief reoccupation of Tel Masos suffered a fate similar to the

7th-6th century occupations at 'Ein Gedi, Tel Arad and Tel Malhata (Fritz, Kempinski 1983a:71).

Kuntillet 'Ajrud

Kuntillet 'Ajrud is located near a group of shallow wells in Wadi Quraiya near the Sinai-Negev border some 50 km south of Kadesh Barnea. Roads leading south to Eilat and the southern Sinai, as well as west across Sinai, pass in the vicinity (Ayalon 1985a:II).

Within the years 1975-1976 three seasons of excavation were undertaken by Z. Meshel, with E. Ayalon participating as one of his assistants. The project was sponsored by the Institute of Archaeology of the Tel Aviv University (Beck 1982:3). The excavator generously provided seven pithoi for inclusion in this study and they are found on Plates 10:1, 16:1, 17:3 and 22:4-7.

Excavations uncovered the entire site and revealed two structures, a storehouse and another unidentified building, both of which contained drawings and inscriptions of a religious nature (13). This would seem to indicate that the site may have had some kind of religious function (Ayalon 1985a:II). Most of the inscriptions on the pithoi and other objects are of a dedicatory, supplicatory, or benedictory nature and include the names of deities such as YHWH, El, Ba'al and Asherah. As a result of the proximity of the desert highways P. Beck has concluded that it would seem only natural for the caravaneers and other wayfarers who

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(13) Beck's studies (1982:43, 47) show that the depictions and inscriptions were executed after firing apparently when the pithoi were already at 'Ajrud and very likely while they were in place in the benchroom. It has also been concluded that the inscriptions appear to have been written by different hands and at different times than those who applied the drawings.

stopped here to dedicate inscriptions in order to secure divine protection for their journeys (Beck 1982:45-46).

'Ajrud was a single-generation site and though cultivation was no doubt practiced along stretches of the wadi bed after flooding this was not an ordinary agricultural settlement (Ayalon 1985a:II-III). The limited agriculture would also indicate the need to have supplies of all kinds imported to the site. The final interpretations and analyses resulted in the dating of the pottery assemblage of Kuntillet 'Ajrud to within decades of either side of 800 BCE (Ayalon 1985a:V).

The geographical situation for the Negebite sites is somewhat more tenuous than that found in the other regions. In contrast to the rich soils of the Central Hill Country the Negev is characterized by windblown loess soils that are primarily dependent on the winter rains. Water, then as now, is an obtainable but precious commodity. Finally the capital of Judah, Jerusalem, was surrounded by a series of satellite sites which acted as strategic buffers against invasion and many of the northern Negebite sites acted in this capacity thus the accessibility of roads for both trade and military purposes was of paramount importance in this isolated region.

Shephelah

In geological cross-section the Foothills Region or Shephelah appears as a large synclinal formation. Geographically, however, the area is characterized by a number of benches or broad terraces, many low rounded hill, and valleys. The area is approximately 65 km long and 12 km wide and lies between the Coastal Plain in the west and the Judean Hills in the

east (see Fig. 2 of this chapter) (Fisher 1961:388; Orni, Efrat 1971:63, 65).

Considerable downwash from the hills in the east have produced extensive rendzina and alluvial soils which when enriched with organic matter produce a fertile and friable soil. These soils are also less affected by runoff and usually are deeper than soils found in the hill country. The ability of the terrain to support a wide range of crops, from fruit trees and vines to grains, has made this one of the most highly productive regions of Israel since antiquity (Fisher 1961:388; Orni, Efrat 1971:58).

Evidence of the fecundity of the land during ancient times has been revealed at a number of sites such as 'Ain Shems and Gezer where there is also evidence, in the form of presses, of extensive olive oil and wine industries (Grant, Wright 1939:76; Macalister 1912:23). Such industries are, of course, not exclusive to the Shephelah as similar installations have been uncovered in Judean sites such as at Gibeon (Pritchard 1964). The existence of field and garden crops in antiquity has also been revealed through excavation and an early report, published in 1912, by the Gezer expedition recognized the presence of wheat, barley, oats, three species of vetch, beans, and fruits such as figs, pomegranates, the aforementioned grapes and olives, pistachio nuts, acorns, apricot and terebinth seeds. The grains discovered were found, in place, piled on the granary floor or stored in pithoi (Macalister 1912:22-23).

The Gezer calendar as translated by O. Bo ski (1987:38) indicates a seasonal agricultural routine as follows:

line 1: two months of ingathering (olives); two months
line 2: of sowing (cereals); two months of late sowing
(legumes and vegetables);

line 3: a month of hoeing weeds (for hay);
line 4: a month of harvesting barley;
line 5: a month of harvesting (wheat) and measuring (grain);
line 6: two months of grape harvesting;
line 7: a month of ingathering summer fruit.

The following is a hypothetical seven year crop rotation cycle as it could have been practiced in biblical Eretz Israel. Fields planted in the first, third and fifth years with cereals such as wheat and barley would be replaced in the second, fourth and sixth years with legumes such as lentils, bitter vetch and chickpeas in order to replenish the nitrogen in the soil, while the seventh year would have lain fallow (Borowski 1987:151).

Thus, as indicated by palaeobotanical finds, the soil type and an annual rainfall of 400 to 500mm, the Shephelah is characterized by a combination of Mediterranean hill vegetation and, further to the west, Mediterranean lowland vegetation. The latter type continues into the coastal plain, making it, like the Shephelah, an important economic area within the Eretz Israel of both the past and present (see Fig. 3 of this chapter) (Orni, Efrat 1971:155, 170).

The topographical region known as the Shephelah or Lowland Belt provided three sites useful for inclusion in this study--Tell Beit Shemesh, Lachish and Tell Beit Mirsim.

Tell Beit Shemesh

The site of Beit Shemesh or, as it is also known, 'Ain Shems, lies in the northeastern Shephelah about 20 km west of Jerusalem where it stands on a long, flat ridge in the midst of the Soreq Valley (Wright 1975:248).

Excavations were carried out in 1911-1912 by D. MacKenzie on behalf of the Palestine Exploration Fund. Work on the site was resumed again for

five seasons in the years 1928-1931 and 1933. This series of excavations was carried out by E. Grant with the sponsorship of Haverford College (Wright 1975:250). Seven pithoi from 'Ain Shems were included in this study and are found on Plates 7:2, 12:6, 13:1-2 and 22:3.

Beit Shemesh was founded in the Middle Bronze Age and existed, with interruptions, until the Byzantine period. During its earlier history it was probably always a dependency of a larger city but during the 10th century BCE it became a defensive outpost and provincial center in the Kingdom of Judah. With the end of the United Monarchy 'Ains Shems became an unfortified village but, despite some changes of fortune, the copper-working, olive oil, dyeing, and wine-making industries continued as did the usage of the site's many cisterns and silos (Grant, Wright 1939:75; Wright 1975:248, 252-253).

Tel Lachish

Tel Lachish is a strategically placed city in the Shephelah which, except for a few abandonments, was occupied continuously from the Chalcolithic to the Persian periods. The site is located about 30 km southeast of Ashkelon near the border of the Shephelah and the Negev (Tufnell 1977:735).

The first season of excavation was carried out in 1932 by the Wellcome-Colt Archaeological Research Expedition. The remaining seasons, 1933-1938, were under the auspices of the Wellcome-Marston Expedition. After a 35-year lapse excavations were resumed in 1973 under the directorship of D. Ussishkin in conjunction with the Institute of Archaeology of the Tel Aviv University and the Israel Exploration Society (Tufnell 1977:736, 750; Ussishkin 1983:97). The excavation reports

provided one pithos for inclusion in this study. This example is located on Plate 8:2.

Lachish was a flourishing Canaanite city when it was conquered by the invading Israelites (Joshua 10:31-32). The excavation of Level V indicates that it became a defensive fort or metzuvah during the refortification program of Rehoboam (2 Chr. 11:5-12, 23) and consequently was equipped with military supplies, food stuffs, oil and wine (Ussishkin 1978:93). Levels IV, III, and II continue the tradition of a royal Judean fortified city but the latter two levels met their end through violent conflagrations attributed to the Assyrians and Babylonians respectively (Ussishkin 1977:31, 51-52).

In its role as a garrison city and depository of supplies Lachish became a repository for royal Judean storage jars of the stamped lmlk (14) handle type. Despite the widespread discovery of these particular storage jars they are not included in this study as they fall outside the designations of function and feature associated with pithoi.

Tell Beit Mirsim

Tell Beit Mirsim is a relatively small mound located southwest of Hebron on the border between the Shephelah and the beginnings of the hill country. The site was excavated by W.F. Albright under the auspices of ASOR in Jerusalem. The four campaigns took place between the years 1926 and 1932 (Kenyon 1979:319). Three pithoi uncovered during these excavations are included in this analysis and can be found on Plate

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(14) lmlk is a transliteration of a Hebrew term which indicates ownership, by a king, of a designated object, normally a storage jar, and its contents.

9:16-18.

This site was occupied without interruption from the Early Bronze Age until the Middle Bronze Age at which point it suffered a major destruction. Once reoccupied in the Late Bronze Age there appears to be no appreciable interruption in the general economics of the town until it met a final and definitive destruction at the hands of the Babylonians in the 6th century BCE. During this final continuous occupation the hiatus of prosperity at Tell Beit Mirsim appears to have occurred in the 8th century BCE (Kenyon 1979:319-320).

A common find at this site included a number of grain silos and also cisterns. The cisterns, however, were fewer in number than those in most excavated Israelite sites of the area. This latter fact is undoubtedly due to the proximity of many excellent wells in the adjacent valleys (Albright 1943:1, 63).

The Shephelah proper is composed of several wide and fertile valleys which attracted important population centers in antiquity. Many of these ancient settlements acted as fortresses guarding the valleys which were, among other things, natural military thoroughfares from the roadways of the Coastal Plain to the Judean mountains (Orni, Efrat 1971:65).

Transjordan

The Transjordan, in its entirety, includes all the regions between the Rift of the Arava, also known as the Jordan Rift Valley, and the Syrian Desert. These regions are in most cases, geologically and climatically, a continuation of the features found in Eretz Israel. While the western boundary of the Transjordan is defined by the Rift, the

eastern reaches of the area are recognized as a transitional zone which fluctuates with the activities of man in his relations with the desert (Orni, Efrat 1971:106). More specifically the country can be divided into three parallel north-south zones: the Jordan Valley-Wadi Arava rift; the high plateaus of Edom, Moab, Ammon, Gilead and Basan; and the rough hill country which forms a transitional zone between them (see Fig. 7) (Dornemann 1983:6).

The region which is of specific interest to this study is the plateau of Moab with its sites of Dibon and Aroer which together provided four pithoi for analysis. These were the only Transjordanian sites which had available published pithoi. The bedrock of the majority of this plateau is Senonian chalk and flint, with patches of basalt in the southern reaches. Ancient rocks, particularly sandstones are exposed on the western escarpments and on the sides of the deep gorges. 'The streams which pass through the high western edge of the plateau have carved abysmal and often impassable canyons such as that of the Nahal Arnon', also known as the Wadi Mujib (Orni, Efrat 1971:110-111).

These canyons break the country into large natural units of which the rich and fertile agricultural plains of the Moab plateau are but one example. The natural vegetation cover here, as in all areas, is determined by climatic and edaphic factors The plateau's altitude, higher than the Judean Hills in the west, results in a relatively reliable winter rainfall, a factor which made the cultivation of grain crops possible. This annual rainfall, ranging from 400 to 600mm, is characteristic of the Mediterranean zone hill vegetation and encourages the growth of Mediterranean wood, low shrubs and herbaceous plants (see

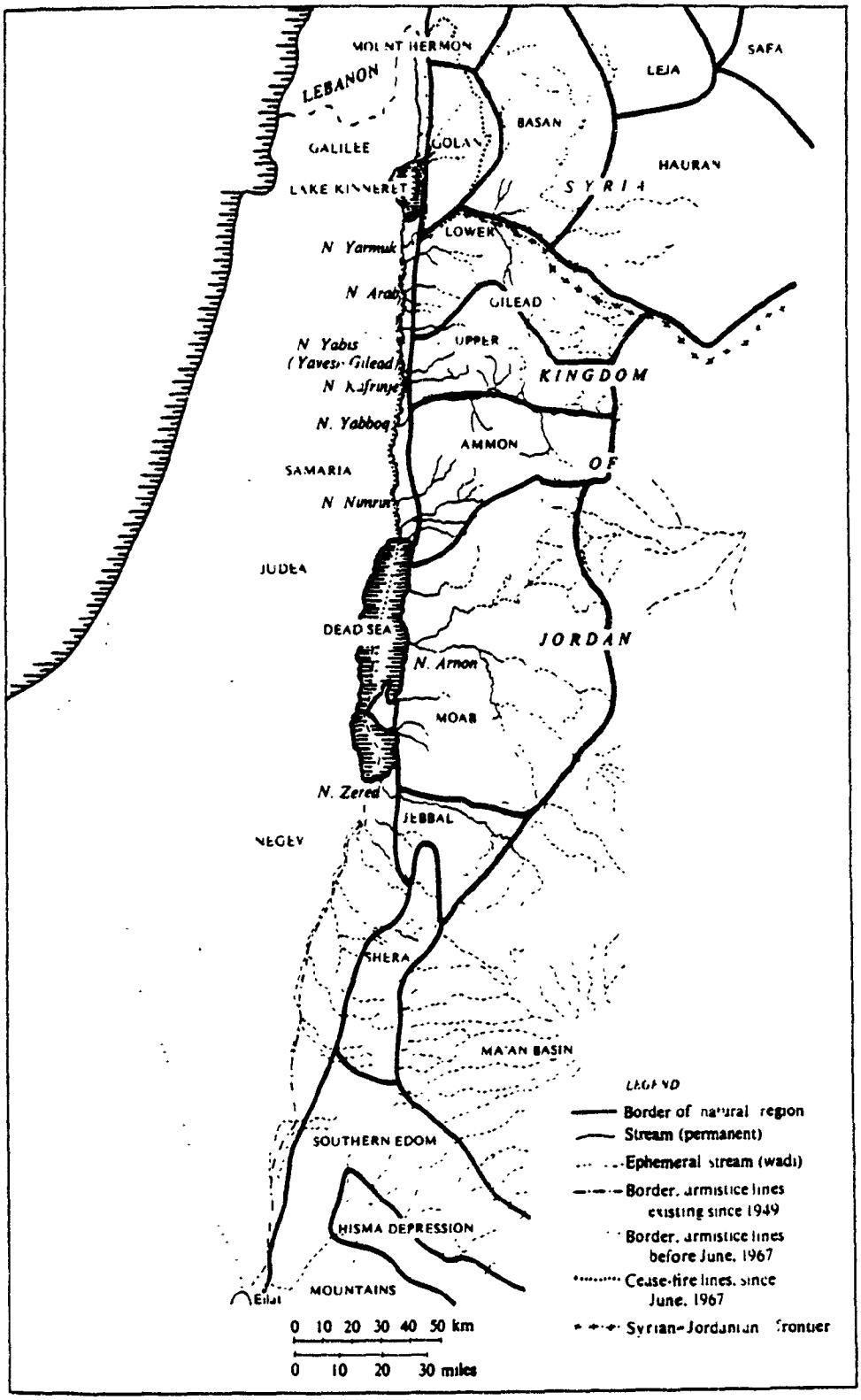

Fig. 7: Subregions of the Transjordan (Orni, Efrat 1971:107).

Fig. 3 of this chapter). A great number of arboreal species such as evergreen oak, tabor oak, Aleppo pine, turpentine tree, storax, almond, hawthorne and the carob tree formed part of the region's open-forest vegetation (Orni, Efrat 1971:111; Van Zeist 1985:200-201). Towards the east the topographic incline results in a sharp decrease in rainfall which has lent itself to the creation of a transitional zone on the plateau's eastern edge which leads into the desert zone (Orni, Efrat 1971:106).

Pithoi from two Transjordanian sites, Aroer and Dibon, are included in this thesis. These sites are located within the biblical boundaries of Moab, a land extending 30 to 40 km directly to the east of the Dead Sea.

The area of Wadi Mujib, though characterized in part by the presence of abysmal canyons, is also a land well-suited for grain farming. The aforementioned canyons are in places impassable but, for the most part, they neatly divide South Moab into easily defensible blocks without interfering with the excellent road network in southwestern Moab (Orni, Efrat 1971:111).

Dibon

The readily defensible site of Dibon, situated on the Kerak Road, is located 64 km south of 'Amman and 4 km north of the Nahal Arnon (Tushingham 1975:330). While the site's identity was confirmed by the discovery of the Mesha Stele, also known as the Moabite Stone, in 1868, excavations were not carried out until the 1950's. The first two campaigns, 1950 and 1951, were directed by F.V. Winnett. W.L. Reed took over in the spring of 1952. A.D Tushingham was director in the fall of 1952 and again for the 1953 season. After a two-year lapse another

excavation was held in 1955 by W.M. Morton (Tushingham 1972:1).

The three pithoi included in this study were discovered in Tomb J5 and are associated with the end of the 7th century BCE. These pithoi can be found on Plate 22:12-14 of this study. All the tombs of Dibon are located in one restricted area on the southern slope of the Wadi Dhiban and were all in a poor state of preservation (Tushingham 1972:86).

The archaeological evidence pertaining to this later Moabite period, from the 9th century BCE until the Babylonian destructions of the 6th century BCE, indicates a highly developed civilization. In many respects the cultures of Moab and Judah paralleled, yet the former retained its own native character (Tushingham 1975:333).

Aroer

Aroer is located 4 km east of the Madeba-Kerak Highway on the north slope of the Wadi Mujib, the biblical Arnon River. The site was excavated during the years 1964-1966 under the direction of E. Olavarri with volunteers from the Spanish Center, Casa de Santiago, Jerusalem (Olavarri 1975:98-99).

According to the Ta'anach the site was first occupied by the tribe of Reuben during the early Settlement Period (1 Chr. 5:8). Acting as a fortress which guarded the King's Highway where it crossed the Arnon River, the site remained under Israelite control throughout the periods of the Judges and the United Monarchy. Aroer continued to mark the southern boundary of Israelite territory in the Transjordan until it was annexed to the Moabite kingdom of Mesha in c. 850 BCE (Olavarri 1975:98). One of Mesha's works was the building of a reservoir, on the same plans as one uncovered at Dibon, for Aroer, like many southern sites, relied solely

upon a stored water supply (Olavarri 1975:100). One published pithos was found for inclusion in this study and it is found on Plate 21:7. Aroer changed rulers once again when Damascus conquered the area in c. 732 BCE, a consequence of Assyrian expansion. During a Chaldean campaign against Moab in c. 582 BCE Aroer suffered a destruction from which it never recovered (Olavarri 1975:98).

The regions described above, the Central Hill Country, the Negev and Sinai, the Shephelah and the Moab Plateau of the Transjordan, have been characterized primarily from data belonging to scientific studies of this century. Studies have indicated, for instance, that during the Iron Age the rainfall in Eretz Israel and the Transjordan was roughly equivalent to the rainfall counts in the first half of this century (Shehadeh 1985:27). Thus an analysis of archaeological, ecological, geological, climatological and various other data bases, combined, where possible, with location models, allows a relative reconstruction of past environments and their associated economies.

Each topographical unit has its own geological history, characteristic soils and vegetation and, hence, each unit differs from its neighbours in its conditions for human settlement. This chapter, by setting forth the history, location, and other particulars of a site, enables the reader to place these varied villages, cities, and/or fortresses in a regional and historical perspective thus adding further coherence and meaning to the results of the statistical program.

CHAPTER THREE

An Ethno-Archaeological Approach to Pottery Technology

In order to better understand and appreciate the place and importance of pottery in general, and pithoi in particular, within ancient communities, this chapter has employed an ethno-archaeological view of pottery manufacture and usage. For well over a century potsherds have provided the raw data for stratigraphical and chronological studies in archaeology. Unfortunately, however, the human aspects of this man-made and man-utilized product have been neglected.

The need for an ethno-archaeological approach was realized as early as the mid-19th century of the common era (CE) for, in 1865, the policy-makers of the Palestine Exploration Fund noted in an original statement of purpose the need to

> ... describe in a systematic and exhaustive order with clear and exact minuteness the manners, habits, rites, and languages of the present inhabitants... Many of the ancient and peculiar customs of Palestine are fast vanishing before the increasing tide of Western manners, and in a short time the exact meaning of many things... will have perished (Besant 1895:23).

To alleviate the sterility of the pure ceramic record the archaeologist needs to develop a framework that will correlate the more complete ethnographic data with the only partially excavated and, in many instances, partially understood, archaeological remains.

A.E. Glock has set forth four basic premises which would facilitate the establishment of models through which developed archaeological and ethnological hypotheses may be tested. If the observed subjects, ancient

and contemporary, have any or all of the following similarities a cultural relationship may possibly be demonstrated: subsistence levels that are judged similar on the basis of interpreted archaeological evidence; the same general level of technological development; approximately similar ecological conditions; and, finally, a demonstrable history of continued environmental manipulation and settlement in a recognized zone or region (1982:147). Consequently, on the basis of these factors, the preindustrial villages of Crete, Cyprus, Lebanon and Eretz Israel provide vital testing arenas for archaeological interpretation as supported by concrete ethnological studies.

Village potters are rapidly diminishing in number, thus the need to utilize analogical thinking in order to systematically exploit the ethnographic data becomes increasingly urgent. Discussions with potters and their families can provide some understanding of the traditional and economic pressures influencing the shapes they produce, the clays and fuels used, kiln type and maintenance, variations in production throughout the year, and the ways in which the fired wares are distributed (Matson 1974:345).

The following study of modern pithos-makers in the Eastern Mediterranean utilizes many of the aforementioned discussion criteria for, once applied to the archaeological record, they may indicate parallels between pottery traditions which are separated by only one major factor--time.

The following section will attempt to recreate the probable ancient processes involved in pithos-making through the assemblage of data from several present day pre-technical village potteries found throughout the

Eastern Mediterranean. The various stages under consideration include the establishment of a work area, clay preparation, construction of the vessel, surface treatment of the pithos, the kiln firing and, finally, considerations for usage of the finished product. The entire scenerio is being presented in terms of what would seemingly have been possible in similar work environments of the 2nd and 1st millennia BCE.

The Work Environment

> Then I went down to the potter's house, and, behold, he wrought a work on the wheels. And the vessel that he made was marred and was again like clay in the hand of the potter: so he made it again another vessel, as seemed good to the potter to make it (Jer. 18:3-4).

Potters, ancient and modern, fulfilled an essential function for they produced the ceramic objects which were required for daily and ceremonial life. In most areas of the world, however, the encroachment of plastics and metal have made the position of the potter much more tenuous, thus strengthening the argument for increased ethno-archaeological studies.

The constant demand for earthenware products would have placed the potter in a unique position within his community but the following Apocryphal passage from Ecclesiasticus (Ben Sirach) indicates that the potter's status did not extend into political life:

> All these [potters] rely upon their hands and each is skillful in his own work. Without them a city cannot be established and men can neither sojourn nor live there. Yet they are not sought out for the council of the people, nor do they attain eminence in the public assembly. They do not sit in the judge's seat, nor do they understand the sentence of judgment; they cannot expound discipline or judgment, and they are not found using proverbs. But they keep stable the fabric of the world, and their prayer is in the practice of their trades (38:31-34).

The assumption has been that ancient potters worked at their craft on

a full-time basis. This was undoubtedly the case in many or even most instances for pottery was a fragile instrument of daily life and was in constant need of replacement. There is, however, the possibility that a limited number of these craftsmen worked on a part-time basis. This small group of potters, possibly from small villages or isolated regions, may have worked at their trade on a seasonal schedule moving from their own villages to other isolated regions in accordance with the demand for their work. An investment of only limited blocks of time toward pottery-making would have enabled the part-time craftsman to allocate a segment of his time to other seasonal pursuits such as agriculture and, at the same time, maintain a secondary source of income.

The vendema, as practiced by Cretan (Voyatzoglou 1974:18), Cypriot (Hampe, Winter 1962), and Afghani (Matson 1974:77) potters, is an example of a present-day seasonally based ceramic industry. The Cretan guildsmen of Thrapsano, for instance, practiced their trade annually from May 21st until September 14th. A guild would travel to a certain locale and during these summer months they would produce and sell pithoi to the inhabitants of the neighbouring districts (Voyatzoglou 1974:18).

The work environment, whether found in the potter's native city or established in a rented field, had several basic needs. The site required accessible supplies of clay, water and fuel, a storage area and a kiln, along with accommodations for the guildsmen and their equipment.

Once the workers were established, having set up their equipment and built a kiln, or made any necessary repairs to an existing kiln, the production season for pithoi could begin. The workday was long, beginning at about 4:30 a.m. and continuing for 12 to 14 hours with a production

capacity of 10 to 16 pithoi. The dry clay that had been brought in the previous evening was prepared and, if there had been a firing the previous day, the kiln was emptied. The pithoi were set in the kiln about 10:00 a.m. or 11:00 a.m. in preparation for the firing which would take place in the early afternoon. Pithoi-building lasted from about 6:00 a.m. until 5:00 p.m. although no work was done at the turntables while the kiln was being fired. The firing lasted four to five hours and ended at sunset. During the first forty days of the season the guildsmen produced 400 to 500 pithoi. The latter half of the vendema was occupied with firing the remaining pithoi and selling the output (Hampe, Winter 1962.35-40; Voyatzoglou 1974:19).

Pithos-making guilds are to be found in many regions of the Eastern Mediterranean. A study of the reports of Hampe and Winter (1962:20-21) and Voyatzoglou (1974:18) reveals that the guilds of both Cyprus and Crete are comprised of six members of varying status and responsibility. The following outline indicates the various functions of the guildsmen.

The Master was the chief craftsman and business manager, but his responsibilities also included the selection of the other members of the guild.

The foreman acted as the exclusive assistant to the Master. He prepared and laid out the coils for each new section or brim of the pithos which the Master then proceeded to fashion into the desired shape and size.

The wheel operator sat opposite the Master and turned the hand-operated turn-table. This role included another function, that of a kiln-man. In this capacity his responsibility lay in setting the wares in

the kiln and covering it, building up the kiln door, and regulating the duration and intensity of the fire.

The clay worker was responsible for pounding and sieving the dry clay. During the initial days of the season this was a guild effort in order that enough clay be produced for the work to begin.

The woodcutter scouted the environs for kiln fuel. The type of fuel used was dependent upon availability but normally consisted of scrub, grasses, twigs and, where available, tree wood.

The lowliest member of the guild was the carrier or porter. As the carrier he brought the fuel and dry clay, loaded on the guild leader's pack animals, in from the source. His duties as a porter included slaking the pithoi by filling them with water and eventually bringing the finished product to the buyer's home.

The next section begins the study of pithos-making by discussing the sources of clay and the various means through which it may be prepared for use.

Clay Preparation

Clay, as a raw material, is described by Kelso and Thorley (1943:87) as "an earthy substance which, when mixed with water, becomes plastic and is then capable of receiving and retaining delicate impressions". Clay, as a chemical form, is composed of a combination of aluminum, oxygen, silicon and water molecules and is designated by the following formula: $Al_2O_3 . 2SiO_2 . 2H_2O$. Rarely, however, is clay found in a chemically pure state in nature (15) (Kelso, Thorley 1943:87; Johnston 1974:88).

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(15) For a detailed discussion of clay and its various properties see Kelso. J.L., and Thorley, J.P. (1943)

The rarer and purer clays are denoted as being in a primary state. This type of clay is produced as a result of varied chemical actions upon felspathic rocks and is found at the site of origin. Felspathic rocks are those composed of any of a group of crystalline minerals that consist of aluminum silicates with either potassium, sodium, calcium, or barium (Kelso, Thorley 1943:87).

Secondary clays or, as they are also known, transported or sedimentary clays, are those which have picked up various impurities during their waterborne travels from their place of origin. The streams carry the clayey materials until they are deposited in a bed or seam. Each seam varies in character for the sedimentation deposits reflect the varying velocity of the clay-bearing source (Kelso, Thorley 1943:87). As a result of the various impurities present in secondary clays it follows that there is no uniformity to be found in their colour, quality and properties, even within a single bed (Kalsbeek 1969:73).

In order to achieve a desired finished product the impurities of secondary clays and even the purity of a primary clay must be considered. The quality of each strain affects the way in which the raw material must be prepared, tempered, fashioned, dried and fired. There are several methods which may be employed in order to prepare secondary clays for use. The methods utilized are dependent upon any or all of the following factors: the quality of the clay; time factors; and, the desired finished product. The purifying process is reciprocal: the finer the required clay, the greater the investment of time and effort. Pithoi, as large and relatively thick-walled vessels, can be fashioned from any quality of plastic clay including clays that have been prepared through the simplest

methods if that is all that time and the environment offer.

The following descriptions outline four methods of clay preparation practiced by the craftsmen of pithos-construction: dry-cleaning or grinding; weathering; slipping; and rotting.

The least effective but fastest means of removing large impurities from clay is by means of grinding or, as it is also known, dry-cleaning. Once the clay has been dug from the bed or seam it is taken to the work area where it is pulverized by means of a flail or stick. When the clay is sufficiently broken up the larger impurities such as stones and vegetation are removed. This latter step may be accomplished with the help of a sieve. Similar to this is a method which requires the addition of some water to the rough clay after which it is kneaded, rolled out over a flat surface and beaten flat. At this point the coarser elements may be removed by hand (Kalsbeek 1969:74).

The process of rotting is practiced when a fine quality clay is desired. The raw material is superficially dry-cleaned before it is set away for a period of time. During the storage period the clay is kept damp and is regularly turned over through a kneading process in a constant effort to expose the organic remains to the air and therefore decay (Kalsbeek 1969:74).

The weathering process employed the basic elements of nature: sun and rain. The disintegration actions of the sun were further complemented by the winter rains and frost which permeated and disintegrated remaining undesired elements in the hardened clay. Weathering, like rotting, required that the clay be turned from time to time to ensure equal exposure and thus produce the following results: a mechanical

disintegration; an equal physical distribution of moisture; and chemical changes. The weathering process of decomposing and rearranging certain elements in the clay is a more elaborate version of the rotting process (Kalsbeek 1969:74).

The most elaborate, yet surest, means of producing a quality clay is through slipping. By employing this process fresh clay could be purified, and weathered clay further refined. The following account describes the methods used by the potters of Beit Shebab, Lebanon as observed by V. Hankey in 1968. The clay was excavated and then brought to the settling beds during the cold, wet winter months. Water was then directed to the beds from a stream via small channels. The beds were built in series of threes at stepped levels with wooden barriers between them. The levigation process took from four to five months. At the end of this period the various qualities of clay were removed from their respective vats and taken to a storage area in time for the May to September manufacturing season (Hankey 1968:27-28).

The majority of purifying processes; rotting, weathering, and slipping, are obviously those practiced by a permanent workshop. The dry-cleaning means of improving clay, on the other hand, would be utilized by those who practiced pottery-making on a seasonal basis away from their native towns.

Once the raw material had been refined it was then brought to the desired consistency. A lean or less malleable clay was given an admixture of a more plastic clay. The opposite instance is a clay which is so fluid that it will not keep its fashioned shape. This latter type will be improved through the addition of tempering agents which increase

workability and reduce shrinkage. Tempering agents, or grits as they are also known, are derived from a variety of sources both vegetable and mineral. They may be used in either their natural state as sand, chaff, and dung or after grinding as quartz, sandstone, lime, sherds (grog), shell and straw (Kalsbeek 1969:75-76). The adhesive quality produced in the clay as a result of the addition of temper is especially useful when building pots, such as pithoi, from coils.

The temper was added at the beginning of the wedging or de-airing stage, the final step in the preparation process for the clay. The evening before the clay was needed the members of the guild would spread a large mound of clay, approximately 600-900 kg, upon the floor of one of the work huts and shape a well or trough into it. At dawn the following morning a quantity of water was poured into the preformed trough and the wedging was ready to begin. At this point three or four of the men knelt facing each other at which time they bent forward and started working the clay into the water. Once the clay achieved a mud-like consistency it was divided into smaller mounds for each of the men to continue working individually. The whole operation was carried out with the hands and during the kneading the mass was turned over several times. In the last stage of the de-airing the men began to trample the mixture with their feet in a snail-like movement from the periphery to the center. During this procedure the feet knead the clay while the hands break it up and move it about. This kneading was repeated approximately three times for any air that remained in the clay could cause fractures or blow outs during the firing process (Hampe, Winter 1962:27; Voyatzoglou 1974:18-19). The wedged clay was then cut into sections or cones of the size needed for

the coils to be formed (Wulff 1966:152).

Pithos Construction

In the construction and shaping of vessels the potter-craftsmen, past and present, could choose from a variety of methods. The means of building a pithos, however, were limited, as the potter had to consider the unusual size and height of the vessel. Thus the technique of building a pithos, common throughout the Eastern Mediterranean, employed a combination of hand-built coils that were thinned and fashioned while rotating on a slow-wheel.

The two types of slow-wheel common in this area of the world, the foot and hand wheels, are still in use up to the present. The foot-wheel, used until today in Beit Shebab, consists of a heavy stone or wooden disk which revolves on a fixed pivot with a vertical axle socketed to the underside of the round table on which the pot is thrown. Parallels to this type have been discovered at Tell Halaf, Hama, Ugarit and several sites in Eretz Israel. The slow-wheel of 18th Dynasty Egypt, which is normally worked from a sitting position, finds its parallel in the Cretan and Cypriot hand-wheels of today. This hand-wheel or tournette was a low-set round or square turn-table made of stone or wood set a vertical shaft (Hankey 1968:28; Johnston 1974:58).

When construction was ready to begin the foreman took one of the precut loaves or cones and quickly rolled it out (see Fig. 1). Once a coil of sorts had been shaped the potter held the ends in either hand at chest level while his arms remained motionless. The coil soon stretched to the desired length by the force of its own gravity. Each coil was about 75 cm long and 4 cm thick and weighed from 4 to 5 kg. Two or three

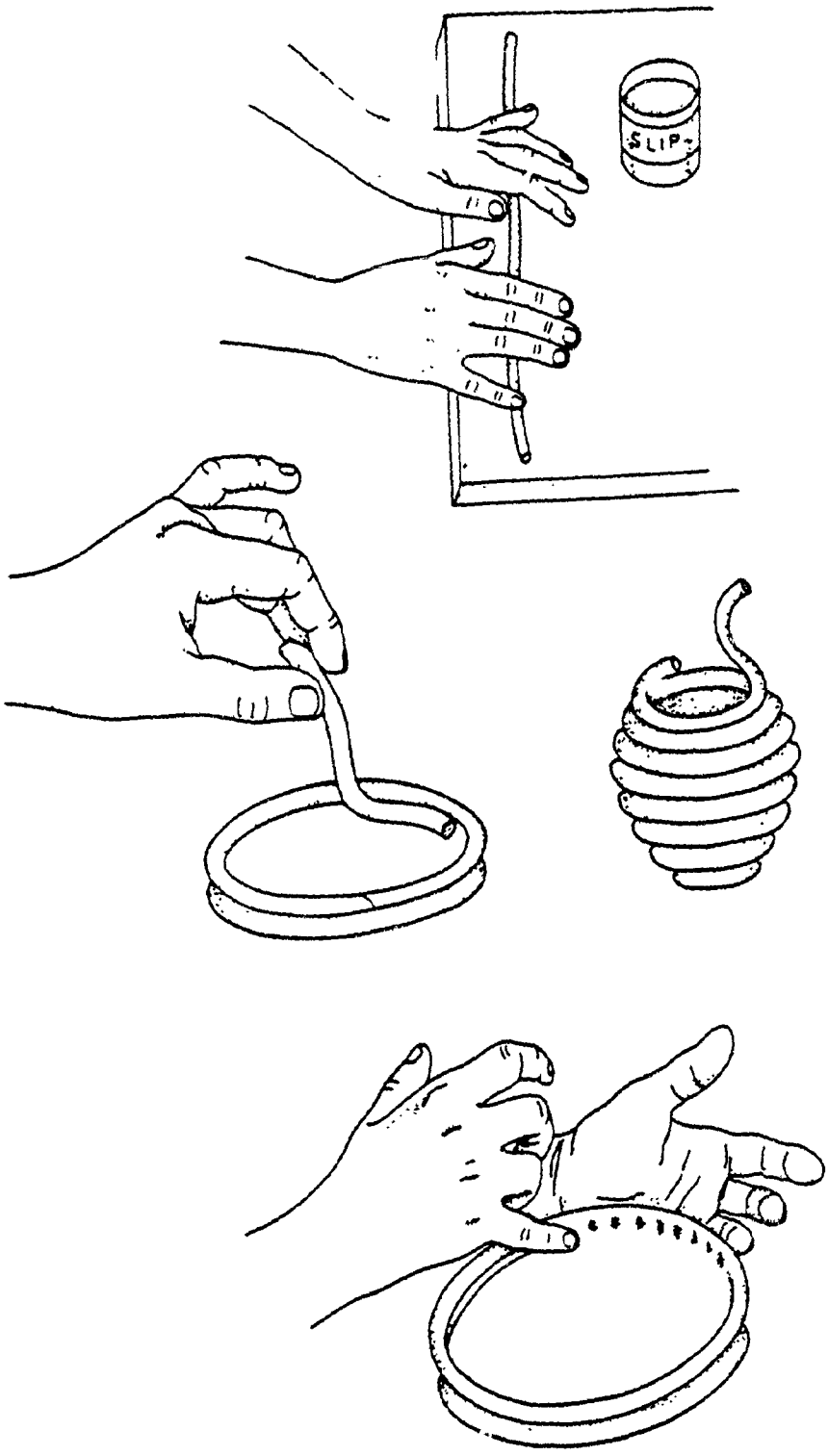


Fig. 1: The principle of coil construction (Joukowsky 1980:364).

of these coils were required to form one band or brim of the final vessel (Hampe, Winter 1962:28; Hankey 1968:28; Voyatzoglou 1974:20).

Once the potter had made a day's supply of bases, ten to sixteen, he began to shape the body. As the tournette was slowly turned the preformed coils were added to the base until the desired brim height and shape was reached. In some instances the pithos was formed while resting on a piece of bark, a weave mat or even a large sherd. These were rotated until the weight of the vessel became too great, at which point the potter was obliged to continue construction while moving about the pithos. When several coils had been added the walls were thinned either by hand, through knuckling, a pulling of the clay (see Figs. 2 and 3), or by means of a paddle and anvil (see Fig. 4). The paddle or beater is a thick bat with the grains marked parallel to its length while the anvil is a thick wooden or clay disk which was covered with cloth and a strap to keep it in place on the potter's left hand (Hankey 1968:28).

If the potter's work schedule and technique were such that he desired to complete the vessel in one session then he would begin to bind the vessel by means of cords or a wooden band. These supports prevented the clay from sagging and enabled work to continue (see Fig. 5) (Johnston 1974:99). Construction of a pithos without support required that it be built in stages. Each band or brim, constituting one section of about 12 cm of the final shape and height, would be left to dry for approximately one hour before it would receive the next set of coils. Built in this manner, a pithos would be comprised of approximately six differently shaped bands from base to rim (Hampe, Winter 1962:29-30; Voyatzoglou 1974:20). The processes just outlined were reversed, the vessel having

Fig. 2: Pulling and stretching the clay so that it becomes a thick walling (Voyatzoglou 1974:22).

Fig. 3: Knuckling or pulling up: the wall of clay becomes thinner as it is pressed between the two index fingers (Voyatzoglou 1974:22).

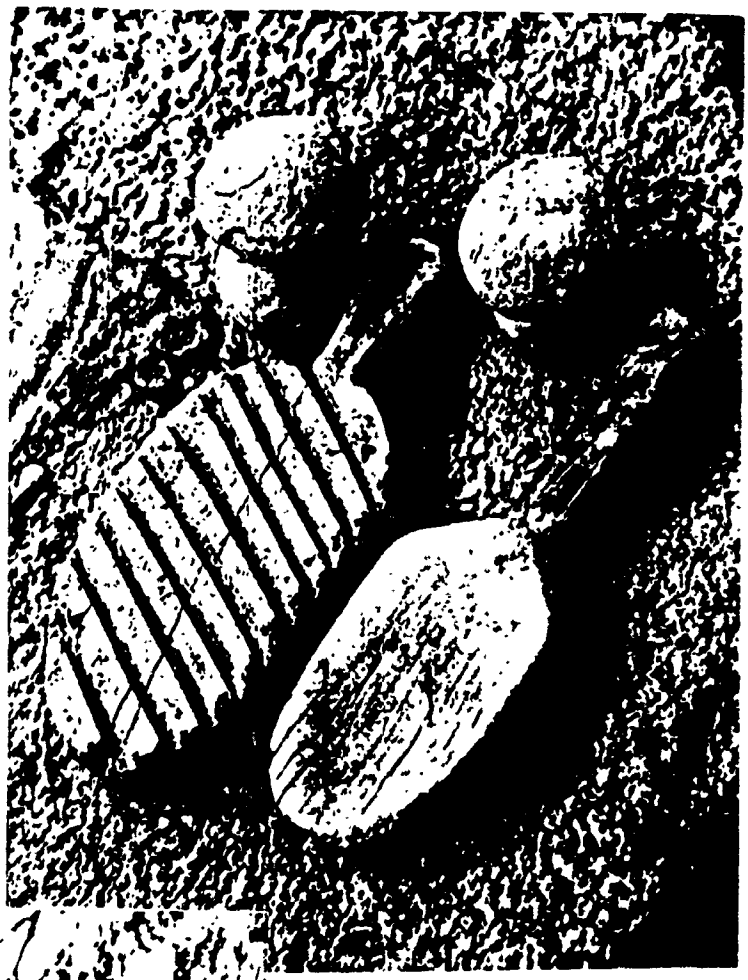


Fig. 4: Wooden beaters and clay disks used in the paddle and anvil process of hand-building pottery (Johnston 1974:93).

Fig. 5: A village potter hand-building a pithos; the wooden hoop strengthens the

been built in stages from rim to base, if the potter or consumer desired a rounded or pointed base on the pithos.

To prevent fractures and add strength and uniformity to the vessel the junctions between the clay coils were smoothed over with an adhesion slip until the spaces were solidly filled and the surface appeared flush (Joukowsky 1980:363). A pithos being built in bands also received an additional belt of clay at the junction between brims which was then treated in the same manner as the borders between coils (Hampe, Winter 1962:29).

The handles were the last addition in the vessel's construction. The most functional and commonly found handle was the vertical loop handle. Once the vessel had been completed and, if so desired, wet-smoothed, then the handles were added. The handles, normally two or four, were shaped and immediately joined to the pithos or, in some cases, they were left to dry to a leather-hard state before attachment. The adhesive used to attach the handles was a liquid clay known as a slip (Johnston 1974:99).

Once construction of the pithos was complete it was left to dry in place, upon the turntable, until the following morning. From the workroom it was transferred to a protected drying area for a further one to four days during which time several new series of pithoi would be turned out and set to dry (Voyatzoglou 1974:20).

In the days following construction the vessel passed through several drying stages. In its leather-hard state the pithos was wet but firm; it could not be bent without cracking, and had a water content of between 8-15%. The final shaping and refining of the vessel, known as turning, took place during this phase. The vessel was returned to the tournette

and the sides were trimmed in order to achieve the desired wall thickness. Green-hard is the term applied to the mid-point of the drying process. The last stage before firing is called bone-dry or white-hard and was considered completely dry with a 3% water content. This final percentage did not include the water present in the clay molecules themselves. While these drying phases occurred the vessel shrank in size and changed to a slightly asymmetrical shape, a process which continued during the kiln firing (Johnston 1974:99; Joukowsky 1980:366-367).

Surface Treatment

The finishing touches were normally worked upon the pithos while it was leather-hard, the most receptive of the drying stages. The treatment and decoration, whether liquid or plastic, could also be applied immediately prior to or following the firing. The most common techniques practiced upon pithoi were wet-smoothing and the application of a slip. Incision, applied or formed ridges or collars, and a few instances of painting have also been noted among the pithoi samples, past and present, that are available for study.

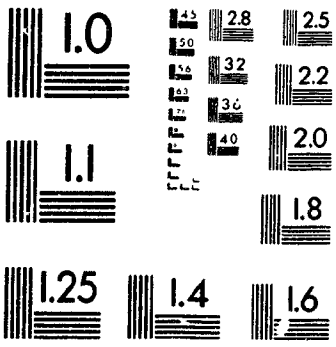
Wet-smoothing is a process which brings a fine layer of clay to the surface by passing a piece of cloth or leather over the newly formed vessel. This may be repeated again during the leather-hard stage. This technique, also known as slurry or wet-hand surface treatment, eliminates many of the marks that occurred during manufacture. During the leather-hard stage the wet-smoothing is often followed by some rough hand-burnishing during which the vessel is rubbed down with a round stick or stone in order to smooth and polish the exterior (Johnston 1974:99; Joukowsky 1980:380).

Another common means of decoration was the application of a slip which was poured or brushed over the leather-hard pithos before firing. Slipping represented a definite refinement in ceramic technique for it was a simple but effective means of rendering the vessel less permeable and, at the same time, improving its surface colour and texture (Shephard 1956:191).

A slip is a liquid composed of fine clay which has been diluted to a consistency similar to a thick cream. A slip may be derived from the same clay as that from which the body of the vessel was made or one which acted with the same coefficient of expansion as the manufacturing clay. Some finds indicate that only a portion of the vessel was slipped, for example the neck and shoulder areas, while in other instances, the vessel was given several applications in order to achieve a slip of greater thickness (Joukowsky 1980:375; Kelso, Thorley 1943:104-105).

Incision, a less common finishing technique, was achieved by marking lines, strokes, or notches into the normally still plastic clay with a sharp tool (Joukowsky 1980:381). Common to the assemblage compiled for this thesis were incisions which encircled the vessels, singly or in groups, seemingly in order to emphasize certain parts of the vessel, in particular the shoulder. When the clay still readily received impressions the trademark of the potter could be incised onto the pithos (see Appendix 3), normally on or near the shoulder (Johnston 1974:102). Considering the number of trademarks which have been uncovered at individual sites it would appear that each potter, or possibly workshop, had its own unique sign or set of symbols.

A characteristic feature of Iron Age I pithoi is the ridge which the


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
7.1

potter would form at the base of the vessel's neck. This ridge or "collar" may take the form of a raised angular, rounded or squared-off band or line. The nature of the collar which, as mentioned above, may take several forms often makes it difficult for the ceramicist to determine whether the ridge had been applied by the potter as plastic decoration or had been created during manufacture (Joukowsky 1980:384).

Paint rarely decorated pithoi, a situation reflected in the sample collected for this thesis where only one example, a pithos from Kuntillet 'Ajrud was discovered to have been painted (see Fig. 6). Even this instance of painting, however, does not appear to have been the work of the manufacturer. It is the excavator's opinion that this depiction of worshippers was made while the pithos was in place at 'Ajrud. When employed, paint was generally thicker in consistency and higher in metal oxides than slip. It was applied with a brush to relatively small areas of the vessel in order to create a decorative pattern or scene. The paint was applied either before or after firing (Joukowsky 1980:375, 377).

The final stage of pottery manufacture, the firing, took place with the greatest surety of success if begun after the vessel had reached a bone-dry state.

The Firing

Once the concept of a covered hearth-fire evolved into that of a simple kiln it was possible for the potter to begin controlling, to some extent, the temperature at which the vessels were to be fired and the duration of the firing itself. This was a great advantage for both the potter and consumer as it was discovered, for instance, that an intensive and controlled firing reduced a vessel's porosity thus making it much more

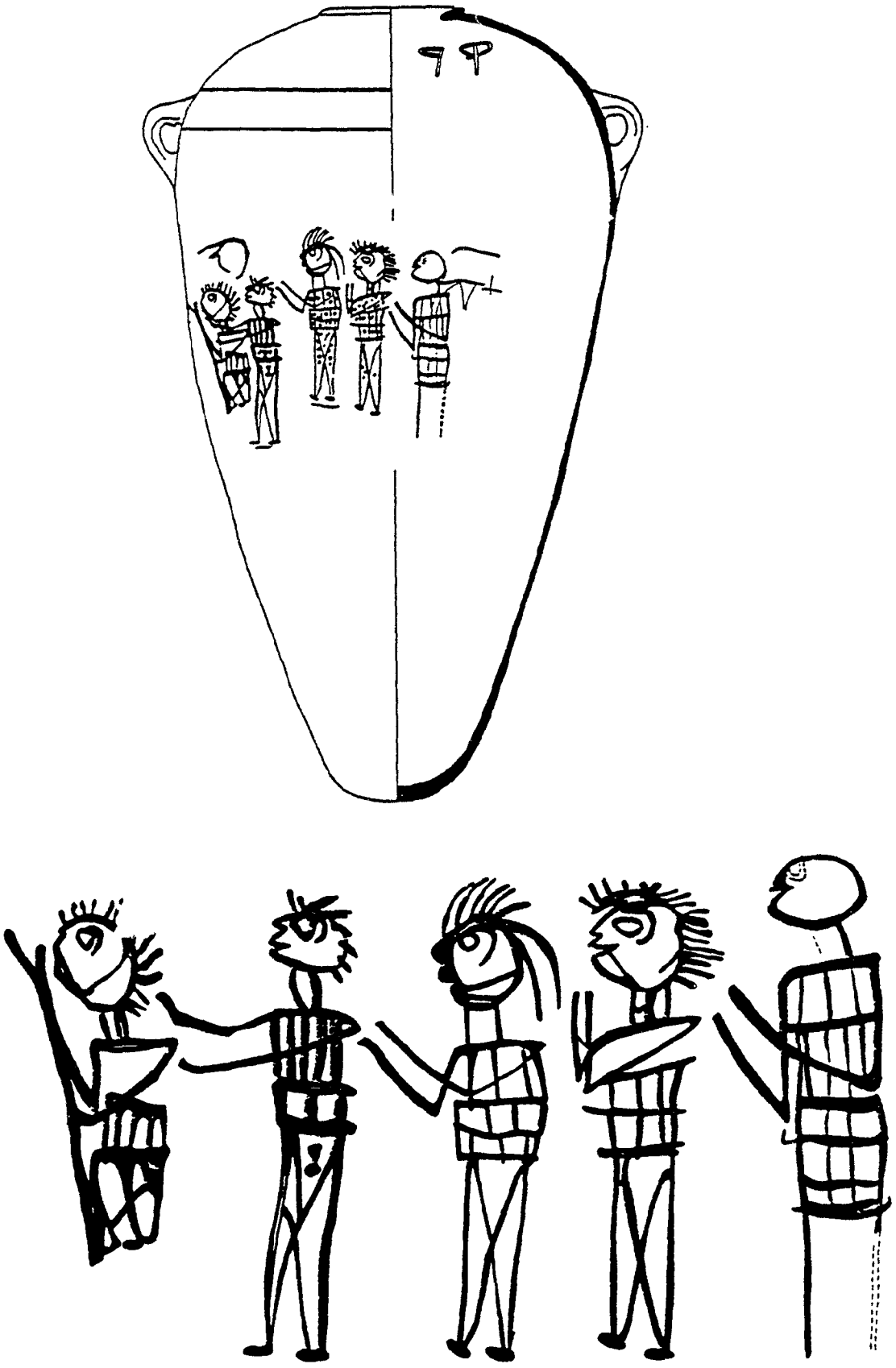


Fig. 6: A painted pithos from Kuntillet 'Ajrud; detail of painted drawing (Beck 1982:6).

desirable for the storage of liquids (Matson 1965:207-208).

There were two types of kiln, commonly found in ancient times, whose usage have continued up until the present. Archaeological evidence indicates that the vertical kiln, basically an open cylinder, was the type most commonly used in Eretz Israel during the Iron Age (see Fig. 7). The lower space or firebox had an earthen floor and for a ceiling it had the lower part of the kiln floor. The fire-hole, through which the fuel was fed, was built into the side of the structure at ground level. The upper level or firing chamber led directly to the open air but was partially covered over during firing. The side entrance or kiln door was used by the potters to transfer the vessels into and out of the kiln during the setting and emptying of the structure. The disadvantage of this kiln type lay in the difficulty of controlling the temperature in the upward draught; this could be rectified, in part, by additional airholes and the use of a damper on the chimney (Hampe, Winter 1962:21; Kelso, Thorley 1943:110; Voyatzoglou 1974:22-23).

The other type of firing structure is the horizontal kiln, known today from Beit Shebab, Lebanon (see Fig. 8). This structure is basically a horizontal cylinder which ends in a vertical chimney. It is the more efficient of the two types for the flue spreads the heat and gases more evenly through the kiln and the draught is easier to control (Hankey 1968:29-30).

The packing of the kiln required special care for there was a variation of at least 100 degrees Celcius (C) in different parts of a small kiln. The kiln was set in a circular fashion with the largest vessels being placed in the outer circles. The pithoi were normally

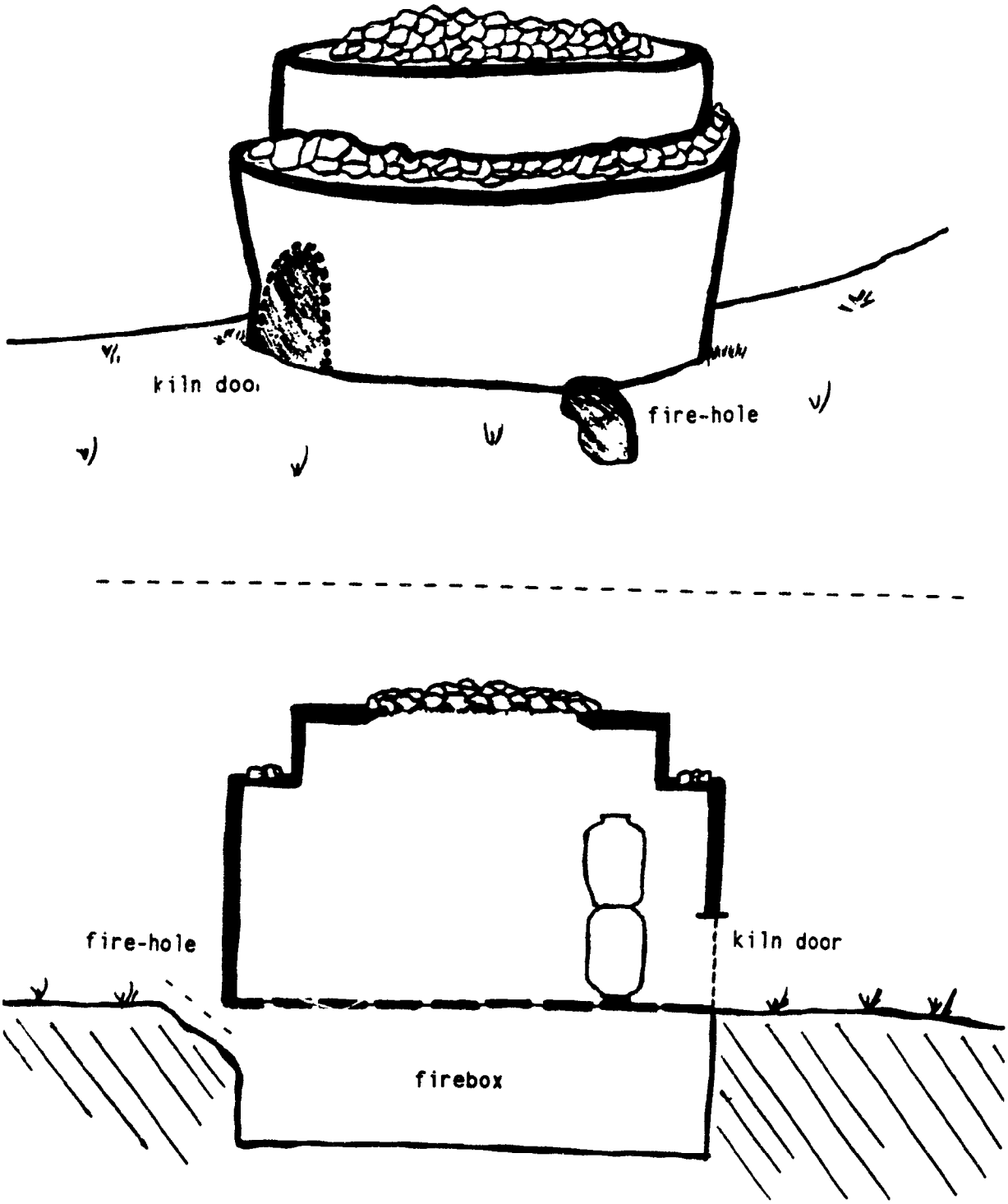


Fig. 7: A typical Eastern Mediterranean updraft kiln with fire-hole (adapted from a photograph in Johnston 1974:103).

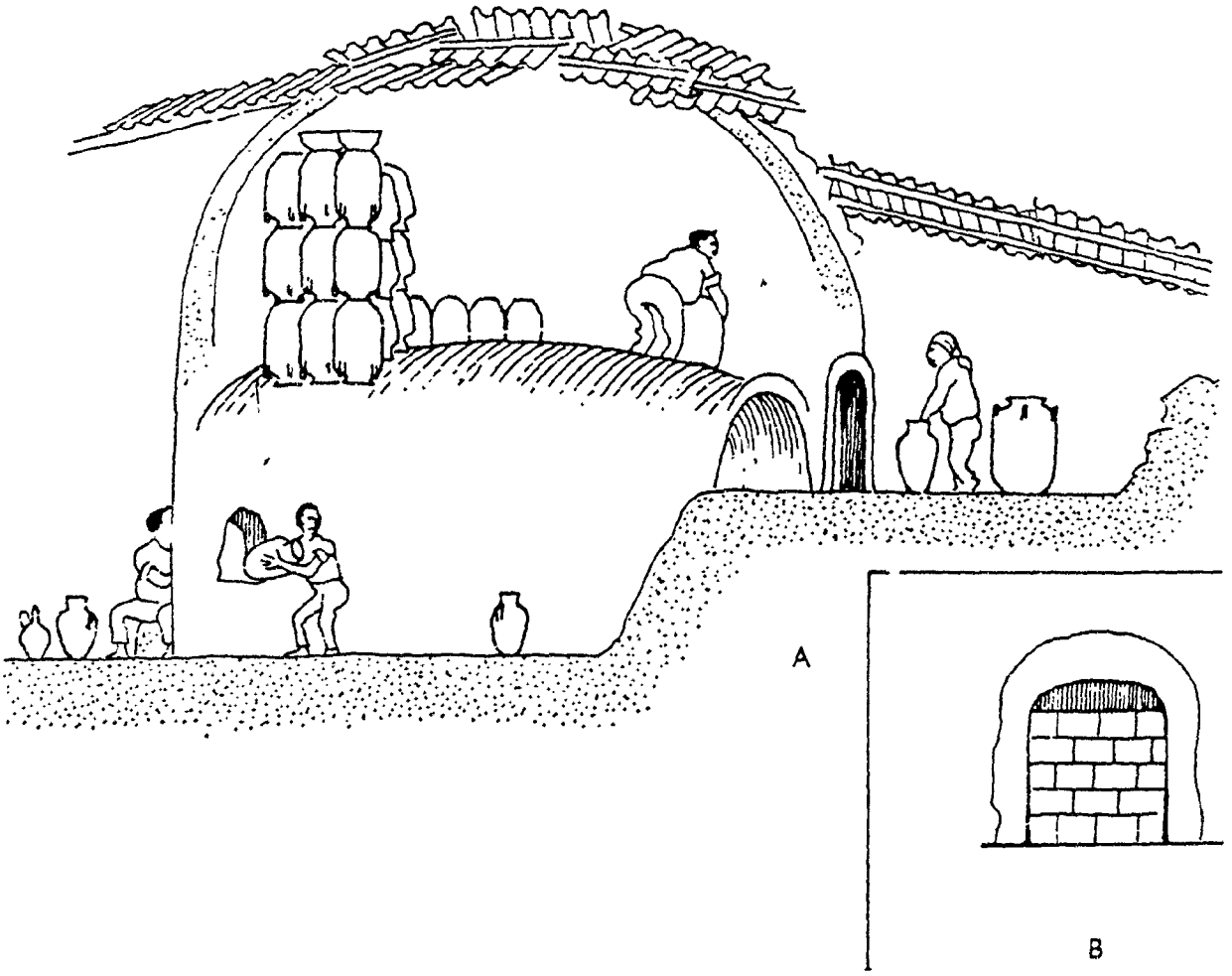


Fig. 8: Drawing in cross-section of a horizontal kiln at Beit-Shebab. Drawing A shows a loading of the kiln through the upper level main loading door, and in the lower level through the firing door. Drawing B illustrates the main loading door bricked up for firing with an exit at the top for smoke (Hankey 1968:31).

placed in two horizontal layers with one placed upright on the base of the vessel beneath. A closely packed kiln, as described above, gave the least variation in temperature for the heat spread from vessel to vessel by conduction rather than by radiation. As soon as the kiln was set, a kiln door, new with each firing, was built up with oblong bricks and mud (Hampe, Winter 1962:36-37; Kelso, Thorley 1943:110; Voyatzoglou 1974:23).

The fuel used for the firing was dependent upon availability. Normally the fire was fed with either desert weeds, scrub such as camel thorn, dried grasses, dung cakes, or, if available, wood (Matson 1965:210).

The kiln man built, with these fuels, a fire relative to the size of the kiln chamber and the vessels being fired. He attempted to bring the heat up evenly to all parts of the structure but, as in the case of the vertical kiln, the greatest heat was usually found near the fire-hole. A good fire passed the vessels through three stages. In the first stage the water should have been driven out of the pot. During the second stage, at temperatures ranging from 750-950 degrees C, dehydration and shrinkage should have begun. The last stage of firing should complete the oxidation of the vessel. Oxidation occurred when the oxygen combined with the sulphur, carbon, iron, and other minerals in the ware-fabric. If vitrification, the stage when the clay melted and fused, occurred before oxidation was complete then the core of the vessel's walls became blackened by the trapped carbon (Joukowsky 1980:367; Kelso, Thorley 1943:110).

Once firing was completed the pithoi were left to cool overnight. The following morning the kiln door was demolished and the pithoi were

removed to a storage area. The vessels sat untouched in storage for a further 24 hours after which time the entire surface of the vessel was wet with a small quantity of water. Following this the pithoi were filled with water and left to stand for one month. In order to complete the manufacture of the pithos a final step, known as slaking, was performed. The water neutralized the pores of the vessel by dissolving the mineral particles that were adhering to it, such as lime, and gradually made the vessel walls increasingly impermeable (Voyatzoglou 1975:23-24).

The potter began with unprepared clay and, as a result of the processes described above, finished with a pithos! Why? For what reason was he commissioned to make such a vessel? The obvious answer, based on archaeological deduction and the unusual size, shape and consequently weight of the vessel, is storage. But what was stored in the vessel? Unless there are trace sediments left clinging to the base or walls of the vessel then archaeological studies alone will not provide the answer. In order to understand even this single facet of a once-living community one must turn to an ethnological system of analogy based on climatic and resource ecological parallels.

Nature, one moment she yields, the next she withholds; her very character encourages man to prepare for an unknown future. What better means of preparing for the days and months ahead than to set aside comestibles and liquids when they are available and plenty. This seemingly simple concept of storage, once understood and practiced, lent itself to the continual growth of sedentary populations.

By implementing an ethnological approach based on present day Mediterranean and Near Eastern village cultures one is able to understand

the likely usages to which pithoi were put in daily domestic and economic life in the past. The relative scarcity of water throughout the Near East makes it a precious commodity worthy of safekeeping. Where there is a nearby perennial source then water, though no less important, becomes a stored convenience. The slight porosity of ceramic pithoi allow for a degree of evaporation which keeps the water cool and pleasant tasting. Other containers such as baskets and gourds were available for storage but, unlike ceramic vessels, these receptacles failed to protect their contents from the encroachment of moisture and rodents.

Several crops played a pivotal role in the domestic and economic life of Eretz Israel, and continue to do so up until the present. Vines and olives are examples of such crops for their by-products of wine and oil, respectively, were much in demand for daily consumption and trade economics. The pithoi provided particular storage care for these valuable liquid commodities which, if need be, could be stored for weeks and months or even longer.

There is a great quantity of information to be gleaned from ethno-archaeological studies in the realm of pottery-making but as modern technology, with all its associated time-saving characteristics, moves into every corner of the world the opportunity to observe village potters at work will soon pass.

The application of an ethno-archaeological approach in this chapter resulted in a proposed model for a pottery workshop involved in the production of pithoi as found in the Eretz Israel of the 2nd and 1st millenniums BCE. A study of the ceramic systems of several present day pre-technical potteries in the Eastern Mediterranean produced this outline

of the probable methodologies employed by the ancient craftsmen of this region in areas ranging from workshop organization to the final steps involved in firing to the bases for product demand.

Ethnological data can complement archaeology by providing living subjects for the testing of hypotheses. Thus a consideration of some of the ceramic products of man in their present ecological context can contribute to a discussion and examination of man's ceramic history as it was influenced by past interactions between the culture and the environment.

CHAPTER FOUR

The Development of the Pithos Within the Context of Judean Ceramics

No other field in the archaeology of Eretz Israel is more able to reflect all the changes in the material culture of this area than the potter's craft. Thus far the geographical and historical backgrounds of the selected sites have been outlined in an attempt to clarify the various social, economic and technological factors pertaining to the Iron Age population of Palestine. Now the focus is directly upon Iron Age pottery assemblages and, in particular, the place of the pithos within the context of Judean ceramics.

Israel's position as a bridge nation between two civilizations, Mesopotamia to the north and Egypt to the south, forestalled any cultural stagnation for the combined influence of the local and international spheres contributed to the development of a unique material culture (see Fig. 1). Ruth Amiran aptly described the factors affecting ancient Eretz Israel when she stated that "this region, more than any other in the Near East, served as a focus where most movements of a cultural, mercantile or political nature met--being alternately a bridge, a goal, and a periphery of the large empires" (1957:187).

A study of Near Eastern pottery reveals that new forms and techniques were often found side by side with traditional styles and methods. If a pottery type is functionally good and is left unchallenged by newly introduced innovations and changed economic factors, though they were contemporaneously revolutionizing other facets of the pottery industry,

Fig. 1: **CHRONOLOGICAL TABLE**

The Neolithic Period (Pottery Neolithic)	6th and 5th mill, B.C.	
The Chalcolithic Period	4th mill. B.C.	Ghassulian and Beer-sheba cultures, beginning of copper use
The Early Bronze I (EB I) Period	3100–2900	Urbanization, trade, culture, religion, art
The Early Bronze II (EB II) Period	2900–2650	
The Early Bronze III (EB II) Period	2650–2350	
The Early Bronze IV (EB IV) Period	2350–2250/2200	
The Middle Bronze I (MB I) Period	2250/2200–2000/1950	Semnomadic
The Middle Bronze II A (MB IIA) Period	2000/1950–1730	Fortified cities, beginning of bronze use
The Middle Bronze II B-C (MB II B–C) Period	1730–1550	
The Late Bronze I (LB I) Period	1550–1400	Egyptian rule in Canaan
The Late Bronze II A (LB IIA) Period	1400–1300	
The Late Bronze II B (LB IIB) Period	1300–1200	Beginning of arrival of tribes of Israel
The Iron I Period	1200–1000	Arrival of sea people (Philistines)
		The Judges
The Iron II A Period	1000–900	United Monarchy
The Iron II B Period	900–800	Division into two kingdoms, Israel, Judah
The Iron II C Period	800–586	Israel from Jehu dynasty to destruction of Samaria
		Judah alone until fall of Jerusalem

(Adapted from Aharoni 1982:XIX and Amiran 1969:12)

then there was no driving force encouraging the planned obsolescence of a particular ceramic type. This character of the pottery industry is demonstrated by the long periods of time in which various types retained primary shapes and by the relative ease with which most forms can be traced through the ages.

When new ceramic elements appear in the archaeological record they may be explained by any number of outside influences. It may simply be the circumstance of a returning potter trader bringing a particular customer request for a feature adaptation from which a new trend is produced, or it may be a foreign tradition introduced with an invading army or a new ethnic group or the potter's inventiveness in solving a technical problem.

Despite the importance of determining why a particular ceramic tradition continues unchanged for centuries, and whether the modification, replacement, abandonment or creation of types finds its basis in changes of local or imported origin, new stress must be placed on the study of assemblages from the viewpoint of the socio-economic and cultural setting of a region.

As W.M. Flinders Petrie wrote in his book Methods and Aims in Archaeology first published in 1904, pottery is the greatest resource of the archaeologist:

> ... for variety of form and texture, for decoration, for rapid change, for its quick fall into oblivion, and for its incomparable abundance, it is in every respect the most important material for study, and it constitutes the essential alphabet of archaeology in every land (1904:15-16).

The following section is a general overview of the introduction and development of various features and innovations characteristic of the

pottery industry of ancient Eretz Israel from the Neolithic Period until the end of the Iron Age (see Fig. 2).

It was during the final stages of the Neolithic Period that pottery made its first appearance in the Near East, but it was not until the further development of settled life in the succeeding Chalcolithic period that pottery became a necessity of household existence. Even during these initial stages of sedentarization man experimented in pottery technology and aesthetics. At this time in history the early potter first utilized a primitive form of the potter's wheel and the first instances of plastic decoration were introduced into the ceramic repertoire (Amiran 1957:193).

During the millennia of the Early Bronze Age several different pottery types were introduced and developed in Palestine as a result of both local initiative and foreign contacts. A notable example of a native product was the ledge-handle, a concept whose popularity soon spread to surrounding regions (Amiran 1957:194).

Early Bronze II, the urbanization stage of the Bronze Age, was noted for the export of Canaanite wares to the 1st Dynasty Egyptian city of Abydos where they found their way into the area's tombs, both common and royal (Aharoni 1982:67).

The outstanding ceramic feature of the Early Bronze III was the introduction of Khirbet Kerak Ware into the region. The makers of this new ware, an ethnic group from mid-eastern Anatolia, practiced their own methods of clay preparation, shaping and finishing alongside the potteries which must already have existed in the country. When the new style ceased to exist, a century or more after its introduction, it had failed to leave any trace upon the local styles of the land which had continued to develop

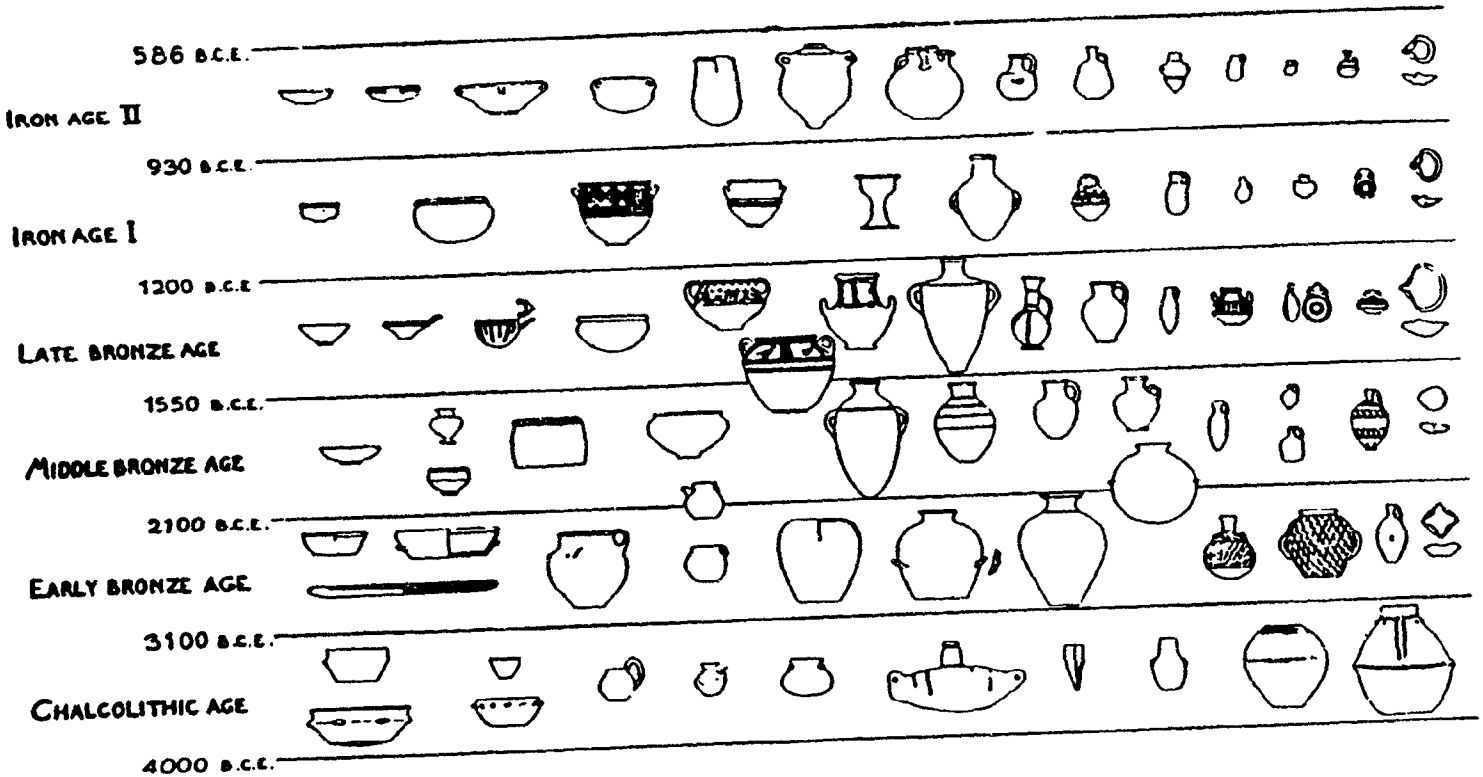


Fig. 2: Chronological chart of characteristics pottery types from the Chalcolithic Period to Iron Age II (adapted from Amiran 1957: 188).

their own traditions, such as that of the ledge-handle, the hole-mouth rim and the practice of combing the surface of a formed vessel (Amiran 1957:194, 199).

Thus the increased use of the wheel in the Early Bronze Age alongside the improved technical quality of the pottery and the use of a proper kiln with a separate combustion chamber resulted in well and evenly fired quality ceramics (Kenyon 1979:108).

A new and different element can be distinguished in the pottery and material culture of the Middle Bronze Age. This break with the earlier culture of the Early Bronze Age is attributed to the arrival of the Amorites. The new pottery assemblage tends toward handleless spherical forms, however, where employed, the handles are of the loop variety. The painted markings of the earlier period also gives way, at this time, to a greater emphasis upon incised designs. During the Middle Bronze II there is yet another radical change in style. The potters and artisans, applying greater aesthetic principles to the final stages of ceramic manufacture, produced the characteristic Tell el Yahudiyeh Ware of the Hyksos and the painted Bi-chrome Ware of Palestine (Amiran 1957:199-200).

Late Bronze Age Palestine had a koine character that was no doubt derived from the trade situation of the age; a time which saw the introduction of products into Eretz Israel from countries throughout the Eastern Mediterranean and the Near East. During this period the craftsmen were inclined to produce traditional shapes but the influx of foreign vessels into the markets of the country contributed to the development of a local richly painted style of ware (Amiran 1957:200).

The phase of history known as the Iron Age is of the greatest

interest here and, in light of the topic of this thesis, will consequently be discussed in the greatest detail.

The closing of the 13th century BCE heralded the collapse of Bronze Age cultures throughout the civilized world with dramatic changes occurring from Hattu through Phoenicia, into the Mediterranean world of the Myceneans, even shattering the isolationist empire of Egypt. Bronze Age Canaan fell, in turn, to the combined effects of Israelite conquest and infiltration, while the southern coastal plain came under the control of the Philistines, the monopolizers of iron in this region (I Sam. 17:7).

After the sharp break between the Early and Middle Bronze Age cultures, the latter developed in a continuous, gradual, and evolutionary manner to the end of the Iron Age, or even later. As seen in the earlier periods continuity does not preclude distinctive changes from taking place at intervals. The new trends may be initiated by any variety of factors from an ethnic movement to political upheavals to trade relations. Thus the new people of the 12th century BCE, the Israelites, introduced some significant changes without drastically disrupting basic elements in the pottery traditions and, in turn, contributed to the development of a new set of ceramic ideas that came to realization in the Iron II period (Amiran 1969:191-192).

During the Iron Age technical progress continued in the areas of wheel use and firing, while the production of Samaria Ware indicates the aesthetic thought and preparation devoted to manufacturing, finish and decoration. This period is also characterized by an abundance of types and of variants within each type, many of which show a predilection for new angular shapes (Chapman 1972:58, 177). The new approach to finish and

decoration sees the application of a slip to large parts of the body or the entire vessel which is then burnished to a high lustre (Amiran 1969:192).

Many developments are due to contacts with neighbouring cultures which served as catalysts introducing change into the local culture. The following is a brief discussion of some of these "instillers of change" whose influence was felt in Eretz Israel.

The influence of Mesopotamia and Egypt continued throughout the Iron Age for Eretz Israel never lost its position as the thoroughfare between continents.

A reciprocal exchange of ceramics occurred between Palestine and Philistia. This is illustrated, in part, in the city of Ashdod. Despite the fact that this enclave of the coastal plain briefly saw an Israelite overlord it was never an Israelite or Judean town; yet typical Philistine craters are found alongside those of the Judean hole-mouth variety (Bachi 1973:39). During the height of Philistine power the cultural superiority of this nation affected the quality of wares in Palestine. However, when her power failed a parallel decline was reflected in the Philistine wares which found their way east. Thus once the political influence of Philistia ceased to be felt her presence in the form of pottery also disappeared form the Palestinian scene (Grant, Wright 1939:127-128, 134).

The existence of close ties amongst the kingdoms of Tyre, Israel and Judah is well illustrated from the Ta'anach. Phoenicia, as a territorial unit, ran from Tartus in the north to just south of Mount Carmel. S.V. Chapman, however, extends the northern border in order to consider the pottery from Al Mina and the few sites south of it as they appear to

belong to the same sphere of material culture as Phoenicia proper (see Fig. 3) (1972:172). The Phoenician Iron Age levels are in many instances divided on approximately the same dating demarcations as Iron Age sites in Eretz Israel and were characterized, in part, by heavy storage jars and the use of bi-chrome decoration. Though the pottery complexes of Phoenicia itself appear to have had a rather limited life, they existed in form for much longer periods of time at non-Phoenician sites ranging from Syria through Palestine and into Egypt in the period of the 8th century BCE (Bikai 1978:47). Examples of Phoenician ware in Eretz Israel have been found in quantity at northern sites such as Hazor, Samaria and Megiddo. Evidence of links with the southern coastal area and Shephelah may be indicated by discoveries at Ashdod and Lachish and by finds in the tombs at Ruqeish and Tell el-Far'ah (S) (Chapman 1972:55-56; Bachi 1973:40). This evidence furthers the conclusions already held that Phoenician trade, in all likelihood, reached Egypt by way of the Palestinian coast (Bachi 1973:40).

The influence of Phoenician ceramics, which in many instances reflect a preoccupation with metal work, may have been incorporated into the angular shapes and several surface features popular in Iron Age Eretz Israel. For instance, the incised lines on the shoulder of Phoenician vessels and many Iron II Judean pithoi may copy a metal decoration, while a ridge at the base of the neck may be in imitation of a metal join (Chapman 1972:181).

Trade contacts with Cyprus, established early in the history of Eretz Israel, continued into the Iron Age and, in addition to Cypriot wares, provided another source of entry for Phoenician goods into Palestine.

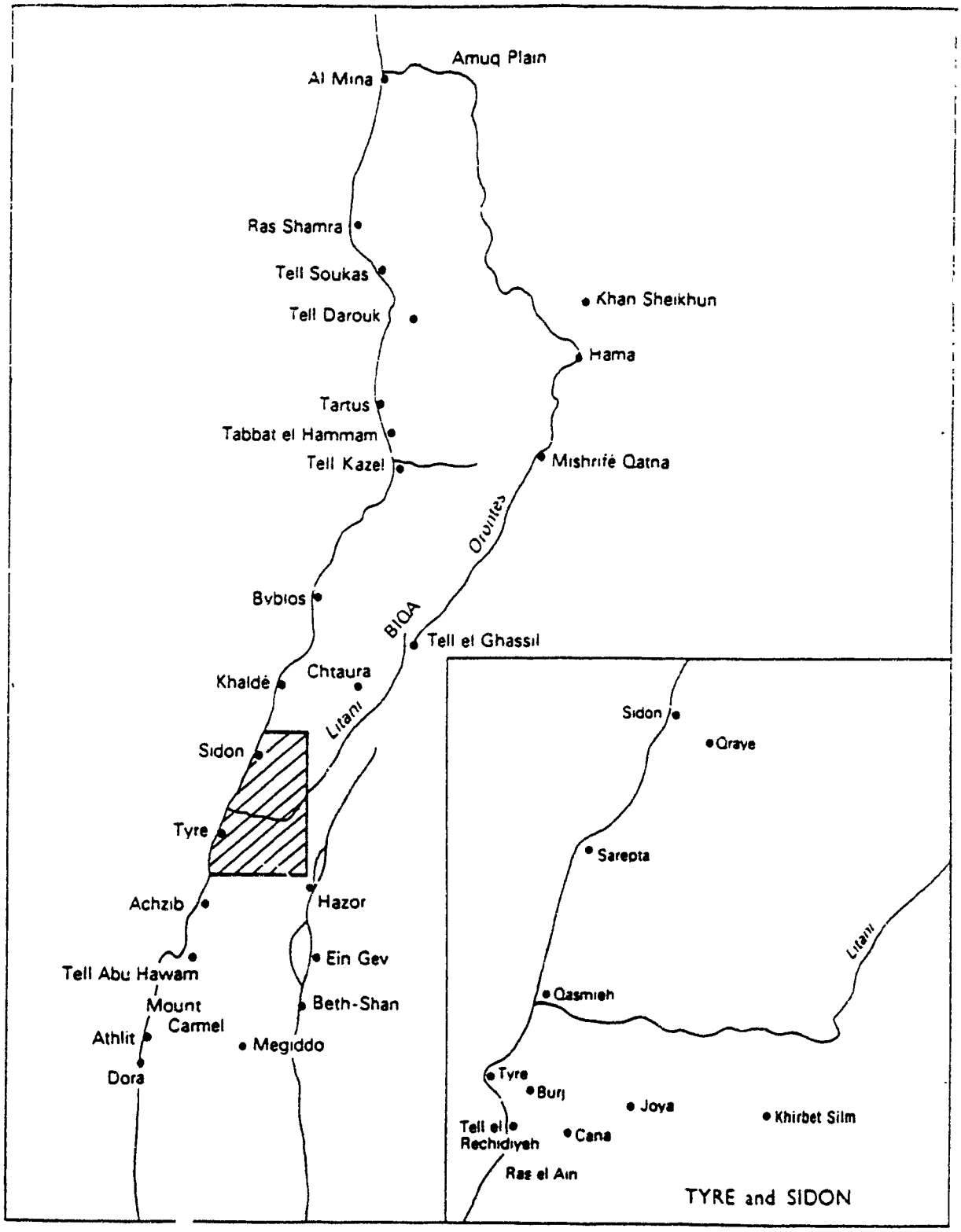


Fig. 3: Phoenicia and neighbouring sites (Chapman 1972:56).

Both religious and philological evidence indicate that a Phoenician settlement had been established on the island of Cyprus during the Iron Age (Chapman 1972:177).

The preponderance of new shapes introduced during the Iron Age were the result of adaptations and innovations made by the Israelites, a new ethnic group, whose presence is revealed to us by various biblical and archaeological sources. Though new trends were introduced, the Israelites furthered the evolution of Late Bronze Age Canaanite elements and amalgamated into the growing ceramic tradition various Cypriot, Egyptian, Phoenician, Philistine, and, in time, Assyrian components.

The overriding conception is that there are two main "shifts" from phase to phase in the cultural history of the country during the Iron Age. Further, many scholars employ a chronological system according to which the development of the Iron II is subdivided into three main periods. The small states of the region practiced close interrelations in many aspects of material life and this is reflected in local cultural development throughout the regions during the Iron Age. As mentioned above, there was a certain amount of stimulus and influence absorbed from without but, to the credit of the Israelites, the exchange of ideas was of a reciprocal nature.

After the Settlement Period of Iron I the first "shift" occurred about 1000 BCE with the consolidation of the country under the Davidic and Solomonic Monarchies. This phase showed a formating of Israelite life both politically and economically and included the increasing decline of Philistine influence. In the material culture the appearance, at this time, of a more angularly shaped pottery style created the impression of

stability in the ceramic assemblage. As stated by R. Amiran, "this pottery needn't be seen as a degeneration in comparison to the Canaanite pottery but rather a new approach to aesthetic values" (1957:205). This view, however, is in complete opposition to the overly critical view of K.M. Kenyon who interprets "the development of pottery types as being distinguished by an increasing lack of artistic taste which moved continually in the direction of dullness and mass production being, in fact, ugly and uninteresting". Kenyon concedes, however, that "technically it was quite well made" (1979:298).

Iron II was born out of the breakdown of the United Monarchy in the 10th century BCE, signalling even greater differentiations between the material and spiritual cultures of Israel in the north and Judah in the south. The second cultural "shift" in the material history occurred sometime in the mid-9th century BCE and was marked by the first political declines of the separated kingdoms. Notable changes were felt as a result of the lessening of Phoenician influence in Judah, its contemporaneous increased presence in Israel to the north, and the subsequent strengthening of Assyrian and later Babylonian positions in the area (Amiran 1957:206).

During the 8th century BCE, in the face of Assyrian expansionist policies, vessels of a strikingly different nature, distinct from local wares, were to be found in the north of the country; having been first identified by Petrie as Assyrian wares. The pottery first begins to appear after the Assyrian conquest of Samaria in 721 BCE, commercial relations between the two kingdoms of Eretz Israel and Assyria were one of the consequences of this foreign occupation. However, as noted earlier,

commercial relations are never one-sided and this instance was no different, Palestinian pottery having been found in the strata of 7th century BCE Nimrud (Amiran 1969:291).

Ceramically the years of the Iron Age showed a continual development in pottery styles and fashions. Great differences can be seen between the pottery of the 11th and 10th centuries BCE when the first cultural "shift" occurred. The latter half of the 9th century BCE produced the second "change" within the ceramic assemblages of the Iron Age, but even the new types can be detected in the preceding phase where random samples foreshadowed the fully developed forms to follow. During the Iron Age the potter progressed in efficiency of production and maintained a standard of ware quality with regard to shape, decoration and other techniques. Included in the Iron Age pottery repertoire of the craftsman were a rich variety of store jars and pithoi. The later years of Iron II can be seen as a period of stabilization in the material culture followed, in the end, by a decline (Aharoni, Amiran 1958:184).

From the middle of the 6th century BCE and onwards the successive occupiers of Eretz Israel, variously Persian, Hellenistic, Roman, and Byzantine rules, turned increasingly to the West for cultural contacts and influences (Amiran 1957:206).

Before taking a detailed look at the evolution of the pithos it is necessary to set out for the reader those features which are particular to pithoi. While the presence or absence of a neck, various body shapes, decoration and ware quality could vary with periods in history, regions or even sites within a defined area, other features are standard such as proposed functions, height, and wall thickness.

A distinguishing characteristic of pithoi is their function; they were used solely for storage purposes as their size and weight precluded any other usage. Variety of function came from the various products, liquid or solid, which were stored in the pithoi. Early in history they became common yet essential household features which were designed, because of their unstable bases, to be set partly into the ground normally in the house or a corner of the courtyard. Value was placed upon these vessels both for the purpose they served and, no doubt, for the expense and difficulty of replacement. If there was no local workshop then the customer would be obliged to import one of the unwieldy vessels or wait for and then commission a seasonal travelling potter. The value of the pithos is illustrated by an early example from Aglioskosmas, Cyprus which, when discovered, was found to have been patched with lead clamps (Wiencke 1970:104).

Storage jars, on the other hand, were constructed on a much smaller scale than pithoi. They were also used to store and preserve goods for household use but, unlike the pithos, one of their main functions lay in the realm of trade and commerce. In commercial ventures between regions and lands the vessel of choice to transport products such as wine and oil was, without question, the smaller and more convenient storage jar.

A physical criterion for distinguishing between large storage jars and pithoi is height. J.C. Wampler, one of the excavators of Tell en-Nasbeh, set a minimum height for pithoi of 75.0 cm (1947:3). On the basis of the material studied for this thesis, however, a minimum height of 90.0 cm, with a few exceptions on the lower side, appears more appropriate in relation to its function as a permanent storage vessel and

also as a means of distinguishing it from storage jars.

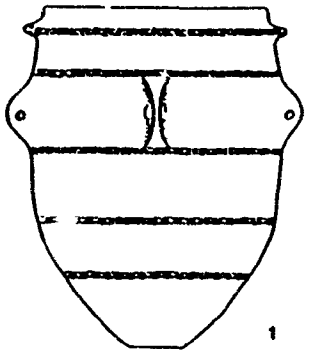
A final criterion was based on the need for sufficient wall strength. It appears, on the basis of the pithoi analyzed for this study, that a minimum wall thickness of no less than 1.0 cm is required in order to provide sufficient wall strength for the vessel and its contents.

A category of anomalous jars is also included in this study; see Plate 9. On the basis of function these vessels were designated by their excavators as pithoi. The examples studied were found to range between 40.0 to 69.0 cm in height and to be characterized by an inverted hole-mouth rim, four handles, and a ring base. For a more detailed analysis of these anomalous pithoi see pages 171-172 in Chapter Six.

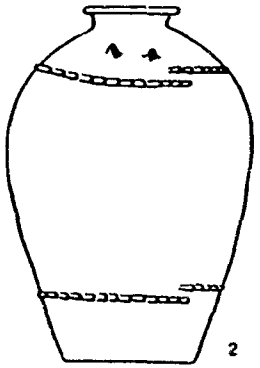
Through a compilation of the available data, this last section of the chapter will present an overview of the evolution of the pithos in Eretz Israel; the emphasis being placed upon those pithoi which are particular to Iron Age Judah (see Fig. 4).

It was the Ghassulian Culture of the Chalcolithic period that first introduced the pithos into the ceramic assemblage of Eretz Israel (Fig. 4:1). Pithoi have been manufactured in essentially the same manner, until present times, being built up by hand with coils or bands. The plastic decoration popular at this time imitated the ropes that were used to bind and support the vessel during drying (Amiran 1969:25).

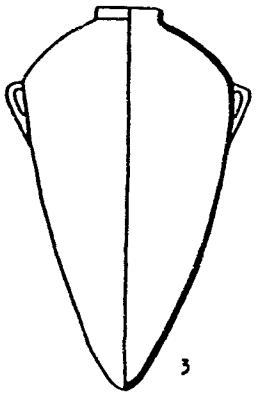
The vessels of the Early Bronze Age continue the traditions of the Chalcolithic Period particularly in the use of rope decoration (Fig. 4:2). At this stage the vessels were being formed with short everted necks and profiled rims. Painting became popular at this time and the manner in which a pithos was decorated indicated whether it belonged to the northern



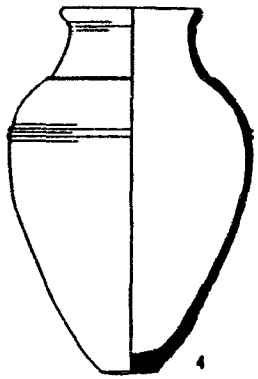
Chalolithic



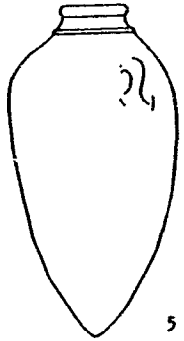
EBA

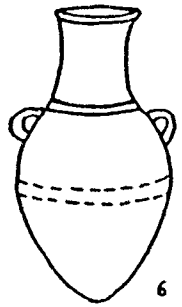


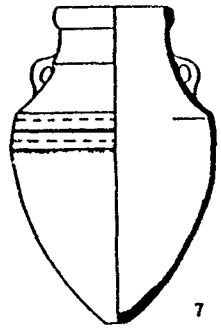
MBA



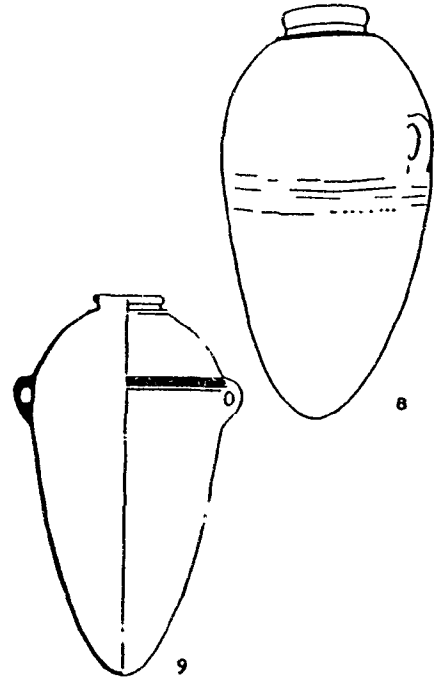
LBA



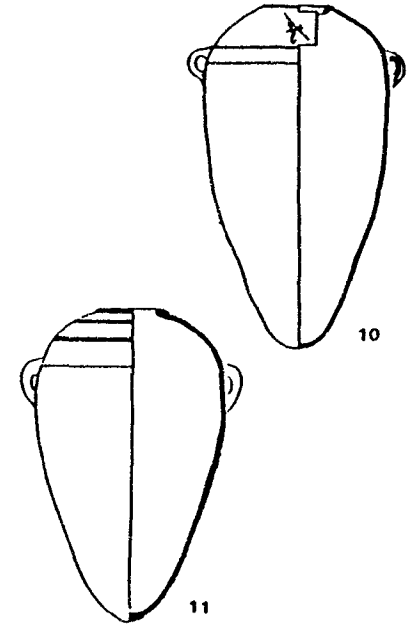




Iron Age I: Israel



Iron Age I: Judea and Transjordan



Iron Age II: Judea

PITHOI

1. Chalcolithic from Ghassul (Amiran 1969:27)
2. EBA from Ras el-'Ain (Amiran 1969:57)
3. MBA from Far'ah (N) (Amiran 1969:105)
4. LBA from Hazor (Amiran 1969:145)
5. IA I from Megiddo (Amiran 1969:255)
6. IA I from Dan (Finkelstein 1988:102)
7. IA I from Tuleil (Aharoni 1976:175)
8. IA I from Bethel (Amiran 1969:235)
9. IA I from Sahab (Ibrahim 1978:116)
10. IA II from 'Ira (Beit Arieh, unpublished)
11. IA II from Nasbeh (Wampler 1947: Plate 4)

Fig. 4: Pithoi characteristic of Eretz Israel from the Chalcolithic to Iron Age II

or southern traditions of the Early Bronze Age (Amiran 1969:55).

One of the characteristics of Middle Bronze II was its large well-proportioned vessels (Fig. 4:3). A typical feature was the ovoid body with walls of uniform thickness from rim to base. The rims are largely of the profiled style, though plain rims occurred, and many of the flared-rim variety had necks which were collared by a band placed at the joint between neck and shoulder (Amiran 1969:103). The latter feature foreshadows a standard Iron I trait of the collared-rim pithos.

The Late Bronze Age pithos of the north was characterized by several features in addition to size; the body gradually tapered to a small flattened base, the rim was often profiled, and two ridges, perhaps serving to strengthen junctions, were found at the base of the neck and at the junction of body and shoulder (Fig. 4:4). During the Late Bronze Age the coiling method of manufacture was accompanied by use of the slow wheel; the tournette was used to make separate parts of the vessel such as the neck or base, and also for turning the vessel. The ridges, mentioned above, were occasionally decorated with incisions in order to create the still popular rope design (Amiran 1969:143). The Late Bronze Age pithos was the prototype form for the Iron I Galilean pithos depicted in figure 4:7. The other northern Iron I type, the Tyrian pithos (Fig. 4:6) was, as the name indicates, influenced by Phoenician trends. Archaeologists have not yet discovered a prototype southern pithos for the Late Bronze Age.

The northern Iron I forms show many features of the Late Bronze Age types, but innovations are evident. The shoulder is now concave instead of rounded and the vessel has two handles, a feature largely unknown in Canaanite pithoi (Amiran 1969:143). Other forms still have the high neck

but it is now much narrower, while the large body has become egg-shaped or elliptical and the ridge which once separated the shoulder from the rest of the body has now disappeared. Other pithoi, such as the example from Megiddo seen in Fig. 4:5, show even further development and have taken on the form known as the "collared-rim" pithos, a phrase first coined by W.F. Albright in the 1920's (Amiran 1969:232).

During the Iron I period there were, for the most part, striking differences between the ceramic assemblages of the coastal plain, the Shephelah, and the northern valleys on the one hand, and the interior hill regions of the country on the other; the causes of these regional differences being environmental, social, economic, political and cultural. I. Finkelstein of Bar Ilan University, Tel Aviv, is a strong proponent of regionalism and feels that it had a shaping effect on Iron I ceramics. Assemblages from Israelite Settlement sites in different sectors of the country reveal their local character through vessel shapes and, on occasion, by the limitations of the repertoire. To illustrate this Finkelstein notes that the pithoi of the Upper Galilee, the Galilean and Tyrian types, were different in form from those of the Central Hill Country, and that these variations arose from the influence of local ceramic traditions in each region (1988:271). Explanations as to why neither of the Galilean types appear south of the Jezreel Valley, and an accounting for the absence of a Late Bronze Age Canaanite prototype in the south both need examination. Through a look at the north and its history the answers may be uncovered but such an analysis is not within the scope of this study.

The reasons underlying the specific character of the pottery of the

Settlement sites can be sought in the social, economic and political background of the Israelite settlers. They were small isolated groups who settled in relatively inhospitable areas. Their meagre resources combined with no established ceramic tradition all led to a situation where only the most basic and necessary types of pottery, pithoi and cooking pots, were made and used (Finkelstein 1988:274).

Gibeah was the site where Albright first identified the collared-rim pithos; after correlating the available data he concluded that "it was a 'type fossil' of great importance for Israelite chronology in the time of the Judges and United Monarchy as it was found all over the hill country of the 12th and 11th centuries BCE but went out of use between 1050 and 1025 BCE following the Philistine destruction of Shiloh" (Sinclair 1960:18).

The collared-rim pithos type, as depicted in Fig. 4:8-9, could reach a height of up to 120.0 cm and was generally ovoid in shape with a rounded base. Its two loop handles were attached vertically above the middle of the body and joined again at the shoulder. The neck was short and ended with an everted rim which in many cases was folded outwards to create a wide variety of shapes and as a result identical rims are rarely encountered. A plastic ridge, the collar, was applied to the transition between neck and shoulder and though this ridge is typical it was not necessarily present on all examples. The connection between the neck and shoulder can be easily observed on the inside of the pithos, thus the collar was probably intended to strengthen and camouflage the connection from the outside. Grooves generally found on the angle between the wide and slightly convex shoulder and the body indicate that the two parts were

made separately (Ibrahim 1978:117; Mazar 1981a:27-28).

The various excavators of Gibeah, Bethel, Ai, and Ta'anach felt they had distinguished distinct types of collared-rim pithoi within the phases of Iron I but the excavations at Giloh, 'Izbet Sartah, Mount Ebal and Shiloh have since shown that there are no grounds for a clear-cut chronological ordering of subtypes (Finkelstein 1988:276).

Presently, the earliest known example of a collared-rim pithos was found in the destruction level of the Egypto-Canaanite governor's residency at Aphek, a building that was destroyed in the second half or at the end of the 13th century BCE. Sherds have also been unearthed in the transitional Late Bronze Age/Iron I levels at Megiddo and Tell Keisan however, on the basis of other pottery finds, both strata should seemingly be dated to the early 12th century BCE. Though the collared-rim pithos peaked in usage during the 12-11th centuries BCE there have been some examples found in 10th century strata: Ta'anach IIB, Megiddo VB, Tell Qasile X-IX, and 'Izbet Sartah I. This may be explained on the basis of function; because these huge vessels were placed upright and left stationary they were likely to remain in use for long periods of time, even though manufacture of a particular style had since ceased (Finkelstein 1988:280-281).

Distribution is an important issue which has repercussions for the questions of source, use and ethnic affiliation. Collared-rim pithoi have been found ranging from the desert fringe of the Transjordan west to the Mediterranean, south to the Hebron Hills and northward into the Lower Galilee. Within the Transjordan they are known from Khirbet Abu-Banna in the south to the Yarmuk River in the north. In the north of Israel they

were utilized as far north as the Jezreel Valley but are unknown in the Upper Galilee except for a variant type found at Tel Dan. Their popularity did not spread to the Negev, with the exception of an example from Tel Masos (Pt. 1:6), and they are not found west of Tell Beit Mirsim and 'Ain Shems (Ibrahim 1978:121-122; Finkelstein 1988:281-282; Mazar 1981a:28-29). The Iron I pithoi included in this study are found on Plates 1 and 19. The Transitional period pithoi are located on Plates 2-4 and 20.

The origin of these pithoi is a problem. A possible connection may be seen between the collared-rim pithoi and the Middle Bronze IIB-C pithoi from sites in the hill country. These vessels, though from two distinct historical periods, are of similar size and shape. Further some discoveries have been made of Middle Bronze pithoi with thickened rims and a ridge on the shoulder, although the latter was less pronounced than the ridge found on Iron I vessels. In this context it should be noted that many of the sites occupied by the Israelites in the Iron I had been previously settled in the Middle Bronze Age. Thus the Israelites may have copied some of the Middle Bronze Age traditions from sherds scattered over the site or may even have reused jars found intact (Finkelstein 1988:283-284).

In relation to the data available on the topic of Iron I pithoi in Judah, comparatively little has been written about pithoi characteristic of Iron II. It may be assumed that as time passed and the Israelites became more entrenched in the land and continued to foment ties with other regions, that the economic situation improved. Consequently, a broader social framework evolved which resulted in material culture changes which

were reflected by a greater variety of forms in the ceramic repertoire. Thus it follows that the Iron II ceramic industry was much more eclectic than that found in Iron I. Surveys of the Iron II sites reveal that there were a greater variety of types but that the vessels within each type were remarkably uniform.

At the end of the 11th century BCE the production of collared-rim pithoi was discontinued and a vessel of the hole-mouth variety was introduced onto the marketplace in, for instance, Gibeah (Aharoni 1982:176). Another type was noted by Grant and Wright in the pottery assemblage of 11th-10th century BCE 'Ain Shems where the rim was characterized by a deep outer groove which appears to have taken the place of the collar feature (1939:143-144). Another, and later, example found at the Gibeah of 1025-950 BCE marked the point at which the thickened and rounded rims began to slope to the shoulder with little or no neck. Similar rims of this type are published from 'Afula IIIA and Hazor XI but these, as well as an early 10th century BCE pithos from Ta'anach, may have had residual necks. A sherd from 10th century BCE Samaria, however, belonged to a vessel with no neck. It appears that these examples may be the antecedents of the "neckless" pithoi of the late Iron II, but the differences are still great and a solid line of development has yet to be positively drawn (Lapp 1981:80).

In the 8th and following centuries BCE the neckless vessels are found in profusion (Fig. 4:10-11). They were characterized by two proportionately small vertical loop handles which were placed near the shoulder on the upper and widest part of the vessel. Further, the body had been formed into an ovoid or pyriform shape which tapered down to a

rounded or pointed base. The majority of these vessels also had a groove or ridge marked 3.0 to 5.0 cm down the shoulder. The rims, as in the earlier phase of the Iron Age, were of many and various styles with profiled, plain, and flaring variations to name a few. But, unlike the Iron I types, the rims of the late Iron II were of a variety which, though variously modeled, did not interrupt the shoulder contour (Wampler 1947:3-4; Sellers 1968:58-59). There is no question that the hole-mouth variety became the class of pithos, or zir as they are known in Arabic, which most characterized the Judah of Iron Age II. The Iron II pithoi are found on Plates 4-17 and 21-22.

Along with the pithoi there are two installations, the cistern and silo, which were used commonly throughout Judah. While most sites in the land have produced a supply of storage jars of all sizes, it is one particular type, the pithos, which is of interest here. In both the presence and absence of cisterns and silos pithoi played an essential function in the storage of such products as oil, wine and water and comestibles such as grain, lentils, pressed figs and so on thus servicing domestic, industrial, economic and, in some cases, military life.

The next section will outline the types of storage facilities utilized by the Israelites aside from, though often in conjunction with, the ceramic vessel known as the pithos. The various means of storage employed by the Israelites will be outlined in regard to features of size, construction and usage. Further, the role of the cistern in relation to the process of Israelite Settlement and expansion will also be briefly described.

Storage Facilities

Through agriculture the Israelites created an economic base from which they were able to conquer the land; consequently agriculture became a dominant factor in Israelite daily life.

In order to establish and maintain a presence in Eretz Israel, the Israelites introduced several innovative agricultural practices: terracing, runoff farming, and the introduction of iron tools. Once implemented and employed these new methods contributed to the creation of agricultural surpluses which, in turn, led to the introduction of new types of storage facilities (Borowski 1987:6). These facilities were constructed in order to store and protect foodstuffs from spoilage through dampness, insects or rodents. A variety of methods was employed both by private individuals and by social organizations and are reflective, in part, of the development of a structured society. Grains, for instance, could be stored in bulk or in sealed jars or pithoi in any of several types of storage constructions.

O. Borowski has categorized storage facilities according to a variety of criteria: method of construction; method of storage; and inferred ownership. These divisions led to further classification: subterranean versus above-ground installations; storage in bulk versus storage in containers; and private (individual or family) versus public (state or temple) ownership or administration (1987:71).

There are three types of subterranean facilities: grain-pits; silos; and cellars.

A grain-pit is best defined as a small stone-lined or plastered pit used for the storage of grain in bulk and is located close to domestic

areas or dwellings (Borowski 1987:72).

The silo appears to have been a very common means of storage and is primarily differentiated from the pit on the basis of size. This construction was a large stone-lined or plastered pit where grain was stored in bulk but, unlike the pit, the silo is located in close relationship to public areas or structures (see Fig. 5) (Borowski 1987:72).

The Iron I site of 'Izbet Sartah is calculated to house as many as 110 silos, of which 43 have been excavated. Their diameters vary between 1.0 and 2.0 meters and their circumferences are generally round or elliptical in shape. They have an average volume of 1.4 cubic metres. The actual size and shape of the silos varied as they were dependent upon local conditions and the needs of the community. Silos were excavated in the earthen accumulation of a site but if the soil deposits were inadequate they would be excavated from the living rock. The general absence of ceramic vessels in the silos and pits, exceptions being at Dan and Aphek, would seem to indicate that, as mentioned above, the grain was typically stored in bulk either loose or in sacks in order to take full advantage of the silo's capacity (Finkelstein 1988:265-269). Provided that the silos were tightly sealed, carbon dioxide would have formed and, to a degree, repelled pests. Further, G.W. Dimbleby notes that another means of reducing spoilage was to heat the grain to be stored to a high temperature, a practice which would to a large extent prevent germination during storage (1967:83-84).

The other type of subterranean facility was the cellar, a normally unlined pit which was used for the storage of goods in containers, such as

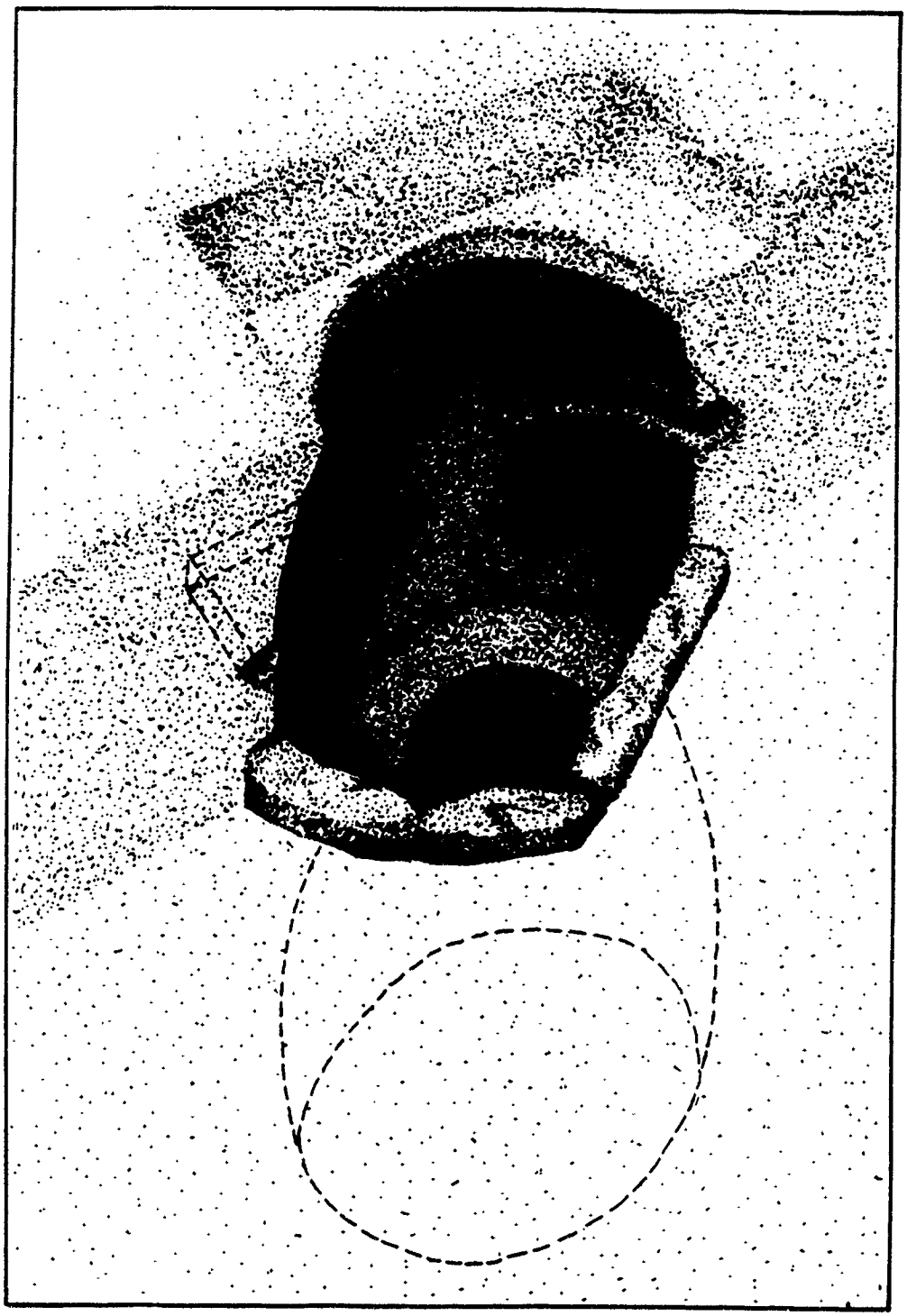


Fig. 5: Section and isometric drawing of an Iron Age silo (Lapp 1981:60).

grain, wine and oil (Borowski 1987:72). According to excavation reports the containers predominantly employed for storage were large jars or pithoi. These vessels were needed in both a domestic and industrial context. An instance of the latter use was revealed, for one, at Gibeon.

The cuttings found at Gibeon lacked a waterproofing plaster which led to the conclusion that they were cellars in which vessels filled with wine or oil were stored. Several considerations led the site's excavator, J.B. Pritchard, to the conclusion that wine was the stored commodity. In the winery of the Trappist Monastery at Latrun, 16 km to the west of Gibeon, wine is today stored in rock-cut cellars for they provide a constant temperature of about 18.5 degrees C, a necessary factor in wine production. It was suggested to Pritchard by the chief wine-maker at Latrun that perhaps olive oil had been floated over the top of the wine in order to keep out air and bacteria which would have turned the wine into vinegar; on site experiments verified the truth of these statements. Once the jars had been placed in the cellars and the opening covered with a stone slab or a bevelled stopper the temperature inside the cellar, as mentioned, was kept relatively constant (Pritchard 1961:95; 1964:25-26).

Studies have shown that a proliferation of silos generally characterizes groups in the process of sedentarization, an example being newly sedentarized Bedouin at the edge of the Judean Desert and in the Negev. The first act in such a transition, from nomad to farmer, appears to be the construction of subterranean storage units for grain and fodder (Finkelstein 1988:266). On the other hand, once concerted urbanization sets in or the unit comes under the control of a centralized power better storage facilities are needed in order to accommodate the growing

population and trade contacts. Once a settlement reaches this stage the small silos are rarely encountered and, instead, large central storehouses are seen to have been established, such as those of the Monarchial period in Eretz Israel. The silos of the later periods are built on a much larger scale as, for instance, the huge stone-lined silo at Megiddo which held a volume of approximately 450 cubic metres. The capacity of the Megiddo silo was three times more than all the silos (110) of 'Izbet Sartah combined (Finkelstein 1988:266).

Borowski proposes four types of above-ground facilities: granaries, storehouses, public storerooms, and private storerooms (1987:72).

Though sometimes of a semisubterranean construction the granary falls into the category of above-ground facilities. Grain was stored in these buildings mostly in bulk. The structure was located primarily in or near a public area.

The storehouse was a freestanding building in a public area. It held, in containers, produce and products such as grain, wine and oil.

The public storeroom was a room in a public building where grain and other foodstuffs were stored in containers.

The last type is the private storeroom which could be found in either an exterior or interior room of a private dwelling; the grain and other products would have been stored in containers.

The use of the plastered pit or silo appears to have been a factor which enabled the Israelites in the 11th century BCE to move into the mountain areas, establish farms and practice horticulture, thus slowly disengaging themselves from any form of dependency on the Canaanite settlements.

The surpluses which resulted from improved farming methodology needed to be placed in storage facilities for times of future need and for trade purposes. The latter aspect would have enabled the settlers to exchange their surplus products for those which were not available in the area or for those cultigens not produced in sufficient yields.

The organized and growing societies needed maintaining and after the establishment of the monarchy the smaller storage units did not suffice and larger administered units had to be planned. The large storage facilities of Iron II, which were primarily above-ground structures, employed ceramic storage containers such as pithoi as opposed to the earlier practice of storage in bulk. These larger constructions provided for growing populations and stationed garrisons during times of peace and unrest and also enabled the large-scale storage of trade goods and other needed supplies.

Cistern construction was a practice which flourished during the Iron Age and, like storage facilities, also contributed to the growth and expansion of the Israelite population into areas that had never before been widely settled.

Cisterns

During the Settlement Period the Israelite population increased rapidly in the hills. This was due, in part, to the construction of cisterns. These installations differed from other storage units in their one or more layers of waterproofing. The lime plaster improved the retention capabilities of the cisterns, as opposed to the earlier use of limy marl or raw-lime as plaster and, consequently, the Israelites were

able to settle in areas which relied solely on rainfall for water. The earlier and coexisting Canaanite populations, on the other hand, had, for the most part, restricted their occupations to sites near springs or perennial streams (Albright 1954:113).

Water is a crucial necessity of daily life in the Middle East and particularly so in the fringe and desert areas. The development and spread of cistern usage thus enabled the occupation of these fringe areas in the period of the Monarchy and later. An example of the employment of a cistern system was discovered at Iron Age Arad (Stratum X), a site in the northern Negev whose only source of water was direct rainfall and runoff from flooding. A water tunnel was discovered hewn into the rock to a depth of more than 2 meters and covered with stone slabs. Excavation revealed that the tunnel eventually led into large plastered cisterns which had been cut into the rock beneath the buildings of the citadel. The tunnel mouth was, however, too high to have allowed water to have been admitted by gravity. As a result of the height of the tunnel mouth, it would seem that water was drawn from cisterns which had been placed at regular intervals within a widespread and well-planned network. On a regular basis carriers would transfer water from the regional network of cisterns into the tunnel at its outer perimeter and from there it would flow into the citadel cisterns (Aharoni 1968:6).

Excavation reveals that by the 9th century BCE the majority of houses had their own cisterns, where winter rains were stored for usage throughout the year. By this time greater attention was paid to cleanliness and sanitation, consequently, cisterns were not only numerous, they were also provided with settling basins. The cisterns now also

caught the relatively pure water from rooftops rather than the flow from the city streets and the courtyards of the houses (Albright 1954:210).

Geological and geographical studies of Eretz Israel have led to the conclusion that, because of the environments associated with this land, agriculture became the mainstay of the Israelite economy. Archaeology, biblical and extra-biblical documents and palaeobotanical studies have together shown that the Israelites were versatile agriculturalists, including the practice of pastoralism. Once the sedentarized Israelites began practicing methods of land reclamation and replenishment large surpluses resulted which increased self-sufficiency and trade options. Initially crop surpluses had been satisfactorily stored in pits and silos; later, however, the much larger surpluses led to the introduction of new and innovative types of above-ground facilities. Thus the introduction and implementation of new farming techniques and tools, the construction of storage facilities and the excavation of cisterns led, in the Iron Age, to an unprecedented expansion and growth of the Israelite population into all regions of Eretz Israel.

The next chapter of the thesis analyzes the clustering tendencies of the collected sample through factor analysis. This will provide a quantitative analysis of the trends existing within the chosen sample of 224 Iron Age Judean pithoi from nineteen sites in four geographical zones.

CHAPTER FIVE

Statistical Analysis of a Sample of Iron Age I and II Judean Pithoi

Factor analysis provides a means of deriving types of pithoi from a large sample by analyzing the clustering tendencies of the variables. In order to best understand the proposed types and their associated features this chapter has been divided into a number of sections. The first section sets forth the chosen variables and the reason for their inclusion. It also outlines those attributes that, while not included in the program, must be understood as present, such as height, various body diameters, wall thickness and body shapes, to name a few. A brief overview of factor analysis provides the computer-literate reader with an outline of the statistical program employed in this study along with various statistical results. Following this the principal variables that were factored out in order to realize the various predominant features of the pithos types are set forth in chart form and their contents briefly analyzed in order to provide an easily accessible and understood verbal translation of the statistical data. The final chapter of the thesis will set forth those pithos types and subtypes which were drawn from the sample as a whole, including plates to illustrate the designated types and also those examples which did not fall into a particular type.

In order to utilize computer based-analysis the researcher must initially define the labelling or classification system chosen to categorize the compiled data. This system must incorporate both spatial information and the data pertaining directly to the artifact or, in this

case, vessel or sherd. The next step, in conjunction with a systems analyst is to develop or choose a means of analysis, in this instance factor analysis, through which each attribute (16) or variable can be analyzed in relation to all the collected data. During the next phase, on the basis of the type of results that the researcher requires, the edits and calculations are performed on the data base. It is these calculations which indicated if a group of artifacts have a common and unique combination of attributes which, through statistics and observation, are seen to be classified in a non-random manner. The homogeneous group which has been produced is considered a type within a class (Joukowsky 1980:280-281; 299-301).

Once the artifacts have been categorized the time/space distribution of the type can be analyzed. If a study of the output indicates types which are closely related one may be seen to have developed from the other and may provide the key for seriation. As outlined by M. Joukowsky this comparison may explain attribute and therefore artifact changes by indicating functional improvement, a decline in usage, or a change in the method of manufacture. However, nothing follows a simple path of progression and one must expect contrasts and overlaps (1980:281).

The original sample included 245 examples or rows which were originally analyzed by 28 variables. The choice of factor analysis as a means of statistical study required a re-evaluation of the data for the number of missing values, also referred to as unknowns, had to be minimized in order to achieve viable results. The original sample

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(16) "An attribute is a recognizable feature, an independent variation in any of the elements of which artifacts are composed." (Joukowsky 1980:280).

included examples of pithoi and variables which produced strongly skewed output as a result of a large number of missing values. These missing values were either the result of a poor state of individual sample preservation or a consequence of a lack of consistency or clarification in the excavation reports. Once the sources of the missing values were deleted a final sample size of 224 pithoi analyzed by 13 variables was created. All of the pithoi included in the refined study sample will be classed according to a proposed typology and included on plates at the end of Chapter Six.

> Let us admit that the senses are not trustworthy since objects appear of different sizes and shapes to different people, and are perceived variously by the same person as he changes his position; since what is brown to one man is red to another, and without hue to the colour-blind; since the identical surface will feel coarse or smooth, warm or cold, depending on the sensitivity of the hand that comes into contact with it (Steinberg 1939:460-461).

In general the basis of this paragraph must be considered as a factor in any analysis of artifacts or vessels, for each excavator has his or her own set of priorities concerning what attributes had to be set apart and by which means of descriptive analysis. The final variables chosen for inclusion in this study are noted below.

Variables

1. Name : variable of name for the 15 sites included in the study sample.
2. Date : divisions of the Iron Age; IA, IB, transitional, IIA, IIB and IIC.
3. Locale : geographical divisions of Judah: Central Hill Country, Shephelah, Negev and the Transjordan.
4. Rim Profile : vertical, inverted, flaring inverted, everted and flaring everted categories.
5. Rim Description 1: plain, rounded, tapered, flattened and undulating categories.

6. Rim Description 2: thickened to exterior, ridge on exterior, groove on exterior, folded to exterior, undulating to exterior, rounded to interior, flattened to interior, T-shaped, pendant and "no secondary features" categories.

7. Neck Shape : categories for neckless, cylindrical concave with ridge, cylindrical concave with no ridge, cylindrical, cylindrical with ridge, residual and residual with ridge.

8. Neck Height : categories of neck height from neckless, residual, 4.0-5.9, 6.0-7.9, 8.0-9.9 to 10.0-11.9 cm.

9. Colour inside : as specified by excavators.

10. Colour groups : general colour categories for browns, buffs, grays, pinks and reds.

11. Colour outside : as specified by excavators.

12. Colour groups : general colour categories as noted above in 10.

13. Inclusions : as specified by excavators, i.e. fine white grits, large dark grits, and so on.

These variables, while all are included in the study, vary in importance as regards interpretations and conclusions. The following is a description and outline of the chosen variables.

The rim, being the most prominent and distinctive part of the vessel, has long been considered a representative feature for vessels as it may indicate vessel shape and size and when stylized may become a diagnostic indicator of style. One must keep in mind, however, that the variations in rim profile are almost infinite and consequently not all rim forms are of equal significance. Many variations, such as concealed thickening on the interior of a vessel, merely result from the chance redistribution of excess clay when the rim is shaped thus making the rim one of the most difficult attributes to define verbally. One should remember that the potter and owner of the vessel may never have noticed the slight

variations in rim profile which are so obvious when drawn for archaeological purposes (Shepherd 1956:245-247).

The rim, which is the upper terminus of the vessel to which the neck or body is attached, is described in terms of three features: the rim profile, a primary rim description and, if applicable, a secondary rim description. The rim profile is one means of distinguishing the rim but one which needs to be further embellished with descriptions outlining any additional characteristics of the rim (Joukowsky 1980:353).

The rim may have any of a variety of functions. It may act as a means of strengthening the orifice, of adapting the shape and dimensions for functional purposes, such as the retention of liquids or grains for short or long-term storage and/or trade, or for affording, in part, a decorative effect.

	Rim Profile		Rim Description 1		Rim Description 2
1	unknown	1	unknown	1	unknown
2	vertical	2	plain	2	not applicable
3	inverted	3	rounded	3	thickened to exterior
4	flaring inverted	4	tapered	4	ridge on exterior
5	everted	5	flattened	5	groove on exterior
6	flaring everted	6	undulating	6	folded to exterior
				7	undulating to exterior
				8	rounded to interior
				9	flattened to interior
				10	T-shaped
				11	pendant

The neck is the part of the vessel that begins at the upper reaches of the body curve and ends at the point where the rim starts. Neck shape or contours are described in geometric terms. Neck height converts the description into terms of metric measurement which range from neckless vessels and those of residual height to neck heights measured in 2.0 cm increments beginning with necks of 4.0 cm in height to a maximum of 12.0

cm in height.

Neck Shape		Neck Height	
1	unknown	1	unknown
2	neckless	2	neckless
3	cylindrical concave with ridge	3	residual
4	cylindrical concave without ridge	4	04.0-5.9 cm
5	cylindrical	5	06.0-7.9 cm
6	cylindrical with ridge	6	08.0-9.9 cm
7	residual	7	10.0-11.9 cm
8	residual with ridge		

Descriptive colour categories, as opposed to Munsell numerical colour designations, were employed in this analysis on the basis of the methodology employed by the majority of excavation reports utilized for this study. The fired colour of an object, ancient clays generally ranging in colour from buff to reds to dull and dark browns, is dependent upon several factors which vary from the composition of the clay, the temperature to which the vessel was fired, the duration of the firing, and the position of the vessel in the kiln (Joukowsky 1980:369). Fig. 1 outlines a variety of common clay colours and the conditions which produced them.

The importance of colour as a variable will no doubt increase as excavators assign scientists to specific tasks within the field expeditions and research processes. Consequently, in time, ceramic colour trends found within a site or region may immediately indicate clay sources, firing technology, and other factors associated with fired clay. Before this is possible, however, a basic corpus of information must be researched and compiled as a means of reference.

COLORS CLEAR THROUGHOUT CROSS-SECTION OF WALL

Fully oxidized.

Color caused primarily by ferric oxide; varies in hue and value with amount, particle size, and distribution of the oxide and with texture and composition of the clay. Gives no evidence of original state. Classification of fired color estimated without refiring.

COLORS CLEAR ON SURFACE, GRAY IN WALL INTERIOR

Incompletely oxidized. Combination of temperature, time, and draft was inadequate for full oxidation.

Probabilities are that the clay was carbonaceous, unless a uniform oxidation is obtained by refiring at low temperature (500°–550°C). Clay classed as red-, buff- or white-firing by color of refired chips.

LIGHT GRAY SURFACE, DARK GRAY WALL INTERIOR

Partially oxidized. Firing conditions inadequate for full oxidation.

Some carbon burned from surface zone but unburned from interior. Clay probably carbonaceous and iron oxide in lower state. Tested by refiring as above.

BROWN, LIGHT TO DARK

Incompletely or fully oxidized.

Iron oxide may be incompletely or fully converted to ferric state; paste may be lightly smoked. Condition differentiated by refiring. Color may be uniform or section through vessel wall may show less fully oxidized central zone.

LIGHT GRAY, UNIFORM

Unoxidized or reduced; condition distinguished by refiring.

Refiring necessary to determine class of clay.

DARK GRAY, UNIFORM

Unoxidized or smudged; may also be reduced.

Highly carbonaceous clay distinguished from smudged paste by refiring. Firing color determined by reoxidation.

BLACK

Generally smudged.

Black surfaces and clear central zone show short smudging of an oxidized paste. Black surface and paste show complete smudging or surface smudge of highly carbonaceous paste unoxidized in firing. Condition distinguished as above.

PALE GRAY TO WHITISH

Incompletely oxidized.

Clay with low iron oxide content reduced or white clay lightly smoked. Distinguished by temperature required for oxidation.

WHITE

Method of firing indeterminate.

Clay free from iron oxide (rare).

Fig. 1: Outline of common Iron Age clay colours and the conditions which produced them (Shephard 1956:106-107).

Specific Colours: Inside, Outside and Core

01	unknown	19	gray buff
02	light brown	20	gray: orangish
03	brown	21	gray: reddish
04	dark brown	22	gray with reddish buff
05	brown buff	23	gray: brownish
06	brown: grayish	24	pink
07	light brown: orangish	25	pink buff
08	brown: orangish	26	pink: whitish
09	mottled brown-orange	27	pink: brownish
10	brown: greenish	28	pink: grayish
11	brown: reddish	29	light red
12	brown: reddish-gray	30	red
13	buff	31	dark red
14	orangish	32	red buff
15	light orange: brownish	33	brown: pinkish
16	light gray	34	gray: pinkish
17	gray	35	buff: reddish
18	dark gray		

Colour Groups: Inside, Outside and Core

1 unknown
2 browns
3 buffs
4 grays
5 pinks
6 reds

The quantity of inclusions and the variability in grain size depends on the nature, chemical and geological, of the tempering material and on the potter's method of preparation; thus "texture bears a direct relation to the kind of temper used and to the potter's technique" (Shephard 1956:117). Noting the inclusions in the pottery samples provides some information but the lack of consistency in reporting these characteristics, even within a single excavation report, frequently invalidated the data.

Inclusions

01	unknown	10	dark grits
02	white grits	11	small dark grits
03	fine white grits	12	large dark grits
04	small white grits	13	white and dark grits
05	medium white grits	14	small white and dark grits
06	large white grits	15	medium white and dark grits
07	white grits of mixed sizes	16	large white and dark grits
08	white grits and groats	17	white, dark grits of mixed sizes
09	white, scintillating grits		

While the original analysis revealed correlations between the aforementioned variables, the deleted variables included a large number of missing values, also referred to as unknowns, which produced results of no statistical value and, further, detracted from the statistical results relating to the valid variables. Fifteen variables were removed from the original program. Several variables were deleted as a result of skewed trends in the data while other variables were subsequently deleted as their presence could be assumed. The deleted and assumed variables are noted below.

1. Degree of Preservation: partial reconstruction, sherd, whole vessel.
2. Shape at Shoulder : sloping or rounded.
3. Shape of Body : inverted pyriform, inverted ovoid, pyriform and ovoid.
4. Shape of Base : rounded, pointed, flat or ring bases.
5. Handle Characteristics: number of handles and position on body.
6. Vessel Height : overall height from base to rim.
7. Diameter of mouth : measured in 4.5 cm increments from 10.0-30.0 cm.
8. Diameter of body : measured in 9.0 cm increments from 30.0-69.0 cm.
9. Wall thickness : acceptable wall thickness of 1.0-2.0 cm.
10. Colour core : as specified by excavators.

11. Colour group : general colour categories.

12. Liquid Decoration : types of surface treatment on the pithos.

13. Traits : incised or plastic decoration on the surface of the pithos and its placement.

14. Ware quality : concerns the levigated quality of the clay.

15. Hardness : general measure of clay strength.

The variable of degree of preservation noted the size of the individual example for future correlation to the number of missing values present in the sample as a whole. However, once select samples and variables were deleted the number of missing values was reduced to a minimum and consequently this category became redundant.

The large number of sherds in the sample produced many missing values in relation to the variables of shoulder, base and body shapes. As a result these variables were deleted from the program. Each of these variables was subset with only a few descriptive shapes which indicated that pithoi were characterized by only a few standardized shapes.

Handle features also fell into a category of predictibility and, like the above variables, were found to be statistically unacceptable as a consequence of the missing value factor. The handles varied from two to four in number and were placed on the vessel either in the area of neck-to-shoulder or shoulder-to-body.

The variable of height, as noted on pages 107-108, was not only an attribute but also a prerequisite. On the basis of a comparison between storage jars and pithoi a minimum height of 90.0 cm was chosen in order to distinguish between these two types of storage vessels. Shephard notes that "the relationship between use and shape is rarely unique for the same shape may have a variety of uses, and conversely, the same purpose may be

served by many forms" (1956:224). However, in the instance of the pithos, it is relatively safe to say that the storage purpose and large-scale size of this particular vessel has a unique relationship. There was an anomalous type of pithos, categorized as such by function rather than shape, included in the study which was distinguished by its smaller size varying as it did between 40.0-69.0 cm in height.

The variable of mouth diameter was measured in increments of 4.5 cm beginning at 10.0 cm and ranging to examples with widths of 35.0 cm. There was only one anomalous sample (Pt. 1:6) with a notably wide mouth diameter which measured 45.0 cm. The statistics revealed no marked trends in relation to this variable and, in an attempt to keep the data base as simple as possible, this variable was deleted.

The variables of diameter of body at its greatest width and the measure of wall thickness were also variables whose characteristics could be assumed when a pithos was included in the sample. A pithos requires a minimum wall thickness of 1.0 cm and, according to the sample as a whole, reached maximum thicknesses of 2.0 cm. This degree of wall width is necessary in order to bear the weight of the vessel when in use as a storage container. When considering the height and function of the pithos it can be assumed that the diameter of the vessel would reach an appreciable width. The sample, including the smaller scale anomalous types, revealed a range in body width, the widest point normally being found near the shoulder, from about 40.0-70.0 cm. This latter variable was removed from the program for the same reason as the variable of mouth diameter: the statistics revealed no particular trends.

Specific and group colours for the core produced 0.0 variance and

consequently were deleted from the program. The majority of core colours were found to be in the hue of gray and as a result of this lack of variance this attribute had no statistical value for factor analysis (see Fig. 1 of this chapter).

The noted presence or absence of liquid treatment on the surface of the vessel, such as slips or wet-smoothing, and traits, such as incised designs or paint, were found to be of no statistical value. This situation was once again the consequence of the large number of missing values. This was unfortunate for these variables may have indicated a level of technical skill held by the Iron Age potters and provided a sense of the aesthetic values current at this time.

The variables of ware quality and hardness, if they had been noted by the excavators with sufficient regularity, could have been applied to furthering the study of craftsmanship and firing techniques but, once again, the excavators failed to report certain attributes in a consistent manner and consequently the data were of no value.

Factor Analysis

Factor analysis (17) is a multivariate statistical procedure designed to identify the underlying structure associated with a group of variables. It is a multidimensional technique for it quantitatively describes relationships in a n-dimensional space. The program format was processed and the results analyzed by Mark S. Laustrup who, at the time of writing , was the Manager of the Remote Sensing Applications Laboratory of the

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(17) For a discussion of the terminology see Hofmann, R. and Simpson, J. (1986), Yeates, M. (1974) and Cole, J.P. and King C.A.M. (1968). For programing information refer to Feldman, D.S. and Gagnon J. (1986).

University of Nebraska at Omaha. On the basis of Mr. Laustrup's conclusions, which I have adopted as my own, further study was done upon reliable attributes, such as rim profile, rim descriptions, and neck features, as indicated by the factor analysis.

The first step in factor analysis involves the calculation of a correlation coefficient matrix (18). This matrix indicates the degree of intercorrelation or covariation among all variables. The focus of the problem then becomes one of finding a measure that describes the main dimensions of variation among the variables and also indicates the way in which the variables are grouped. In correlation analysis relationships are analyzed visually through a scattergram. In factor analysis the question becomes how many patterns or dimensions are statistically recognizable.

As described above, of the original 245 records and 28 variables, 13 variables describing 224 records were found acceptable for factor analysis. This was a necessary refinement in order to employ factor analysis for an appreciable number of missing values produces skewed results with this form of statistics.

Principal component analysis was chosen as the factor procedure. Factor extraction was accomplished by an algorithm which selected either the value associated with root curve analysis or the 75.0% variance rule, which ever is the larger. An oblique (correlated) solution was chosen on the basis of initial statistics as well as the desire for a correlated

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(18) The correlation coefficient matrix is obtained by transforming the raw data matrix into a standard score matrix. This latter matrix looks at the standard mean deviation or "area within the curve" and indicates the way the data relates to a normal distribution and thus the correlation coefficients are calculated.

solution of a simple structure.

Table A (19) is the correlation matrix associated with the data base mentioned above. It has already been mentioned that the correlation matrix is fundamental to factor analysis. Table A represents the variance - covariance matrix of the 13 variables in a standard score format. The ij-th value of the correlation matrix (row i, column j) is the correlation between variables i and j. The correlation matrix is triangular because, for example, the correlation between locale and rim profile is the same as the correlation between rim profile and locale.

Table A

Correlation matrix

	name	data	locale	rim prof	rim desc	rim desc	neck sha	neck hei
name	1							
data	- 3	1						
locale	- 448	259	1					
rim profile	056	- 207	- 173	1				
rim desc	021	- 127	- 257	3	1			
rim desc	- 111	051	079	087	275	1		
neck shape	247	- 387	- 295	015	172	- 163	1	
neck height	312	- 499	- 366	122	08	- 166	466	1
color insi	- 194	298	178	- 033	- 04	069	- 122	- 266
color gro	- 321	266	267	- 032	- 07	027	- 1	- 266
color out	- 181	292	165	- 045	- 048	048	- 106	- 192
color gro	- 302	263	236	- 047	- 069	- 007	- 091	- 229
inclusions	076	- 109	- 034	- 072	- 052	- 052	119	25

Correlation matrix

	color ins	color gr.	color ou	color gr	inclusions
color inside	1				
color group1	818	1			
color outside	909	774	1		
color group2	776	94	829	1	
inclusions	- 125	- 204	- 069	- 185	1

Table B lists the squared multiple correlations and the partial correlations. The former indicates the percent of the variation which can be predicted in a linear regression sense by the other seven variables.

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(19) Read the word data in all charts as date.

The latter indicates the percent of variation which is common to the two variables but not common with the other variables.

Table B

Partials in off-diagonals and Squared Multiple R in diagonal

	name	data	locale	rim prof	rim desc	rim desc	neck sha	neck hei
name	306							
data	- 142	353						
locale	- 333	- 027	336					
rim profile	- 015	- 167	- 083	15				
rim desc	- 11	- 011	- 221	254	245			
rim desc	- 043	- 051	07	007	3	156		
neck shape	072	- 185	- 084	- 138	188	- 134	325	
neck height	045	- 312	- 178	069	- 046	- 084	311	445
color in	044	- 009	- 083	- 008	027	- 027	009	- 155
col gro	- 067	005	097	054	- 049	075	048	025
color out	051	098	037	014	- 017	082	- 031	143
color gro	- 054	- 029	- 049	- 048	031	- 12	- 002	- 041
inclusions	- 04	- 007	061	- 076	- 042	- 011	03	181

Partials in off-diagonals and Squared Multiple R in diagonal

	color ins	color gr	color ou	color gr	inclusions
color inside	908				
color group1	654	937			
color outside	836	- 552	914		
color group2	- 558	879	887	84	
inclusions	- 057	- 009	139	- 096	13

For instance, 90.8% of inside colour characteristics could be predicted by the other variables. Those heavily influencing predictive ability also carry heavy loadings. Colour group 1 shares 42.8% of variation with colour inside and not with remaining variables; the square of the partial correlation of 65.4% squared is equal to 42.8%. Because partial correlations between variables should approximate 0.0 and multiple correlations should be high, an index has been developed to address sampling adequacy with respect to the above. Table C summarizes the aforementioned information. With respect to the pithoi samples, the total matrix sampling adequacy equals 0.651. In order to meet the minimum criteria, the matrix sampling adequacy (MSA) should be greater than 0.50. The MSA for each of the variables is also included in Table C. In all instances the minimum criterion is surpassed.

Table C

Measures of Variable Sampling Adequacy

Total matrix sampling adequacy .651

name	.816
data	.83
locale	.771
rim profile	.599
rim descript1	.538
rim descript2	.526
neck shape	.748
neck height	.767
color inside	.616
color group1	.622
color outside	.601
color group2	.61
inclusions	.72

Bartlett Test of Sphericity- DF 90 Chi Square 1661.781 P .0001

Factor analysis identified six factors or dimensions associated with the pithoi data base. Table D illustrates the correlation of each variable with each factor referred to as a loading.

Table D

Unrotated Factor Matrix

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
name	-.475	.36	-.124	-.39	.458	.127
data	.533	-.448	-.004	-.139	.332	.028
locale	.457	-.493	-.13	.34	-.374	-.049
rim profile	-.138	.29	.576	-.083	-.357	.605
rim descript1	-.155	.303	.716	.152	.089	.206
rim descript2	.105	-.137	.633	.382	.326	-.214
neck shape	-.36	.61	-.189	.139	-.146	-.435
neck height	-.527	.56	-.215	.205	-.126	.002
color inside	.851	.369	-.011	-4.59E-4	.149	.064
color group1	.882	.334	-.03	.005	-.101	-.031
color outside	.835	.407	-.058	.044	.184	.085
color group2	.872	.364	-.062	.002	-.081	-.022
inclusions	-.243	.066	-.337	.716	.333	.381

The square of a loading represents the variance for an attribute (by row) which can be predicted by the column factor. The sum of the factor loadings by row results in a proportion called the final communality estimate. This value represents the total proportion of the variance of an attribute or variable that can be predicted by the six factors. The communality summary is included in Table E.

Table E

Communality Summary

	SMC	Final Estimate
name	308	75
date	353	615
locale	336	727
rim profile	15	932
rim descript1	245	702
rim descript2	156	74
neck shape	325	765
neck height	445	895
color inside	908	888
color group1	937	902
color outside	914	902
color group2	94	904
inclusions	13	948

As regards the 13 variables it can be seen that 35.3% of the dates associated with the 224 records or samples is predictable in a linear regression equation using the other 12 variables. When two factors are used to predict the date, 61.5% of the variation is predictable. When attempting to actually name the factors it is important to select a solution which has high loadings on one factor or 0.0 loadings on the majority of the factors thus forming a simple structure. The six factors contained in this study have been named as follows:

Factor 1: colour characteristics
Factor 2: neck characteristics
Factor 3: rim characteristics
Factor 4: clay characteristics
Factor 5: geographical zones
Factor 6: rim profile designations

A simple structure is best achieved by correlating the factors into an oblique solution. Table F includes the oblique pattern solution defining the loadings which are regression coefficients and can be used for predicting the standard score of a variable in terms of the defined factors.

Table F

Factor Score Weights for Oblique Transformation Solution-Orthotran/Varimax

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
name	106	- 275	- 083	04	725	- 069
data	- 002	- 43	048	051	241	- 172
locale	- 121	156	- 074	053	- 634	024
rim profile	032	- 142	- 178	096	- 05	962
rim descript1	03	145	587	- 099	006	- 024
rim descript2	- 023	- 074	703	15	- 022	- 221
neck shape	093	633	143	- 199	- 161	- 359
neck height	089	387	- 06	144	- 081	046
color inside	31	- 049	032	099	166	009
color group1	26	132	- 028	- 066	- 073	026
color outside	328	- 036	023	159	167	011
color group2	274	13	- 041	- 048	- 046	022
inclusions	1	- 094	054	962	- 02	08

For the 13 variables, as listed in Table F, several observations can be made.

1. There are high loadings present for colour inside, colour group 1, colour outside and colour group 2, all of which are associated with Factor 1, colour characteristics.

2. The high loadings for neck height and neck shape are associated with Factor 2, neck characteristics.

3. The presence of high loadings for rim descriptions 1 and 2 illustrate the association with Factor 3, rim characteristics.

4. Factor 4, clay characteristics, is associated with inclusions.

5. The high loadings for name and locale are associated with Factor 5, geography.

6. The variable rim profile is associated with Factor 6, also entitled rim profile.

When an oblique or correlated solution is utilized the intercorrelations between factors can be outlined in a matrix such as that charted in Table G. It is necessary to recall, however, that <u>oblique factor solutions</u> are not utilized with intercorrelations larger then 0.50.

Table G

Primary Intercorrelations-Orthotran/Varimax

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1	1					
Factor 2	- 216	1				
Factor 3	- 005	- 021	1			
Factor 4	- 115	133	- 049	1		
Factor 5	- 229	317	013	044	1	
Factor 6	- 059	126	185	- 079	096	1

Another measure associated with factor analysis is variable complexity. When an ideal simple structure is obtained the average variable complexity equals 1. Table H summarizes this information.

Table H

Variable Complexity-Orthotran/Varimax

	Orthogonal	Oblique
name	1 184	1 053
data	1 581	1 345
locale	1 341	1 118
rim profile	1 065	1 008
rim descript1	1 529	1 37
rim descript2	1 188	1 188
neck shape	1 181	1 233
neck height	1 623	1 307
color inside	1 065	1 045
color group1	1 174	1 087
color outside	1 046	1 053
color group2	1 125	1 061
inclusions	1 06	1 01
Average	1 243	1 145

The pithoi data approach this ideal with an average of 1.145 for the oblique solution.

Factors contribute differently to the common or explained variance within a data base. The direct proportionate contribution includes the common variance that a factor accounts for independantly. The joint proportionate contribution is also defined for oblique solutions since shared variance is part of the solution. Table I illustrates proportionate variance contributions.

Table I

Proportionate Variance Contributions

	Orthogonal	Oblique		
	Direct	Direct	Joint	Total
Factor 1	339	338	8 151E-5	338
Factor 2	187	18	-4 418E-4	18
Factor 3	124	124	014	138
Factor 4	1	1	005	105
Factor 5	145	137	- 001	136
Factor 6	104	103	-4 730E-4	102

Since no large positive joint proportionate contributions are present, very little of the common variance is attributable to covariation between the six factors.

Looking back at the communality summary in Table E the observations noted below can be made with regard to the use of the six factors to predict, in a regression sense, the variation within the data base. In conjunction with this Table F, factor score weights, can be used to identify the two high loading factors involved in the variation predictions.

Column 1 = variable/attribute names.
Column 2 = variation in percent (%) as predicted by two factors.
Column 3 = the two factors (F) involved in the variation prediction in percents (%).

Column 1	Column 2	Column 3
Name	75.0	F 5 (72.5), F 2 (27.5)
Date	61.5	F 2 (43.0), F 5 (24.1)
Locale	72.7	F 5 (63.4), F 2 (15.6)
Rim Profile	93.2	F 6 (96.2), F 3 (17.8)
Rim Description 1	70.2	F 3 (56.7), F 2 (14.5)
Rim Description 2	74.0	F 3 (70.3), F 6 (22.1)
Neck Shape	76.5	F 2 (63.3), F 6 (35.9)
Neck Height	69.5	F 2 (38.7), F 4 (14.4)
Colour Inside	*90.8	*F 1 (31.0)
Colour Group 1	*93.7	*F 1 (26.0)
Colour Outside	*91.4	*F 1 (32.8)
Colour Group 2	*94.0	*F 1 (27.4)
Inclusions	94.6	F 4 (96.2), F 1 (10.0)

*1 factor score; use of two factor scores lowers predictive capability.

Calculation of Principal Variables

The factor analysis computations outlined in the above section produced results which indicated the reliable attributes upon which further analysis could be based: rim profile, rim descriptions 1 and 2

and neck characteristics. Thus factor analysis provided a statistical basis for eliminating variables of no value for the compilation of various types of pithoi particular to the dating periods of the Iron Age. The following section will interpret the quantitative calculations of 15 charts created to further analyze the high loading variables revealed by the factor analysis. The principal variables were also calculated in relation to the variable of date in order to study any possible relationships.

The temporal and geographical variables of name, date and locale, as a result of a disproportionate number of samples for certain geographical zones, presents a skew in the data towards the Central Hill Country and Negev (91.0%) in the Iron IIC period (72.0%). Table 1 illustrates this problem.

Table 1: Date versus Locale

CHC = Central Hill Country
NEG = Negev
SHEP = Shephelah
TJ = Transjordan

Date		Locale			
	sample #	CHC	NEG	SHEP	TJ
Unknown	14	14	0	0	0
Iron IA	14	13	1	0	0
Iron IB	3	3	0	0	0
Transitional	15	8	7	0	0
Iron IIA	14	11	3	0	0
Iron IIB	3	1	2	0	0
Iron IIC	161	92	55	11	3
	224	142	68	11	3

There is a preponderance of sites in the Central Hill Country of which the majority belong to the Iron IIC period. Unfortunately the Shephelah with three sites and the Transjordan with two sites did not

offer many pithoi for analysis, a consequence of the limited excavation material published to date. In light of the sample as a whole the Negev offered comparatively more sites for analysis, five, while the majority of sites (9) and samples (142) in the study can be attributed to the Central Hill Country.

Once the date categories with little associated material and no relationships, Iron IB and Iron IIB, had been removed from further consideration the analysis focused on those time periods which revealed particular trends and associations in the sample; Iron IA, the Transitional period, Iron IIA and Iron IIC.

Iron IA: of 14 samples 13 (92.9%) are found in the Central Hill Country with the remaining sample coming from the Negev.

Transitional: of 15 samples 8 (53.3%) are from the Central Hill Country while the remainder are from the Negev.

Iron IIA: of 14 samples 11 (78.6%) are from Central Hill Country while the remainder are again derived from the Negev.

Iron IIC: of 161 samples 91 (57.1%) are from the Central Hill Country, 55 (34.2%) are from the Negev, 11 (6.8%) are from the Shephelah and 4 (1.9%) are from the Transjordan.

The Central Hill Country is the most highly represented geographical zone in all periods of the Iron Age. This is followed by the Negev, the Shephelah and the Transjordan; the last two zones, however, are only represented in the Iron IIC period.

As noted above, Table 1 outlines the data associated with Date versus Locale. As a result of the skew in the data it is necessary to keep the results of this chart in mind when reading the tables describing the relationships between the principal variables. The following Tables, 2 through 4, further illustrate the skew in the statistical base towards the Iron IIC period. This slant in the data, while not providing a strong

analysis of the pithoi of the Shephelah and the Transjordan, does produce relevant indications of trends to be found in the Central Hill Country and Negev.

Table 2: Date versus Rim Profile

UK = unknown
IA = Iron IA
IB = Iron IB
TL = Transitional
IIA = Iron IIA
IIB = Iron IIB
IIC = Iron IIC

UK = unknown
VL = vertical
IN = inverted
FLI = flaring inverted
EV = everted
FLE = flaring everted

Date		Rim Profile					
	sample #	UK	VL	IN	FLI	EV	FLE
UK	14	0	2	3	1	3	5
IA	14	0	2	0	0	10	2
IB	3	0	0	1	0	2	0
TL	15	0	7	1	0	5	2
IIA	14	0	10	3	0	0	1
IIB	3	0	2	1	0	0	0
IIC	161	3	16	71	43	12	16

The Iron IA period is represented predominantly by samples with everted rim profiles, but vertical rim profiles are also present. A change has occured during the Transitional period; although the everted style is still present, the vertical rim profile has gained in number and therefore presence. The Iron IIA phase is predominantly represented by vertical rim profiles but inverted rims are beginning to be introduced. The Iron IIC, because of the large sample size, has examples from all rim profile types but the largest percentage of the examples fall in the category of the inverted and flaring inverted rim profile.

Table 3: Date versus Neck Shape

UK = unknown
NL = neckless
CCR = cylindrical concave with ridge
CC = cylindrical concave without ridge
C = cylindrical
CR = cylindrical with ridge
R = residual
RR = residual with ridge

Date	Neck Shape							
	sample #	UK	NL	CCR	CC	C	CR	R	RR
UK	14	0	5	2	0	0	2	1	4
IA	14	0	0	11	3	0	0	0	0
IB	3	0	0	1	0	0	1	1	0
TL	15	0	4	8	0	0	0	3	0
IIA	14	0	4	0	1	3	2	3	1
IIB	3	0	3	0	0	0	0	0	0
IIC	161	3	133	6	5	5	1	5	3

Iron I is represented by predominantly necked vessels. This trend continues into the Transitional period but some neckless vessels are starting to appear. By Iron IIA there is an approximately equal split between the number of necked and neckless pithoi. The Iron IIC is, without question, characterized predomiantly by neckless pithoi; however, all other types are still minimally represented.

Table 4: Date versus Neck Height

UK = unknown
NL = neckless
R = residual
4.0- = 04.0-05.9 cm
6.0- = 06.0-07.9 cm
8.0- = 08.0-09.9 cm
10.0- = 10.0-11.9 cm

Date		Neck Height						
	sample #	UK	NL	R	4.0-	6.0-	8.0-	10.0-
UK	14	0	5	5	1	3	0	0
IA	14	0	0	0	1	10	3	0
IB	3	0	0	1	0	2	0	0
TL	15	0	4	3	2	4	2	0
IIA	14	0	4	4	2	4	0	0
IIB	3	0	3	0	0	0	0	0
IIC	161	3	133	8	6	5	5	1

The results of Table 4 are directly related to those of Table 3. This chart merely details the various neck heights which are reached by the necked pithoi. The necked vessels of Iron I fall primarily into the range of 6.0-7.9 cm and higher. The pithoi of the Transitional period, as indicated by this sample, are characterized by neck heights in most ranges. The Iron IIA vessels also have mixed neck heights. The Iron IIC pithoi are predominantly (82.6%) neckless, but all neck shapes and heights are represented.

The following tables are composed of the high loading variables indicated by the factor analysis. As mentioned earlier, all studies of the data included in this program must consider the skew towards the last period of the Iron Age. The results associated with the Iron IIC can be interpreted as representative of the Central Hill Country and Negev as a result of the sample size (161 rows) but those trends and types drawn from the Iron IA, Transitional and Iron IIA periods must be considered in terms of their limited sample sizes. For example, when studying the next table, Table 5: Rim Profile versus Date, it becomes apparent that the Iron IIC is represented by all rim profile descriptions. This high percentage is related, as indicated by Table 1, to the large number of samples associated with this last phase of the Iron Age, Iron IIC.

Table 5: Rim Profile versus Date

Rim Profile	Date						
sample #	UK	IA	IB	TL	IIA	IIB	IIC
UK	3	0	0	0	0	0	3
VL	39	2	2	0	7	10	2	16
IN	80	3	0	1	1	3	1	71
FLI	44	1	0	0	0	0	0	43
EV	32	3	10	2	5	0	0	11
FLE	26	5	2	0	2	1	0	16

When studying the rim profile descriptions by period it becomes obvious that all types are present in the Iron IIC period. However, when one views the distribution of rim types in terms of sample proportions it becomes apparent that certain types are particular to the specific dating periods. Everted rim profiles are predominant in the Iron IA period and though vertical rims are present at this time, they do not come to the fore until the Transitional period. Vertical rims continue into the Iron IIA period but are now accompanied by inverted rim profiles, the latter type dominating during the Iron IIC period.

Table 6: Rim Profile versus Locale

Rim Profile	Locale			
sample #	CHC	NEG	SHEP	TJ
UK	3	0	0	0	3
VL	39	32	6	1	0
IN	80	41	34	5	0
FLI	44	21	19	4	0
EV	32	28	4	0	0
FLE	26	20	5	1	0

All rim profile descriptions are represented in the geographical zones of the Central Hill Country and the Negev. All profile types except the everted rim profile are found in the Shephelah. The examples from the

Transjordan are of unknown rim profile type as they were partially destroyed in antiquity.

Table 7: Primary Rim Description (1) versus Date

RD = Rim Description
UK = Unknown
PL = Plain
RD = Rounded
TA = Tapered
FL = Flattened
UN = Undulating

		Date						
RD 1	sample #	UK	IA	IB	TL	IIA	IIB	IIC
UK	3	0	0	0	0	0	0	3
PL	82	2	3	2	6	5	1	63
RD	72	4	8	1	7	4	1	47
TA	54	5	1	0	2	5	0	41
FL	12	3	2	0	0	0	1	6
UN	1	0	0	0	0	0	0	1

Plain and rounded primary rim descriptions are the most common and are found in all time periods of the Iron Age. A tapered rim description is also relatively common whereas flattened and undulating rim descriptions, within the context of this sample, are present but uncommon.

Table 8: Primary Rim Description (1) versus Locale

		Locale			
RD 1	sample #	CHC	NEG	SHEP	TJ
UK	3	0	0	0	3
PL	82	40	34	8	0
RD	72	55	16	1	0
TA	54	39	14	1	0
FL	12	8	3	1	0
UN	1	0	1	0	0

Despite the skew in the data it would appear that all of the primary rim descriptions defined in this study are common to all of the geographical zones in Eretz Israel. This observation can not be made in

regard to the Transjordanian samples as the rims are missing from the vessels.

Table 9: Rim Profile versus Primary Rim Description (1)

Rim Profile	Primary Rim Description (1)						
	sample #	UK	PL	RD	TA	FL	UN
UK	3	3	0	0	0	0	0
VL	39	0	10	17	8	4	0
IN	80	0	40	26	13	1	0
FLI	44	0	22	10	12	0	0
EV	32	0	7	19	4	1	1
FLE	26	0	3	0	17	6	0

The vertical rim profile is predominantly associated with rounded and plain primary rim descriptions but tapered and flattened rim descriptions are also present. Both styles of inverted rim profile are characterized by plain, rounded and tapered rim descriptions. Simple everted rim profiles are found with rounded, plain and some tapered rim descriptions. Flaring everted rim profiles are, however, predominantly associated with tapered rim descriptions with only a few examples of rim profiles with flattened and plain characteristics.

Table 10: Rim Profile versus Secondary Rim Description (2)

UK = unknown
NA = not applicable
THI = thickened to exterior
RID = ridge on exterior
GRO = groove on exterior
FOL = folded to exterior
UND = undulating to exterior
ROU = rounded to interior
FLA = flattened to interior
TSH = T-shaped
PEN = pendant

Rim Profile	Secondary Rim Description (2)										
	sample #	UK	NA	THI	RID	GRO	FOL	UND	ROU	FLA	TSH	PEN
UK	3	3	0	0	0	0	0	0	0	0	0	0
VL	39	0	20	7	0	0	5	1	0	0	6	0
IN	80	0	17	31	15	6	3	1	0	0	7	0
FLI	44	0	6	19	17	2	0	0	0	0	0	0
EV	32	0	21	5	0	0	4	0	0	1	1	0
FLE	26	0	12	0	0	0	0	0	13	0	0	1

Vertical rim profiles vary between those which have no secondary rim characteristics and those which are characterized by secondary rim descriptions which are thickened or folded to the exterior or T-shaped. Inverted rim profiles tend toward any of the external rim characteristics but are primarily noted as being thickened to the exterior or marked with a ridge or groove on the exterior. With regard to the everted rim profiles, half of the sample has no secondary characteristics (NA = not applicable). The remaining half is split between simple everted rim profiles with thickened or folded external characteristics and flaring everted rim profiles which are predominantly rounded to the interior.

Table 11: Rim Description 1 versus Rim Description 2

		Rim Description 2										
RD 1	sample #	UK	NA	THI	RID	GRO	FOL	UND	ROU	FLA	TSH	PEN
UK	3	3	0	0	0	0	0	0	0	0	0	0
PL	82	0	24	35	17	2	1	2	1	0	0	0
RD	72	0	32	12	8	3	7	0	0	0	10	0
TA	54	0	12	15	7	3	4	0	12	1	0	0
FL	12	0	7	0	0	0	0	0	0	0	4	1
UN	1	0	1	0	0	0	0	0	0	0	0	0

All of the primary rim descriptions are characterized by an appreciable percentage which have no secondary characteristics. The plain primary rim description is predominantly accompanied by external secondary characteristics. The rounded rim description is split between those which have external features and those which have only a primary characteristic. Tapered rims are notably formed with external shaping but there are also samples which have only a simple primary characteristic or are rounded to the interior. Flattened rims tend to be created without secondary characteristics.

Table 12: Rim Profile versus Neck Shape

Rim Profile	Neck Shape							
	sample #	UK	NL	CCR	CC	C	CR	R	RR
UK	3	3	0	0	0	0	0	0	0
VL	39	0	10	8	2	6	4	6	3
IN	80	0	77	0	0	0	1	1	1
FLI	44	0	43	0	0	1	0	0	0
EV	32	0	1	18	7	0	0	4	2
FLE	26	0	18	2	0	1	1	2	2

Vertical rim profiles are commonly found on both necked and neckless pithoi. Neckless vessels are, however, most often built with inverted and flaring inverted rim profiles. Simple everted rim profiles are normally associated with necked pithoi. Flaring everted rims are present primarily on neckless vessels but there are examples of pithoi with this rim type in almost all neck shape classes.

Table 13: Rim Description 1 versus Neck Shape

RD 1	Neck Shape							
	sample #	UK	NL	CCR	CC	C	CR	R	RR
UK	3	3	0	0	0	0	0	0	0
PL	82	0	61	8	3	3	3	3	1
RD	72	0	43	16	4	1	0	5	3
TA	54	0	38	3	1	3	2	5	2
FL	12	0	7	1	1	1	1	0	1
UN	1	0	0	0	0	0	0	1	0

The primary rim descriptions of plain, rounded, tapered and flattened are associated with all neck shapes. The only combinations which are missing are a rounded rim on a cylindrical neck with ridge and a flattened rim on a residual neck. As a result of the skew in the sample the majority of all primary rim description types are associated with neckless pithoi.

Table 14: Rim Profile versus Neck Height

Rim Profile		Neck Height						
	sample #	UK	NL	R	4.0-	6.0-	8.0-	10.0-
UK	3	3	0	0	0	0	0	0
VL	39	0	10	9	6	9	5	0
IN	80	0	77	2	0	1	0	0
FLI	44	0	43	0	0	0	1	0
EV	32	0	1	6	5	16	4	0
FLE	26	0	18	4	1	2	0	1

Vertical rim profiles are represented equally by neckless and necked pithoi in the majority of categories of neck height. Both styles of inverted rim profiles, on the average of a 97.0% frequency, are associated with neckless vessels. Everted rim profiles are largely associated with necked vessels found in the majority of categories of neck height, although they have also been built on neckless vessels. Unlike simple everted rim profiles the flaring everted rims tend to be found primarily on neckless pithoi.

Table 15: Rim Description 1 versus Neck Height

RD 1		Neck Height						
	sample #	UK	NL	R	4.0-	6.0-	8.0-	10.0-
UK	3	3	0	0	0	0	0	0
PL	82	0	61	4	5	8	4	0
RD	72	0	43	8	5	11	5	0
TA	54	0	38	7	2	6	0	1
FL	12	0	7	1	0	3	1	0
UN	1	0	0	1	0	0	0	0

The majority of neck heights are represented by the primary rim descriptions of plain, rounded, tapered and flattened characteristics. The skew in the sample, however, unfortunately associates the majority of all primary rim descriptions with neckless vessels.

These calculations of the primary variables, in a variety of

combinations, provides the analyst with a ready reference. The interpretation of the tables, 1 through 15, in conjunction with the description of the variables and the statistical program employed, factor analysis, provides bases upon which to initiate the building of types particular to the four periods of the Iron Age which have sufficient associated data: Iron IA, the Transitional phase, Iron IIA and Iron IIC.

The next and final chapter will utilize the temporal data of Chapters One through Four, historical, geographical, anthropological and archaeological, and the numerical calculations of this chapter to define those types of pithoi, indicated by the collected sample, to be representative of the Iron Age in Judah.

CHAPTER SIX

Pithos Typologies for Iron Age Judah

Factor analysis as a means of statistical analysis does not take individual samples and coordinate them with other identical samples (20); rather it takes the entire collection of attributes and compares, on a percentage basis, the degree to which certain attributes, also referred to as variables, are found associated with other attributes. The results of these calculations were outlined in the factor analysis section of Chapter Five. In order to further refine the factor analysis computations a series of calculations were worked out for those variables which were indicated by the factor analysis to provide strong correlations.

Table 1, as discussed in the previous chapter, revealed a strong skew in the data towards the Iron IIC pithoi, the majority of which are associated with Central Hill Country sites. Consequently, one must consider this element when comparing trends within the Central Hill Country, and in relation to the other regions, particularly the Shephelah and Transjordan.

The calculation of principal variables (Tables 1-15), indicated by the factor analysis to be valid, led to the creation of a "four-part" typology. This typology is based upon the variables of rim profile, primary and secondary rim characteristics and neck shape and height. The

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(20) A sample by sample comparison would provide few, if any, parallels as a consequence of the many and slight variations to be found amongst rim profiles and in neck height and shape to name only a few attributes.

latter two attributes are considered as one unit since they are, for the most part, directly proportional variables. The following chart outlines the four parts and related sub-sections involved in the proposed typology. A feature noted in any part's subsection, e.g. vertical rim profile, will always be found in combination with subsection features of two or more other parts, i.e. vertical rim profile with plain primary rim description on a necked vessel.

PART ONE :	Rim Profiles	- 1 vertical - 2 inverted - 3 flaring inverted - 4 everted - 5 flaring everted
PART TWO :	Primary Rim Description	- 01 plain - 02 rounded - 03 tapered
PART THREE:	Secondary Rim Description	- 001 thickened to exterior - 002 ridge on exterior - 003 rounded to interior - 004 T-shaped
PART FOUR :	Neck Features	- A collared-rim - B necked - C residual - D neckless

The variables chosen to represent parts--rim profile, rim descriptions and neck characteristics--were those attributes in the sample which were consistently present and reliable. The rim profile and its associated primary and secondary rim characteristics are acceptable for typological use, as indicated by the factor analysis, for they are the best-represented part of the vessel. The rim is also the section of the vessel which best lends itself to stylistic changes which are recognizable by the modern analyst. Neck height in conjunction with rim characteristics acts as another indicator of change. Changes in rim

description appear to be in direct correlation with alterations in neck shape and height. Neck forms change in a manner different from rim features. The latter varies over time by forming new combinations of features, whereas neck shape, in conjunction with height, may have styles which go completely out of production or other styles which are maintained on a minor scale while a new trend comes to the fore.

One should recall that the principal variables are found in conjunction with other reliable attributes whose presence can be assumed: shoulder, body and base shapes, handle traits, body height, body diameter and wall thickness. Also, on the basis of factor analysis, a gray core can be assumed for most vessels, as well as the presence of inclusions in some combination of grit colour and size. In many instances the surface of the vessel has been treated with a process of wet-smoothing and/or a trait, such as circumferential grooves. Potter's marks are also incised on the body of the pithos and a compilation of all those present in the sample can be found in Appendix 3. Surface treatment, decoration and ware quality were not noted with any consistency by the excavators, thus these attributes are of no calculable value.

Seven types of pithoi are recognized within this Iron Age sample. The subdivisions within the types were distinguished primarily on the basis of secondary rim characteristics. The secondary features associated with the rim descriptions are noted as being sufficiently distinct from the original primary shape to be characterized as a subtype. Realistically, however, the reason behind their presence or seeming addition to the pottery repertoire may be explained simply as the consequence of a minor construction deviation on the part of the potter

rather than a conscious intent to create a new rim form.

The variations in neck height and shape are noted but they are not regarded as uncompromising definitions. These variables do not need to hold a definite form in order to be regarded as being in conjunction with any of the other "parts" of the "type". The role of the neck within the context of the typology became descriptive rather than quantitative. This change in emphasis occurred as a result of the many variations in neck height and shape in relation to rim profile. Again, as in rim characteristics, the minor variations, such as neck height, which are found within the context of this variable may have been produced unintentionally by the craftsman. Related to this is the subjective element which led the analyst to choose certain quantitative delimitations for an attribute, such as neck height, when the potter who created the vessel probably approached his or her craft in terms of an entirely different mindset.

The calculations and, therefore, the types, have been organized according to time periods of the Iron Age. The Iron IB and Iron IIB phases were removed from consideration as they provided insufficient data for analysis. The time periods with satisfactory data bases were Iron IA, the Transitional period, Iron IIA and Iron IIC. There were several bases for the decision to analyze the pottery according to time periods. The dates assigned to the pithoi were derived from the excavation reports. The pottery finds, artifacts and structures associated with the pithoi, as outlined in the site reports, indicated that the dating conclusions held by the expedition leaders were, for the most part, well based. An instance of incorrect dating for a pithos is found in an article by M.-L.

Buhl in The Danish Excavations at Tall Sailun, Palestine. In this report Buhl assigned the collared-rim pithos to the Iron II period. The mistake was clearly evident, however, when the Sailun/Shiloh pithoi examples were compared to similar pithoi excavated at other sites in Judah and the Transjordan. The dating of pottery finds was one of the only consistent features to be found in the excavation reports as a whole. Since the excavation reports provided acceptable and verifiable dates there were valid reasons for choosing to act upon the strong correlations associated with the dating variable as revealed by the factor analysis in Tables E and F in Chapter Five.

The last factor which motivated the allocation of types by dating phases was based on an attempt to typologize and subsequently recognize pithos types within a geographical and historical-cultural context. If a pottery sample was large and evenly spread across all of the high loading variables then pottery production and use could possibly have been interpreted and understood within a climatic and resource ecological framework. With a proportional data base it may have shown that the varying climates and geomorphology of Eretz Israel have a strong impact upon pottery production (Glock 1982:149). Unfortunately the available pithos samples employed in this study were spread unevenly throughout the geographical zones and consequently produced skewed statistical results of varying consequence and validity for pottery type/geographical correlations as desired within the boundaries of this paper.

The following section describes the various features of the proposed types of pithoi characteristic of the Iron Age in Judah.

Iron IA Pithoi

The sample of fourteen pithoi for Iron IA, because it is small, may for this reason represent only a few types of primary and secondary rim descriptions. This reasoning also holds true for the samples produced in regard to the Transitional and Iron IIB periods.

Iron IA vessels of this sample are characterized predominantly by everted rim profiles (85.7%), although vertical rim profiles (14.3%) are, as seen in Table 2, also represented. Tables 9 and 11 show that the majority of everted rim profiles are associated with a rounded primary rim description (59.4%), while the secondary rim description characteristics reveal a split between those rim profiles with no external characteristics (44.4%) and those with external characteristics (41.7%). Those rim profiles with a plain primary rim description are largely (63.4%) associated with secondary external characteristics. Again, as mentioned previously, the variation seen between a rounded and plain characteristic, for example, may only be the product of this particular analyst's perceptions.

This Iron IA sample, consisting only of examples from the Central Hill Country site of Giloh, with one exception from the Negebite site of Masos, consists entirely of necked vessels (Table 3). More specifically, the majority are of a cyclical concave outline with a ridge at the base of the neck (78.6%). A vessel with these combined characteristics, particularly the neck shape, is commonly known as a collared-rim pithos. This can be further refined, in this instance, to indicate that the majority (71.4%) of these necks fall within the 6.0-7.9 cm range of neck height (Table 4).

Type 1A: 4.02.005.A
.everted rim profile
.rounded primary rim description
.no secondary rim description
.collared-rim neck (of 6.0-7.9 cm)

Type 1B: 4.02.001.A
.everted rim profile
.rounded primary rim description
.secondary rim description of thickening to the exterior
.collared-rim neck (of 6.0-7.9 cm)

As a consequence of the skew in the data base (Table 1) the samples pertaining to Iron IA, Types 1A and 1B, are indicative solely of pithoi found at the Central Hill Country site of Giloh in this time period, c. 1250-1150.

Giloh was a briefly occupied Set ement site in an inhospitable and poorly watered locale (see pages 39-40 Judging by the limitations on settlement conditions available in this area the site was most likely occupied for its strategic advantages and did not maintain a constant population. On the basis of this information it can be hypothesized that the collared-rim pithoi of this hill country site were utilized for the storage of the essential supplies of a temporary settlement, such as water and grains, though primarily the former for grain could be transported to the site and stored in bags or baskets.

The majority of untyped vessels (Plate 19) associated with the Iron IA period can be classed as collared-rim pithoi. This classification is based upon neck shape and height and the ridge feature located at the junction of the neck and shoulder (Pt. 19:1-3). In several instances the neck ridge must be assumed since only the upper half of the neck and rim are present (Pt. 19:6-8). There are two instances (Pt. 19:4-5) of pithoi which resemble vessels of the collared-rim tradition but differ in the

angle of the rim and the absence of a ridge. Further, Plate 18 illustrates a number of pithoi which remained untyped as a result of a lack of dating information. However, on a comparative basis selected pithoi from this plate can be slotted into relative time periods or even typed. The basic features of examples 18:1-4 and 7 resemble collared-rim pithoi of Iron IA as discovered at Giloh and pictured on Plate 19.

Transitional Period

The phase designated "Transitional" represents, as its name would indicate, a period of change. The sample of fifteen vessels, divided between the Central Hill Country and the Negev, produced rim profiles of almost all descriptions: vertical, everted, flaring everted and even one inverted example. To further emphasize the eclectic nature of the sample a study of the primary and secondary rim descriptions reveals that they also fall into almost all possible descriptive categories. These variations are a small-scale indication of future stylistic trends.

On the basis of the percentages indicated in Table 2 the rim profiles are predominantly of a vertical (46.7%) or an everted (46.7%) nature. The vertical rim profiles are associated with rounded (43.6%), plain (25.6%) and tapered (20.5%) primary rim descriptions (Table 9), while the secondary characteristics, as mentioned above, are found in a variety of styles (Table 11). The most prevalent style, however, was found to be a secondary thickening to the exterior.

The overall majority of examples are characterized by the presence of a neck and in some instances, more specifically, a collared-rim neck (53.3%). A number of vessels are characterized by residual necks (20.0%), while a certain percent (26.7) are neckless (Table 3). In this sample of

Transitional period pithoi, all of the vessels with vertical rim profiles are characterized by a collared-rim. As indicated by Table 4 the neck heights vary from those measuring 4.0-5.9 cm (13.3%), 6.0-7.9 cm (26.7%) to 8.0-9.9 cm (13.3%).

The everted rim profiles of this period repeat the styles outlined in the discussion of Iron IA types, particularly Type 1A. The Transitional period is also represented by pithoi with everted plain and everted rounded rim profiles with no secondary rim characteristics. The neck styles are changing, however, for in the Transitional period, while the majority of vessels are still necked, a number of pithoi are now present in the sample which have necks of a residual nature. There are also examples of neckless vessels. Half of the sample associated with this period is characterized by necked vessels with everted rim profiles (Tables 2 and 3). Table 4 indicates that 50.0% of the necked vessels fall into the 6.0-7.9 cm range of height, 25.0% are between 4.0-5.9 cm and the final 25.0% are between 8.0-9.9 cm in height.

Type 2A: 1.02.005.A
- .vertical rim profile
- .rounded primary rim description
- .no secondary rim description
- .collared-rim neck

Type 2B: 1.02.001.A
- .vertical rim profile
- rounded primary rim description
- .secondary rim description of thickened to the exterior
- .collared-rim neck

Type 2C: 1.01.005.A
- .vertical rim profile
- .plain primary rim description
- .no secondary rim description
- .collared-rim neck

Type 2D: 1.03.005.A
.vertical rim profile
.tapered primary rim description
.no secondary rim description
.collared-rim neck

Type 3A: 4.02.005.B/C
.everted rim profile
.rounded primary rim description
.no secondary rim description
.necked or residual neck

Type 3B: 4.01.005.B/C
.everted rim profile
.plain primary rim description
.no secondary rim description
.necked or residual neck

It becomes obvious, even from this limited sample, that this was a period of change and overlap. The Transitional period, c. 1150-1050, continued the traditions of earlier generations but, at the same time, gradually introduced both variations on the traditional styles and distinct changes. These trends are particularly apparent in the fluctuating neck heights and the slow disappearance of the collared-rim ridge application.

The samples particular to the Transitional period are, similar to the Iron IA period, predominantly from a Central Hill Country site. Shiloh's possession of numerous cisterns and silos and its location near a well-watered and fertile valley (see pages 34-35) lead to the conclusion that the collared-rim pithoi of this well-populated site were used for purposes other than the storage of water and grains; these basic storage needs of the populace would seemingly have been served by the excavated cisterns and silos. Pithoi may, however, have served in some instances as a convenient storage unit for the aforementioned necessities. Shiloh was a population center for this area of the hill country, consequently

products such as wine and oil would have been in demand by the local populace and transients. This market would have encouraged the utilization of pithoi for practical commercial purposes relating to the production and storage of wine and oil.

The six untyped pithoi of the Transitional period, Plate 20, are each marked by a unique rim profile and are associated with either neckless vessels or necks of a residual height. The body shape of example 20:1, 3 and 5 seem to hint at the outlines characteristic of the anomalous type, 5F, of the Iron IIC period. Examples 20:2 and 4 are standard pithoi in respect to body, shoulder and base shapes and other recognizable prerequisites, but they feature as yet uncommon rim profiles; these rim profiles, in conjunction with a neckless vessel, are characteristic of the Iron IIC period.

Iron IIA

By the time of Iron IIA the stress upon certain rim profile types had changed. This is seen by the introduction of the inverted rim profile into the market place, though the vertical rim profile style still predominated (Table 2). The primary rim descriptions associated with these rim profiles are rounded, plain and tapered simple (Table 9). These same descriptions are also found with secondary rim characteristics which are noted as being thickened or folded to the exterior (Table 11). All of the samples which fit these characteristics are found in the Central Hill Country. The Negebite sites, of which there were not enough samples to create a type, produced those examples with inverted rim profiles.

The neck styles of the sample are divided between necked, though of various shapes and heights, and residual necks. The selected samples

included in the Iron IIA typology, Type 4, show 55.6% necked vessels and 44.4% with residual necks. The neck shapes are all cylindrical and noted to have been formed either with or without a ridge at the base of the neck (Table 3). The majority of neck heights fall toward the lower end of the scale with 60.0% in the 4.0-5.9 cm range and 40.0% having been measured as belonging in the 6.0-7.9 cm category.

Type 4A: 1.02.005.C/B
- .vertical rim profile
- .rounded primary rim description
- .no secondary rim description
- .residual neck but necked possible

Type 4B: 1.02.001.C/B
- .vertical rim profile
- .rounded primary rim description
- .secondary rim description of thickened to exterior
- .residual neck but necked possible

Type 4C: 1.01.005.B/C
- .vertical rim profile
- .plain primary rim description
- .no secondary rim description
- .necked but residual neck possible

Type 4D: 1.01.001.C/B
- .vertical rim profile
- .plain primary rim description
- .secondary rim description of thickened to exterior
- .residual neck but necked possible

Type 4E: 1.03.005.C/B
- .vertical rim profile
- .tapered primary rim description
- .no secondary rim description
- .residual neck but necked possible

Type 4F: 1.03.001.B/C
- .vertical rim profile
- .tapered primary rim description
- .secondary rim description of thickened to exterior
- .necked but residual neck possible

It becomes apparent that changes are occurring, for the coexistence of new and varied styles is increasing in frequency. Though rim profiles

are still predominantly vertical in this period, Iron IIA, c. 1000-900 BCE, inverted outlines are being introduced into the Judean ceramic repertoire from a source in the south of the country. It is apparent that styles, a simpler neck shape, the general absence of a neck ridge and lower neck heights, are leading toward an overall change in pithos appearance which is revealed in the Iron IIC period through the mass production of pithoi with inverted rim profiles.

All of the pithos types associated with the Iron IIA period were derived from the Central Hill Country sites of Nasbeh and Gibeah (see pages 36-37 and 38-39, respectively). Though, as mentioned, the necks are lessening in height their relation to necked vessels is still apparent. The sites of Gibeah and Nasbeh were less ideally situated, for instance, than Shiloh. Excavation reveals that both of these sites utilized cisterns and some means of grain storage, either silos or above-ground structures. Since the need to store and protect perishables and maintain a water supply has been met it would appear that the pithoi of these Iron IIA sites may have served to store products such as wine and oil for both commercial practices and daily usage, and water and grain for personal convenience.

The Iron IIA untyped pithoi of Plate 21 are distinct from the typed pithoi, 4A-4F, pictured on Plates 4 and 5. The untyped examples vary from everted and vertical to inverted, the three inverted samples differing distinctly in rim and neck characteristics, the only common features available for analysis.

Iron IIC

The majority of Iron IIC samples are derived from the Central Hill

Country, but the Negev is also adequately represented. All of the examples from sites in the Shephelah and Transjordan fall into this time period. In a sample of this size (161 examples) it is not surprising that all profile types are represented. The clear majority, however, fall into the class of pithos characterized by inverted (44.1%) and flaring inverted (26.7%) rim profiles (Table 2). Thus inverted rim profiles total over 70.0% of a well-represented time-period sample. The remainder of the examples comprised 9.9% flaring everted, 9.9% vertical and 7.5% everted rim profiles. Both types of inverted rim profiles are characterized by plain, rounded and tapered primary rim descriptions (Table 9). The secondary rim characteristics are, however, found in variations of presence and absence throughout the sample (Table 11). As discussed previously the variety of shapes may be seen as the product of something as simple as some additional and unintentional pressure on the part of the potter during the fashioning of the vessel rather than a conscious attempt to create an infinite variety of rim profile outlines.

The majority (82.6%) of the collected Iron IIC sample is neckless, though every other category of neck height and shape is represented by a minimum number of examples (Tables 3-4).

Simple rims with only primary characteristics are found predominantly in the Central Hill Country, 14 of 16 examples; the remaining two examples belong to the Negev. Eleven of nineteen examples with a secondary characteristic of a ridge, or what may be seen as a groove (causing a ridge), on the exterior are from the Negev. The profile described as having a secondary characteristic which is thickened to the exterior has fifteen examples from the Negev, many of which belong to the anomalous

pithos category; a further eleven examples are from the Central Hill Country; and four examples are derived from the Shephelah. The three examples from Dibon in the Transjordan are a. missing rims and the majority of the neck and are, therefore, impossible to place within a type. The inverted rounded rim profile class contains one distinct subgroup with a secondary characteristic defined as "T-shaped" and which, in a more general terminology, could be described as an external thickening; the ancient producers and consumers of these products were probably not concerned with or even aware of the inner profile of a pithos if it did not interfere with the vessel's functioning.

Another Iron IIC type which prevailed was a class of vessels with flaring everted rim profiles. These rims were characterized by a tapered rim with a secondary feature best described as having been rounded to the interior. This rim type was only associated with neckless vessels. All of the examples included in this type were taken from the Central Hill Country.

As illustrated on Plate 9 the study sample produced a total of nineteen 'anomalous type' pithoi, Type 5F Anomaly. Analysis revealed that the inverted rim profile particular to these pithoi can be recognized as belonging to a neckless vessel with variations on a plain primary rim description and a secondary characteristic noted as being thickened to the exterior. The examples associated with this type were formed with sloping shoulders characterized by incision and a pyriform body outline. The body diameter averages a width of about 40.0 cm, over 75% of the 52.0 cm height of the average vessel. The mouth of the pithos is also wide, proportionately larger than the other measurements of the vessel,

averaging 20.6 cm in diameter. Fifteen of the nineteen pithoi in this category were found at Negebite sites, three of the remaining four were from Tell Beit Mirsim in the Shephelah while the last one was from Tel 'Eton in the Central Hill Country. It would appear that this anomalous pithos type was particular to the Negev and the needs and conditions confronting its inhabitants. An Iron IIB pithos classed as untyped (Plate 21:6) features the shapes and characteristics of the later Iron IIC anomalous types. The main distinctions lie in rim size and profile; the earlier example is strongly inverted and flattened while the Iron II examples tend, for the most part, to be rounded and angled upward to a sharper degree.

The examples associated with the Iron IIC period, c. 800-586 BCE, have been divided into three groups, types 5, 6 and 7. These types have, in turn, been classed into subtypes and can be noted below.

Type 5A: 2.02.005.D
.inverted rim profile
.rounded primary rim description
.no secondary rim description
.neckless

Type 5B: 2.02.001.D
.inverted rim profile
.rounded primary rim description
.secondary rim description of thickened to exterior
.neckless

Type 5C: 2.02.002.D
.inverted rim profile
.rounded primary rim description
.secondary rim description of ridge on exterior
.neckless

Type 5D: 2.02.004.D
.inverted rim profile
.rounded primary rim description
.secondary rim description of T-shaped
.neckless

Type 5E: 2.01.005.D
.inverted rim profile
.plain primary rim description
.no secondary rim description
.neckless

Type 5F: 2.01.001.D (Standard and Anomalous)
.inverted rim profile
.plain primary rim description
.secondary rim description of thickened to the exterior
.neckless

Type 5G: 2.01.002.D
.inverted rim profile
.plain primary rim description
.secondary rim description of ridge on exterior
.neckless

Type 5H: 2.03.001.D
.inverted rim profile
.tapered primary rim description
.secondary rim description of thickened to exterior
.neckless

Type 6A: 3.02.001.D
.flaring inverted rim profile
.rounded primary rim description
.secondary rim description of thickened to exterior
.neckless

Type 6B: 3.02.002.D
.flaring inverted rim profile
.rounded primary rim description
.secondary rim description of ridge on exterior
.neckless

Type 6C: 3.01.005.D
.flaring inverted rim profile
.plain primary rim description
.no secondary rim description
.neckless

Type 6D: 3.01.001.D
.flaring inverted rim profile
.plain primary rim description
.secondary rim description of thickened to exterior
.neckless

Type 6E: 3.01.002.D
.flaring inverted rim profile
.plain primary rim description
.secondary rim description of ridge on exterior
.neckless

Type 6F: 3.03.001.D
.flaring inverted rim profile
.tapered primary rim description
.secondary rim description of thickened to exterior
.neckless

Type 6G: 3.03.002.D
.flaring inverted rim profile
.tapered primary rim description
.secondary rim description of ridge on exterior
.neckless

Type 7A: 5.03.003.D
.flaring everted rim profile
.tapered primary rim description
.secondary rim description of rounded to interior
.neckless

Though the study revealed only a few main types of pithos, the variations in rim description create numerous subtypes. On the basis of percentages it may be assumed that the majority of all inverted rim profiles of the Iron IIC period can be associated with neckless vessels. The presence of necked vessels may simply be attributed to the continued use of pithoi which survived from earlier periods, for once in place, in a domestic structure or courtyard, a pithos could survive for generations; or, the presence of these necked pithoi may be a consequence of the continued production of aesthetically popular or functionally useful styles.

The majority of typed Iron IIC vessels are inverted, though one class of everted neckless vessels was distinguished. The untyped vessels of this period (Plate 22) are primarily of two rim styles; everted and vertical. There are a number of pithoi (Pt. 22:21, 26-28 and 39) which resemble the earlier Iron IA collared-rim pithos type. The inclusion of these latter types in the category of Iron IIC may, as mentioned above, be related to surviving traditions, or even vessels, from the earlier period.

Hypotheses regarding the functional purposes of neckless pithoi are noted below.

The statistical analysis in its entirety, supplemented by plates, indicates that the neck characteristics of pithoi are notable throughout the periods; the neck becomes increasingly residual over time until it predominantly disappears. Therefore, on the basis of neck shape and height, untyped examples 18:5-6 can be classed as belonging to the Iron IIC period. Examples 18:8-14, however, can be classified more specifically. The remaining untyped and undated samples of Plate 18 were studied in relation to the Iron II sample as a whole and the following analogies were revealed: 18:8 and 11 as Type 5A including 18:9 as a more exaggerated version of this type; 18:12 as Type 5F Standard; 18:14 as ascribable to Type 6C; and 18:10 and 13 as belonging to Type 7A.

As a result of the skew in the overall sample in favour of Central Hill Country sites and vessels, this analysis has been especially indicative of types particular to this region of Eretz Israel. Type 1, a collared-rim pithos with an everted rim profile, is, in this study, particular to the Central Hill Country for of fourteen examples only one is found in another region, the Negev. The Transitional period produced two types of pithoi, the examples being divided almost equally between two zones, the Central Hill Country and the Negev. The types were divided, in turn, between those with a vertical rim profile (Type 2) and those characterized by an everted rim profile (Type 3). The Iron IIA material produced a predominant trend which is illustrated in Type 4. The majority of examples from this sample of fourteen fall into a category characterized by vertical rim profiles associated with necked vessels of

various heights, including residual necks. It becomes apparent that the styles which distinguished the earlier types are changing. Once again the emphasis was upon the Central Hill Country for only three examples originated in the Negev.

The last types, Types 5, 6 and 7, are the product of a large sample which held examples from all regions, though the Central Hill Country is the best represented. The majority of the sample is characterized by rim profiles of an inverted nature. These were further subdivided between inverted and flaring inverted rim profiles, all of which were associated with neckless vessels. As a result of the size and scope of the Iron IIC collection, necked vessels of all heights and shapes are also represented.

An analysis of the collected material (224 samples) presented several possibilities for correlations between pithos usage and shape in relation to geographical factors. The essential role of cisterns and silos at the majority of sites in all regions must be clearly understood, however, before presenting hypotheses concerning the position of the pithos in daily private and commercial life in Iron Age Judah. These two primary installations for both growing and established populations, the cistern and silo, played a pivotal role in the sedentarization process in Judah and in later community life providing, as they did, a sure supply of water and comestibles.

The northern Negev produced a high grain yield, the locale not being particularly conducive to the cultivation of the grape and olive. Grain was a basic requirement of Judean life, as in all regions of the world throughout history, and where settlement was tentative it can be assumed that grain supplies and, if of limited availability, water were to be

found in pithoi. The large established occupation sites also employed pithoi for the storage of perishables but they could be utilized in conjunction with storehouses; this option created the opportunity to practice storage in bulk. On the basis of archaeological evidence it would appear that the large-scale storage of dry goods was preferable in low-necked and, later, neckless vessels; the preponderance of inverted rims associated with these pithoi was possibly discovered to have been more effective for the sealing and protection of some stored goods. The presence of a quantity of necked vessels at Negebite sites may be attributable to the regional importation of liquid commodities from the hill country or Lowland areas, such as wine and oil.

The Central Hill Country and Shephelah and, on the basis of similarities in terrain and resources, the Moab region of the Transjordan were relatively well-watered and fertile zones. The sites associated with these regions were relatively well supplied with cisterns and silos. Agricultural trends particular to these areas included the cultivation of the vine and olive, the byproducts of which were in demand both locally and in distant regions. The market for these products encouraged their large scale output for distribution purposes. The competitive production of these marketable resources necessitated large and convenient storage facilities. This need for storage space was seemingly satisfied by necked pithoi; the high neck feature predominated in the early stages of the Iron Age, but its presence can be noted in all periods.

In heavily populated areas such as the Central Hill Country and Shephelah it would appear that necked vessels were primarily employed in the storage of liquids, until the production of neckless vessels in the

Iron IIC came to predominate in Judah. Throughout history, until the present, necked vessels have characteristically served for the storage of liquids, possibly because the narrowed dimensions of the neck protect the contents from the intrusion of foreign elements to a greater degree than an open neckless vessel, and any pouring of liquids is facilitated by a neck and rim, particularly an everted rim. Liquids, such as wine, would be more sensitive to spoilage through contact with foreign elements, particularly bacteria, than would dry comestibles. The neckless vessels which predominated in the Negev would also have adequately protected dry goods from both bacterial spoilage and, further, rodents, while the open neck would have eased the removal of the stored dried goods on a regular basis.

Despite these proposed distinctions between vessel shape, function and locale the pithos could be used variously throughout Judah and even within a single region or site. The pithos was a large-scale storage vessel in use for personal and commercial purposes for a variety of goods. Although in most areas the water supply was, as mentioned, handled by cisterns, there were instances, such as Iron IA Giloh, where no reservoirs have been discovered and it can therefore be assumed that the pithoi held the water supply and any other essential items.

This study has attempted, by several means, to analyze and subsequently categorize the pithoi of Iron Age Judah. The historical-cultural approach outlined the economic and political position of Judah in the early and late Iron Ages. This overview reflected the gradual establishment of an Israelite presence in Eretz Israel which culminated in nationhood under Saul and David. This increasing sedentarization by a

large population created the need for a sure food supply, a factor of daily life which was reflected in the increased usage and consequently production of the pithos. The technology associated with cistern and silo usage also increased alongside pithos usage and the growing population. The manner in which the pithos was utilized can be hypothesized on the basis of the major resources found in particular geographical zones. The regions included within the boundaries of Judah were the Central Hill Country, the Shephelah and the Negev; the Transjordan was included on the basis of its similar hill country terrain and cultural history. The smaller storage jars found on Judean sites were also used to store goods, possibly trade items, brought into the region or site from other locales. The pithos, on the other hand, because of its cumbersome size, was probably utilized for the storage of products particular to the region and for those resources in constant demand, such as water.

In order to better understand the prominent position of the pithos within the structure of daily life in Iron Age Judah an ethno-archaeological approach was employed as a means of illustrating the vessel's function and its role within the pottery industry. This approach employed a combination of archaeological data and the study of ethnological reports detailing the techniques and mindset of modern pithos manufacturers in the Eastern Mediterranean.

Once the role of the pithos had been outlined, within the context of Judean history, selected pithoi from four geographical zones were analytically studied. The general character of Judean ceramics were set forth, followed by an account of the development of the pithos throughout Eretz Israel. The statistical program employed to "factor out" the chosen

thirteen variables indicated which of the these variables were valid for typological definitions. In conjunction with the assumed variables of body height, wall thickness and so on the factor analysis revealed that rim profile, primary and secondary rim descriptions and neck features were those variables upon which to base a typology. Consequently a "four-part" typology was established which produced, from the sample of 224 pithoi, seven types with associated subtypes. The subtypes were established on the basis of notable variations. The distinctions, however, based on the general appearance of the pithos, the place of the analyst's perceptions in the study and possible sporadic work deviations on the part of the ancient potter, were not great enough to create a new type. The statistical results and proposed typologies are primarily representative of the Central Hill Country in the Iron IIC and, to a lesser degree, the Negev. The skew in the data resulted from the disproportionate availability of field reports from sites throughout the hill country as opposed to other regions. Despite this imbalance the available data would seem to indicate that pithoi were present, to varying degrees, in all regions and at all times during the Iron Age. The number of samples from Central Hill Country sites would seem to indicate a strong reliance upon the pithos during all periods of occupation, from the Settlement Period to the end of the Iron Age in the Iron IIC period. Again, judging from the sample number, the Negev appears to have had a similar reliance upon the pithos, particularly the neckless pithos.

Through an historical, geographical and ethno-archaeological approach to archaeology this study has attempted to place a statistical and analytical analysis of pithoi within the context of Judean history and

culture. Further the typologies, in combination with the geographical information, enable one to place the pithos types within defined regions while proposing possible usages.

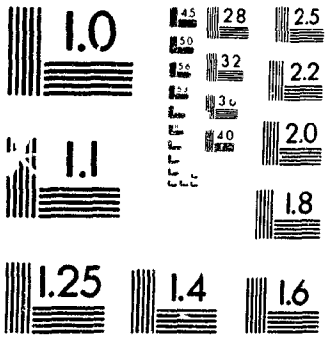


Plate 1

Iron IA
Type 1A: 4.02.005.A

Type 1B: 4.02.001.A

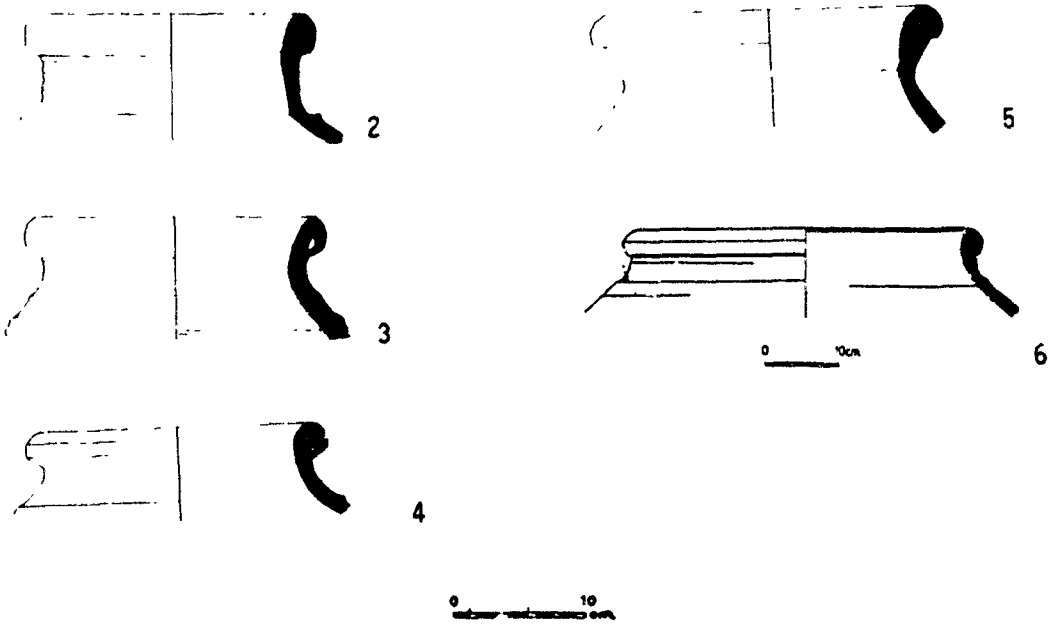
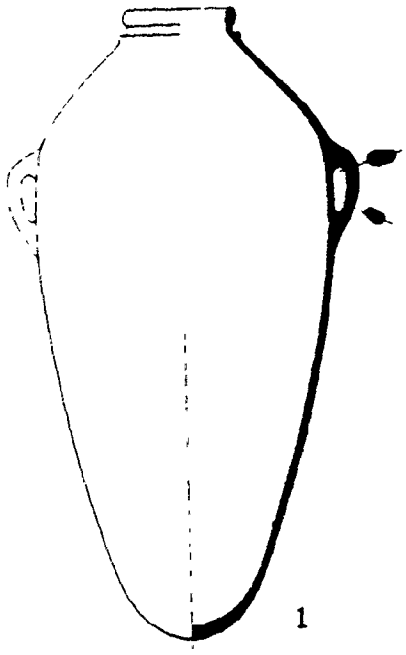


Plate 2

Transitional Period
Type 2A: 1.02.005.A



Type 2B: 1.02.001.A

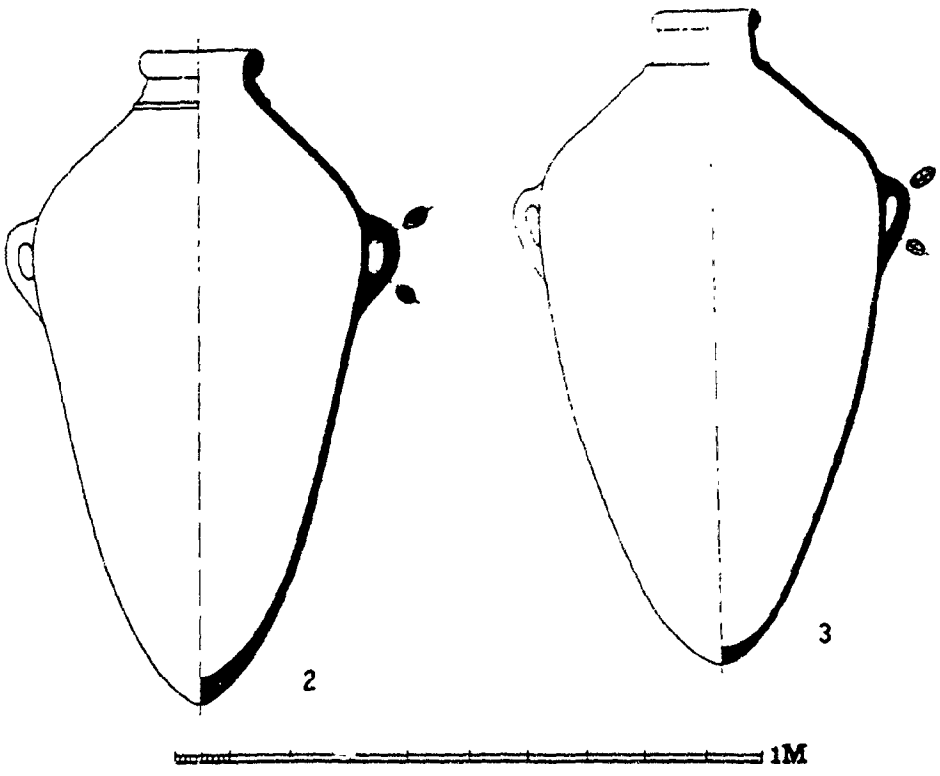
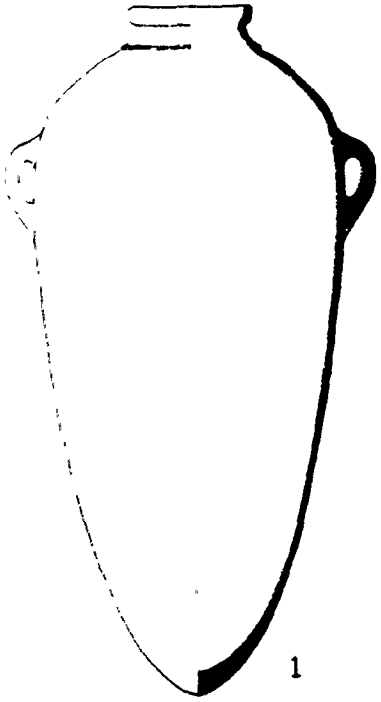


Plate 3

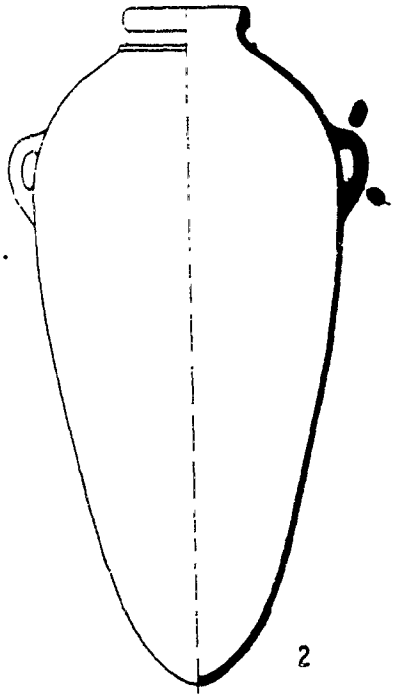
Transitional Period

Type 2C: 1.01.005.A



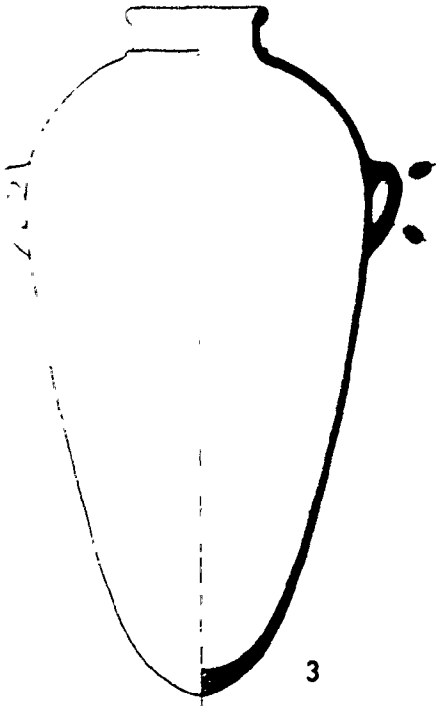
1

Type 2D: 1.03.005.A



2

Type 3A: 4.02.005.B/C



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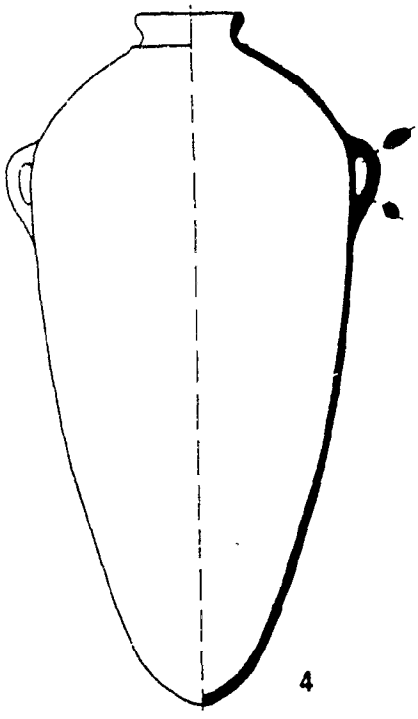
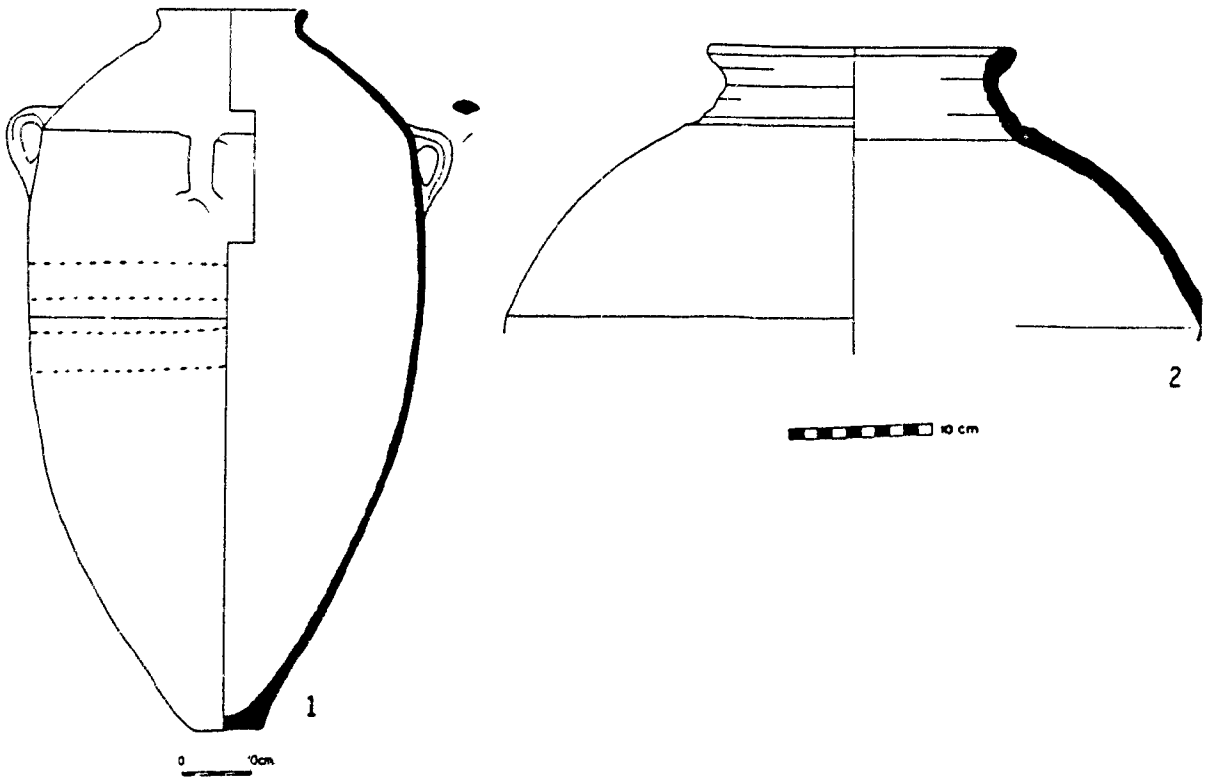


4

1M

Plate 4

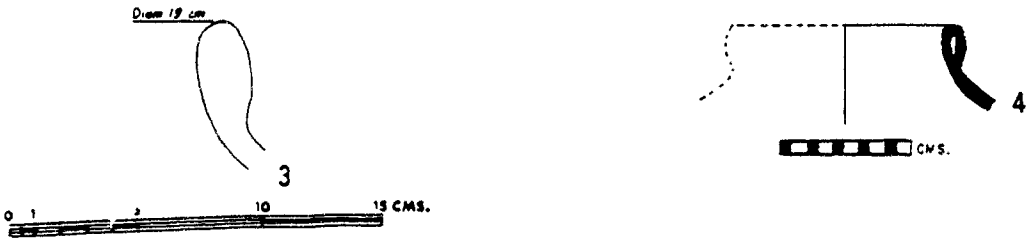
Transitional Period
Type 3B: 4.01.005.B/C



Iron IIA

Type 4A: 1.02.005.C/B

Type 4B: 1.02.001.C/B



Type 4C: 1.01.005.B/C

Type 4D: 1.01.001.C/B

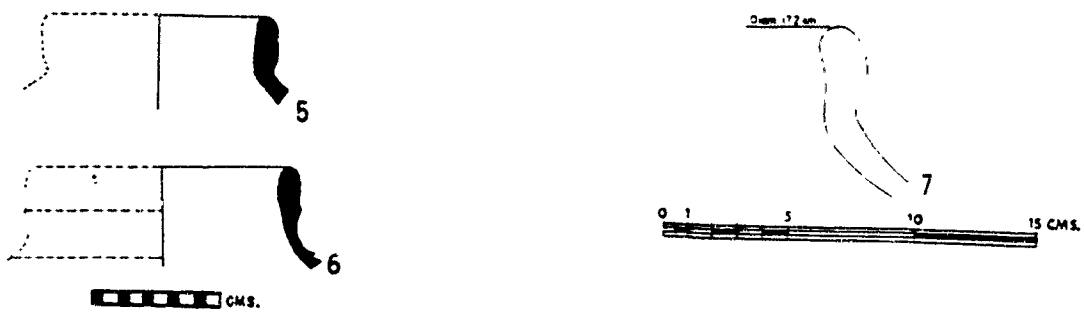
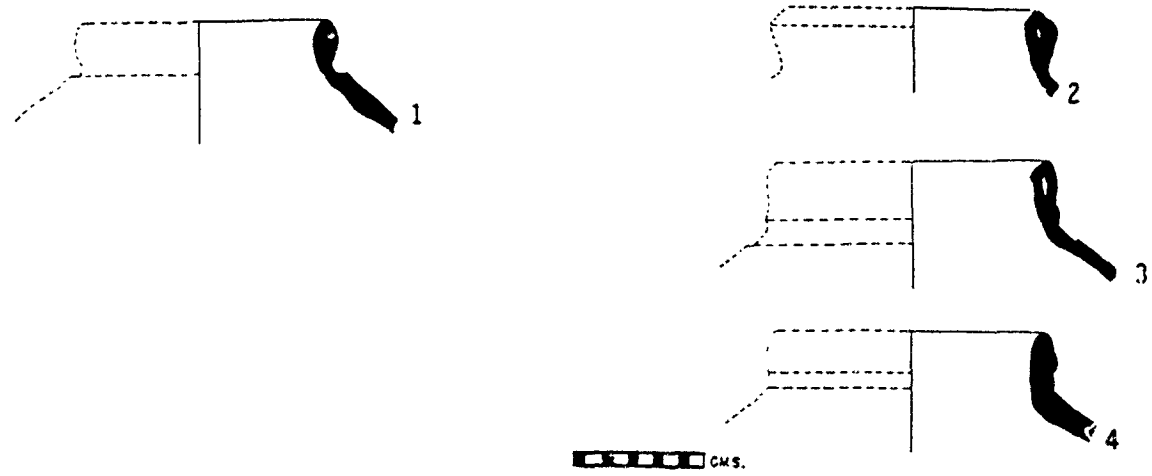


Plate 5

Iron IIA

Type 4E: 1.03.005.C/B

Type 4F: 1.03.001.B/C



Iron IIC

Type 5A: 2.02.005.D

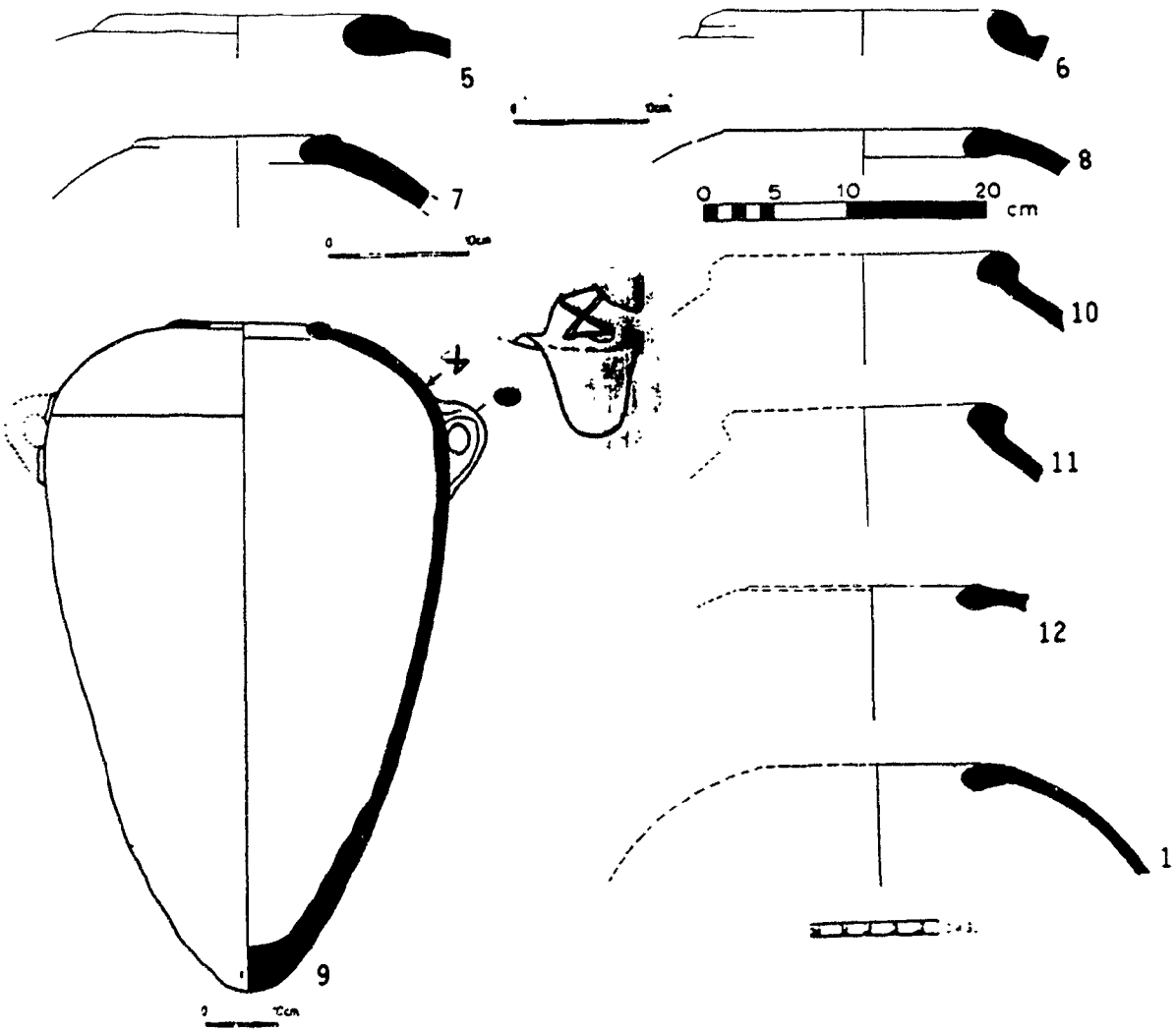
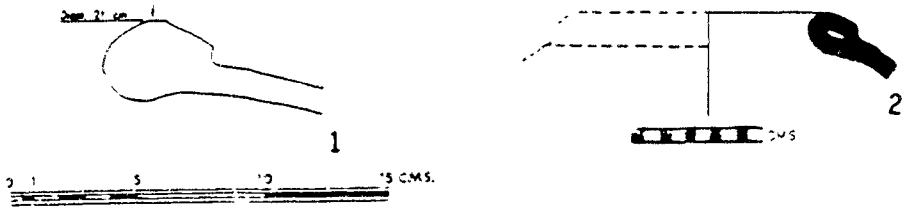


Plate 6

Iron IIC
Type 5B: 2.02.001.D



Type 5C: 2.02.002.D

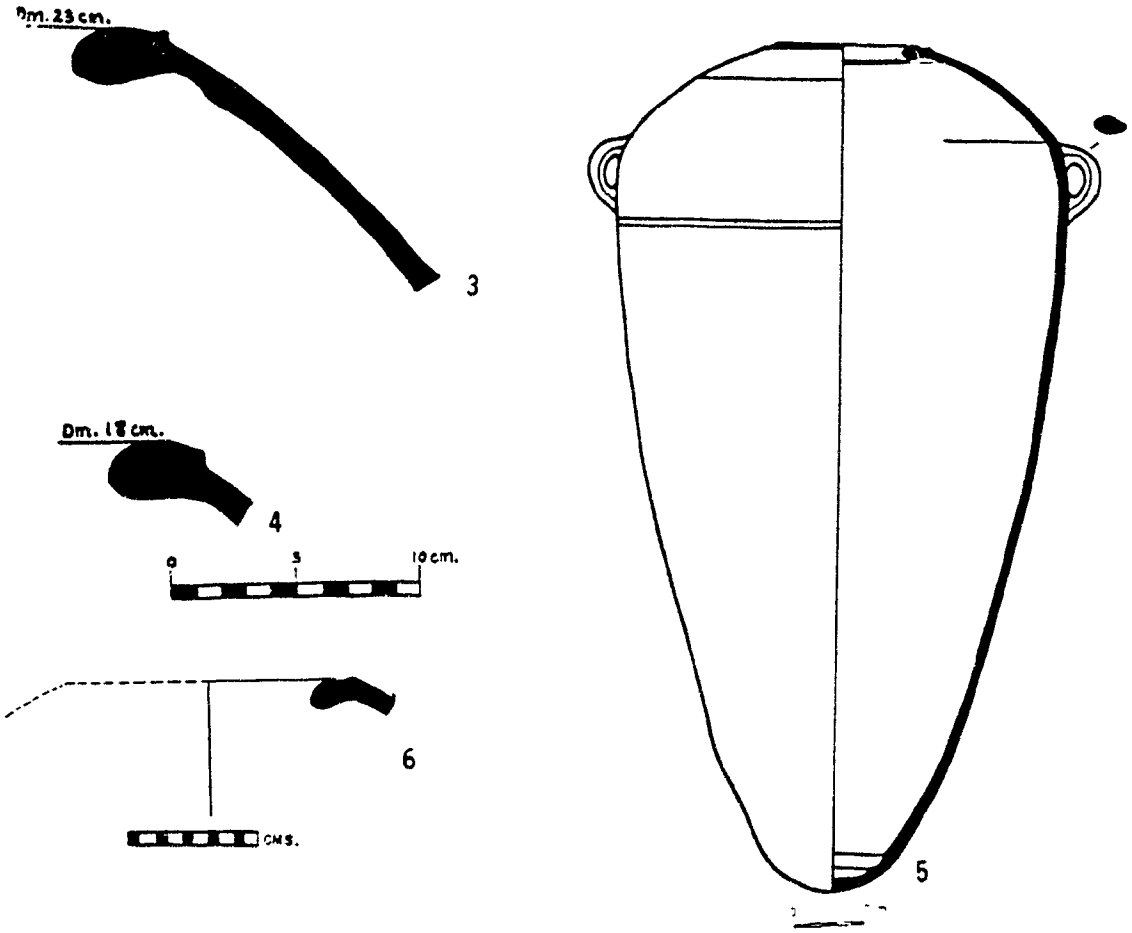
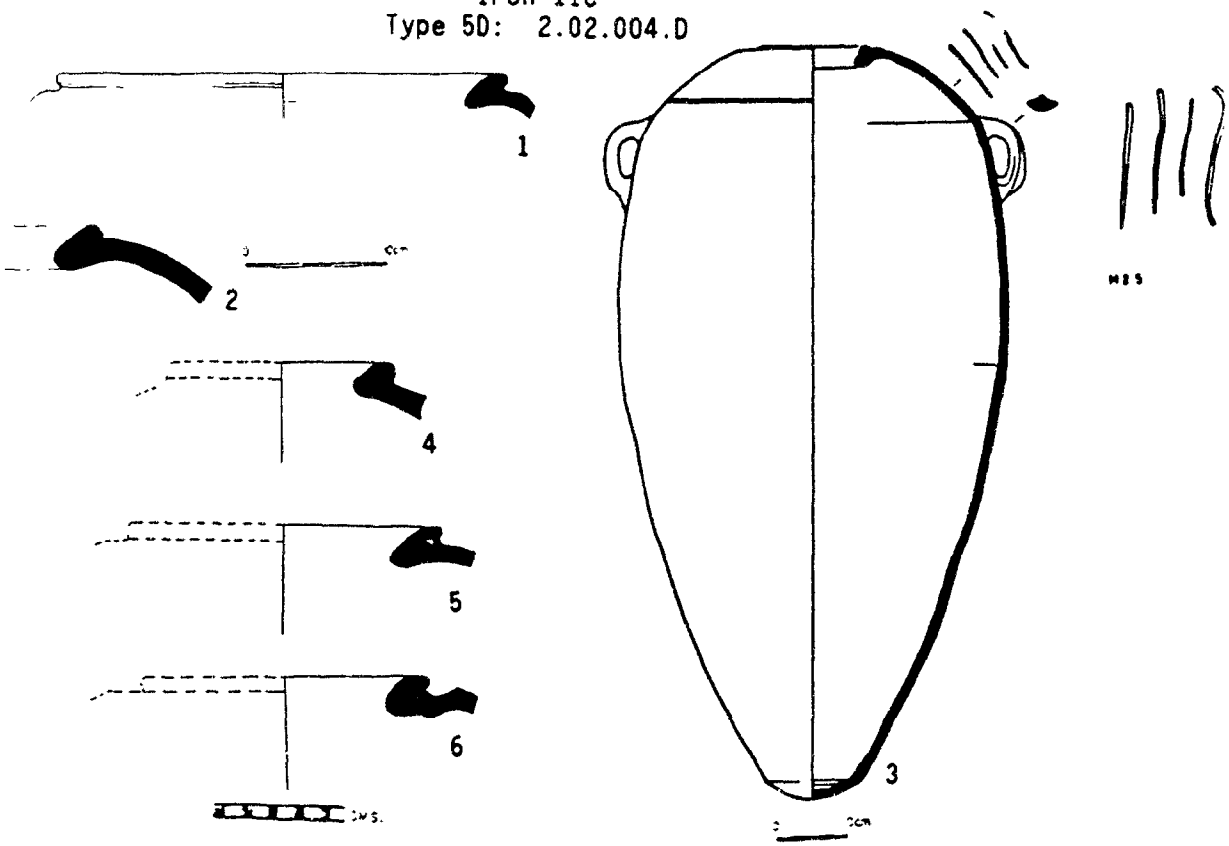


Plate 7

Iron IIC
Type 5D: 2.02.004.D



Type 5E: 2.01.005.D

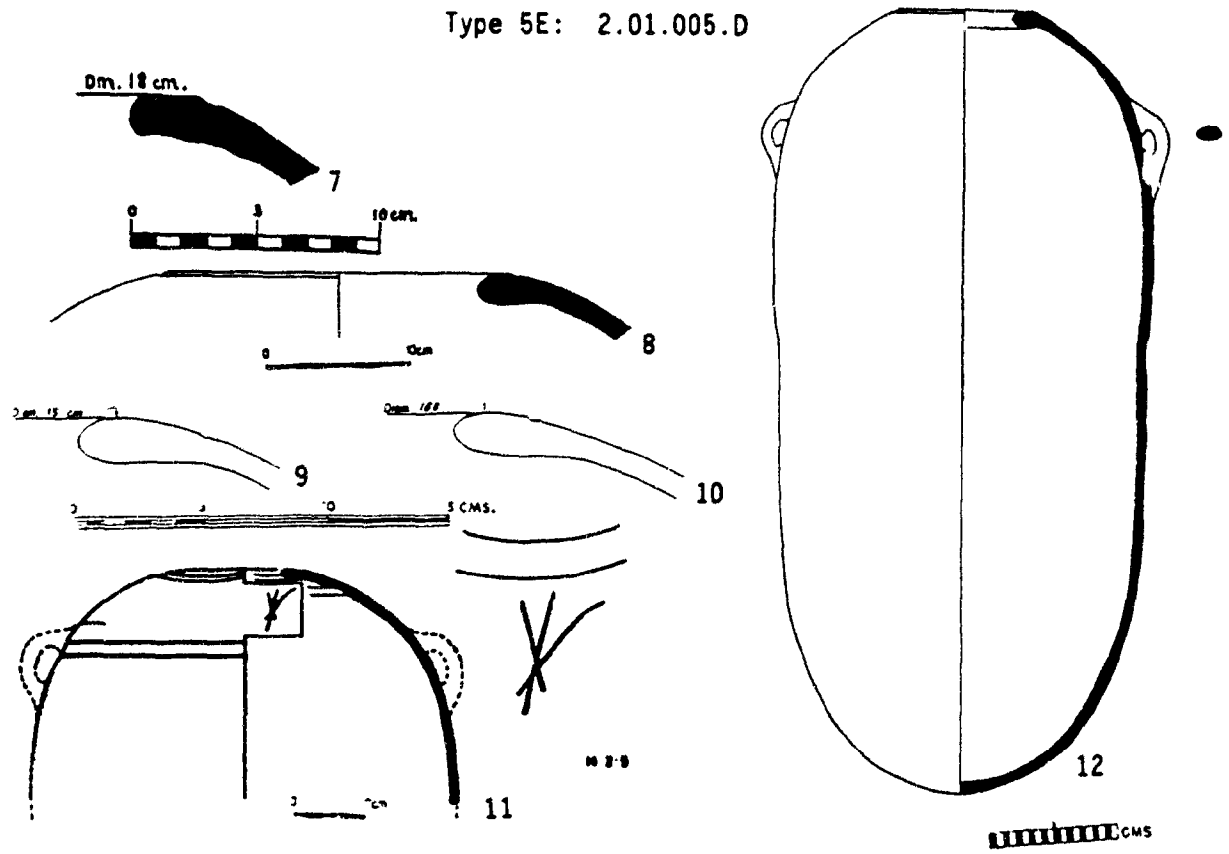


Plate 8

Iron IIC
Type 5F (Standard): 2.01.001.D

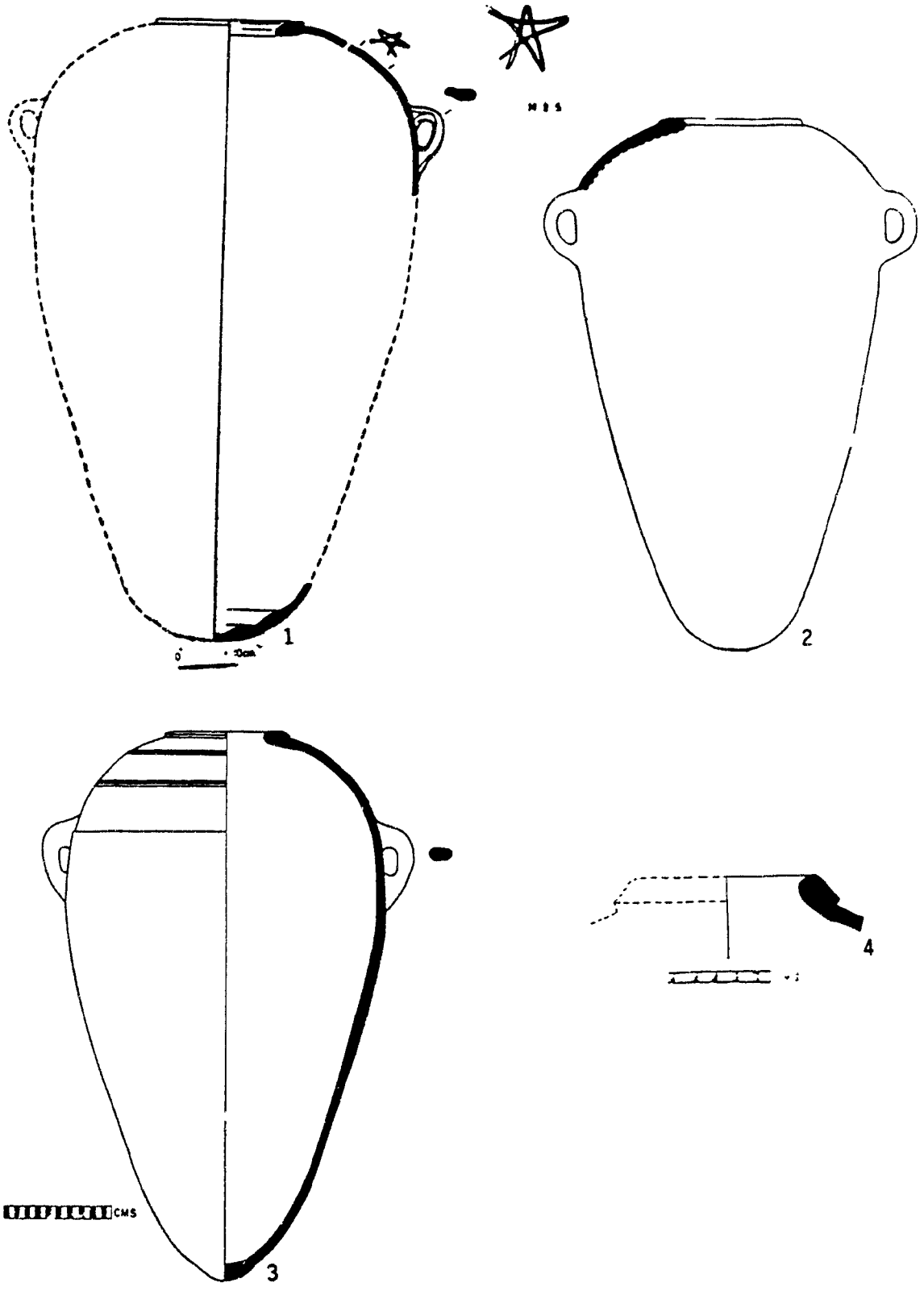


Plate 9

Iron IIC
Type 5F (Anomaly): 2.01.001.D

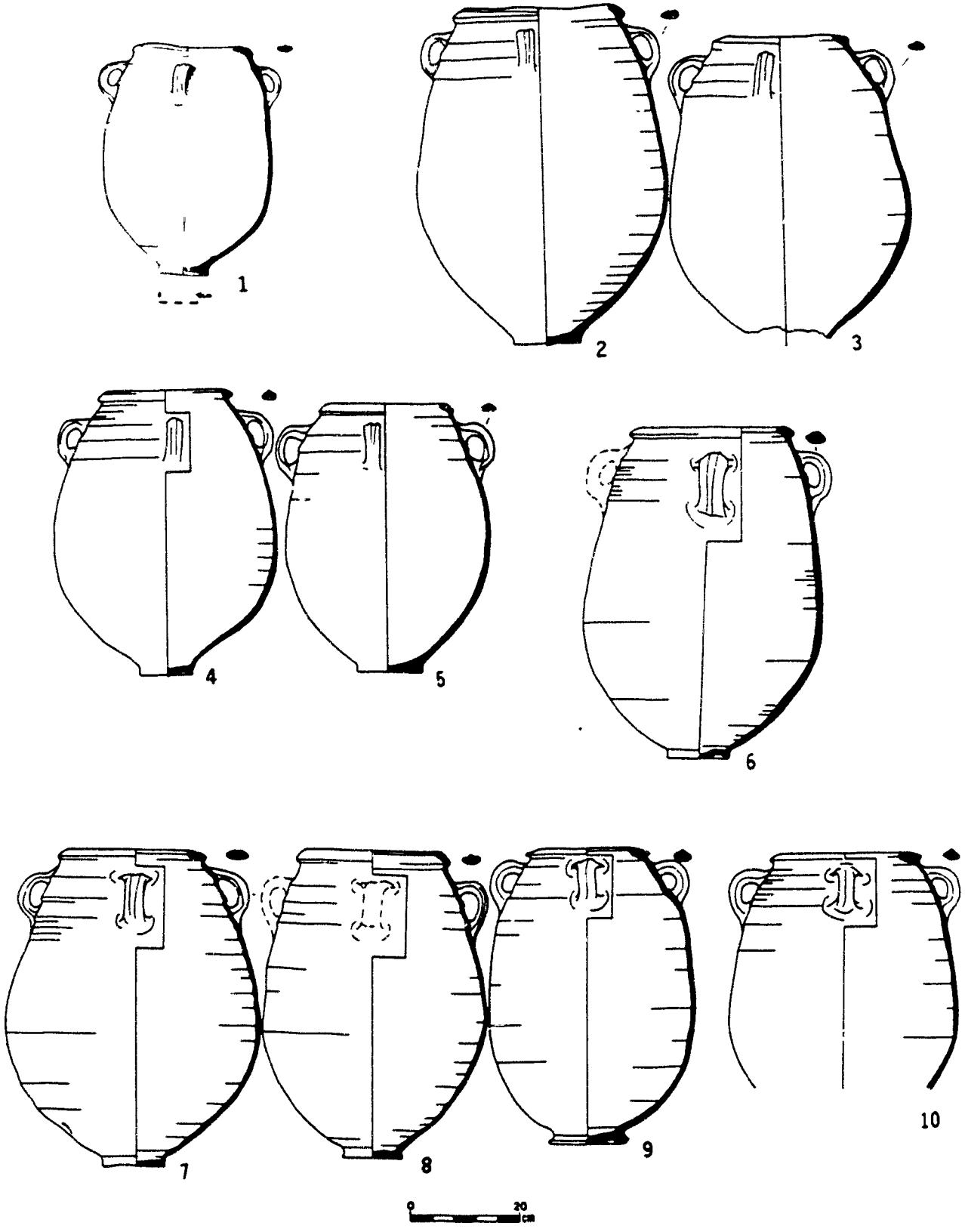


Plate 9, con't

Iron IIC
Type 5F (Anomaly): 2.01.001.D

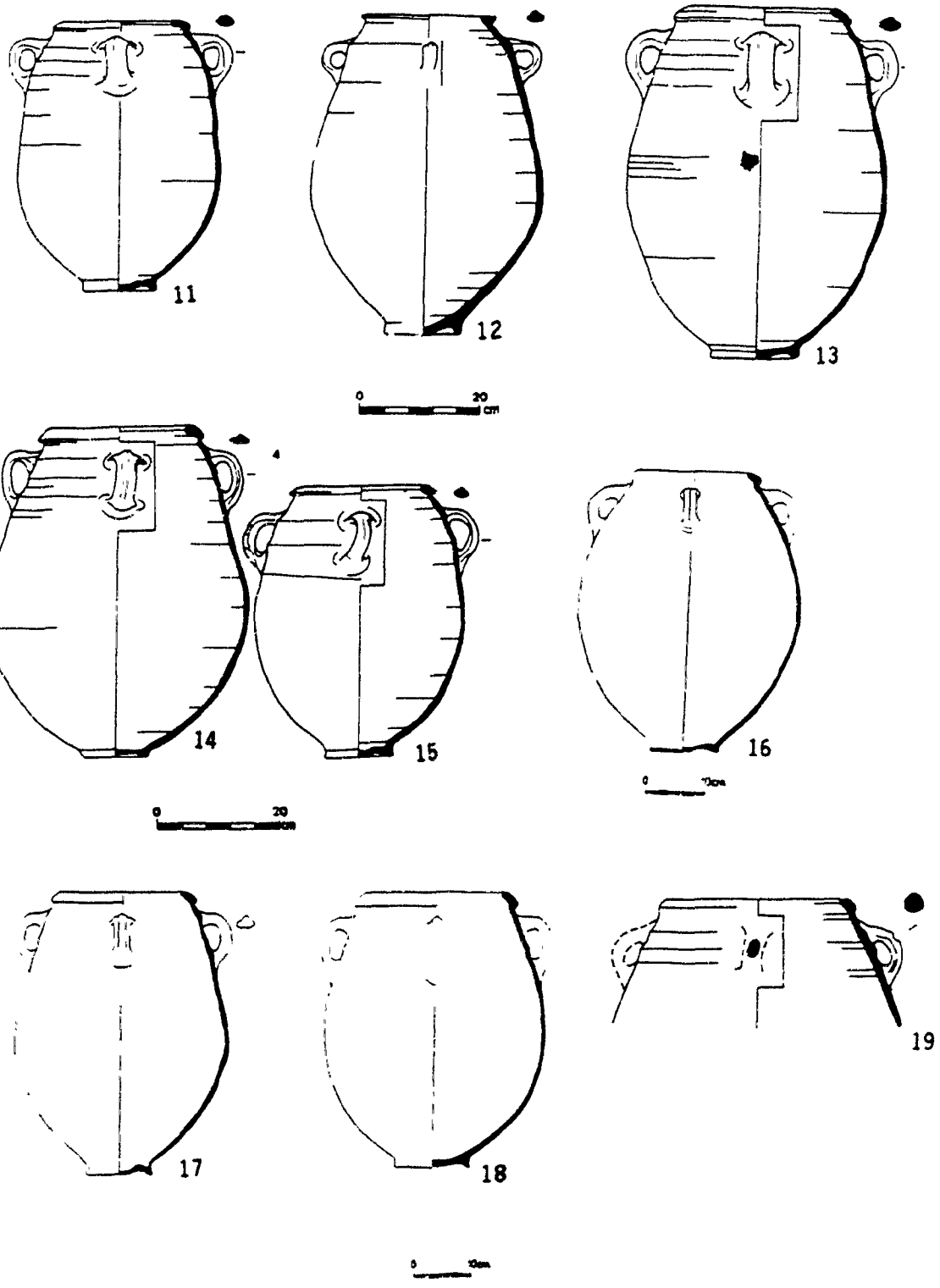


Plate 10

Iron IIC
Type 5G: 2.01.002.D

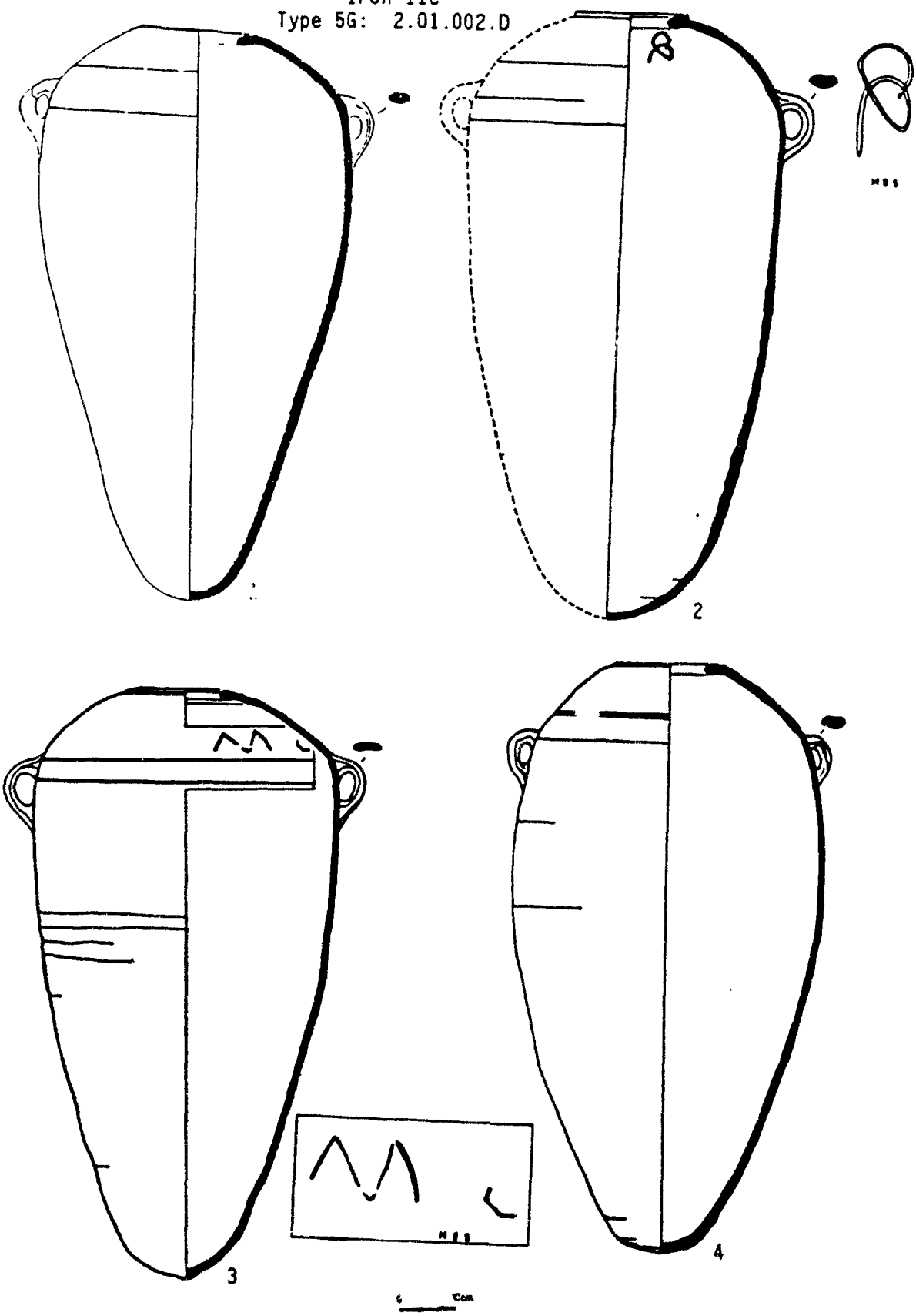


Plate 10, con't

Iron IIC
Type 5G: 2.01.002.D

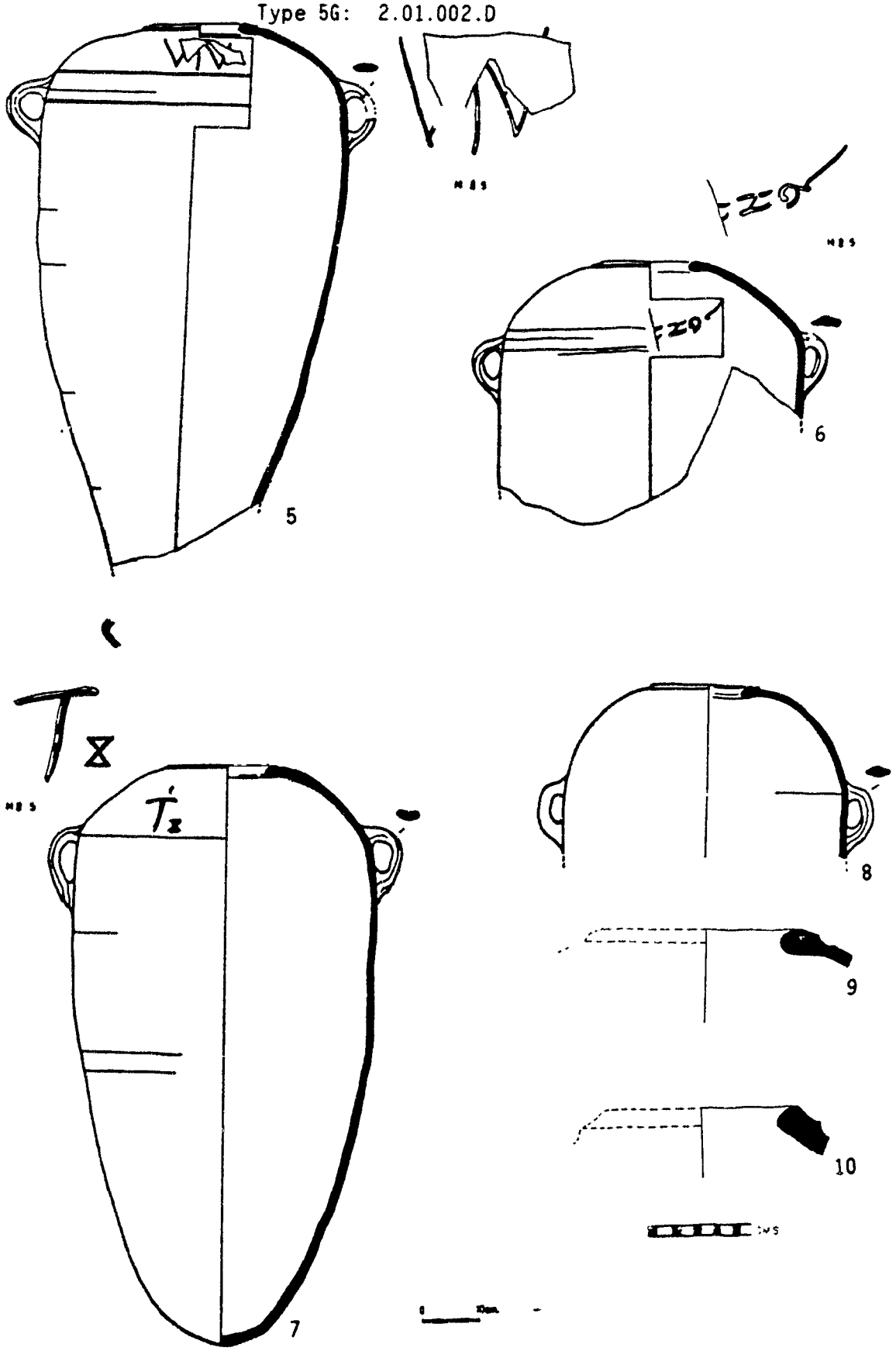
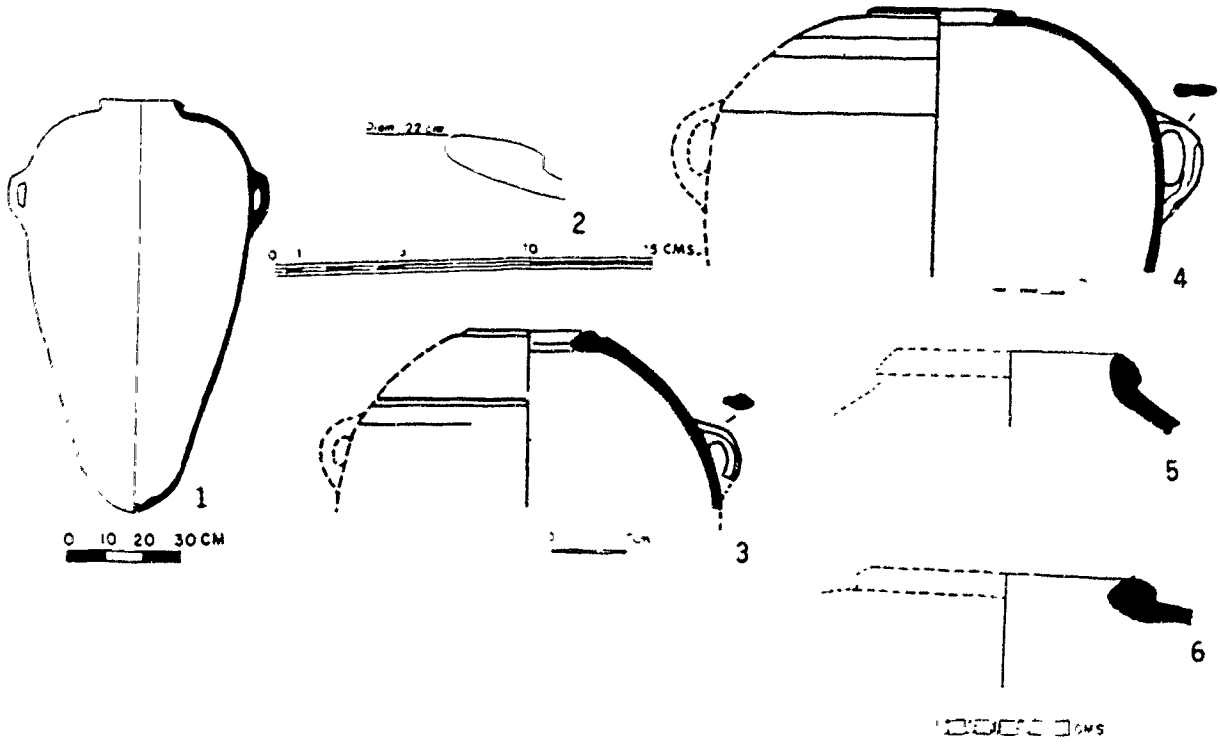


Plate 11

Iron IIC
Type 5H: 2.03.001.D



Type 6A: 3.02.001.D

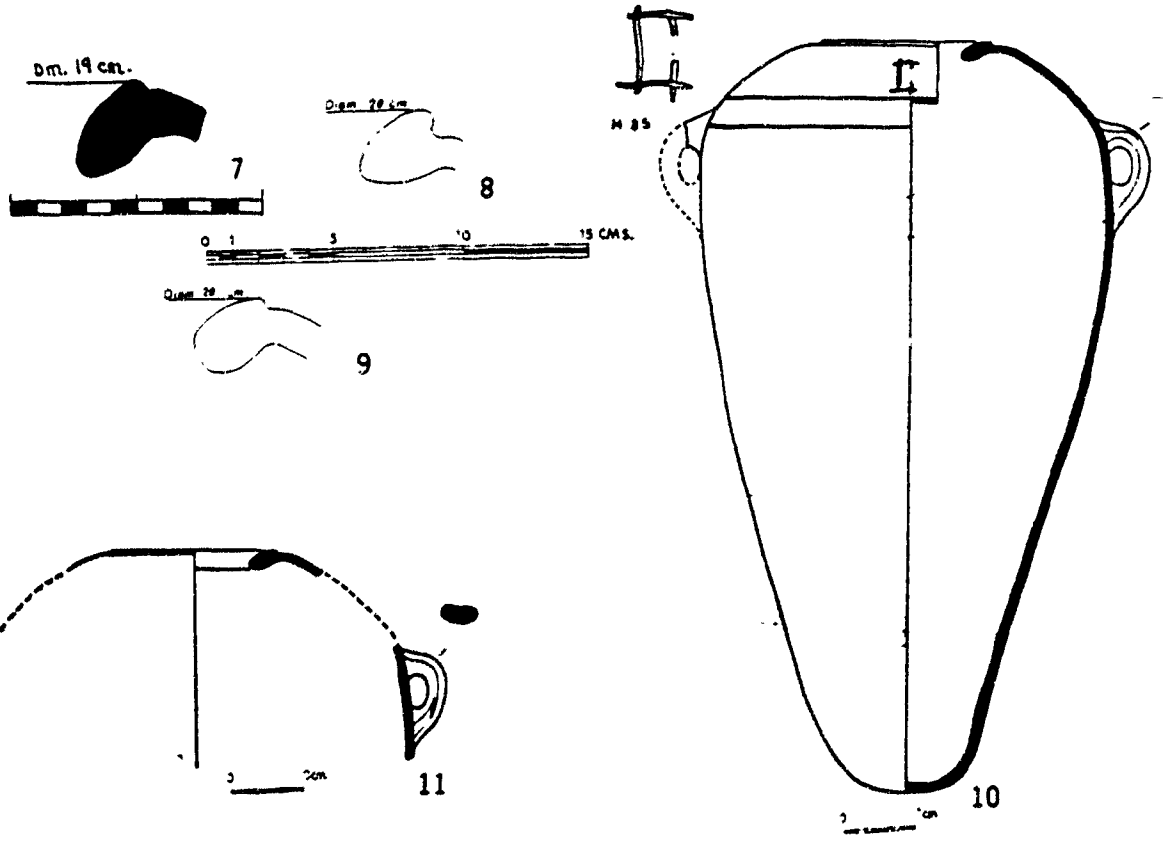
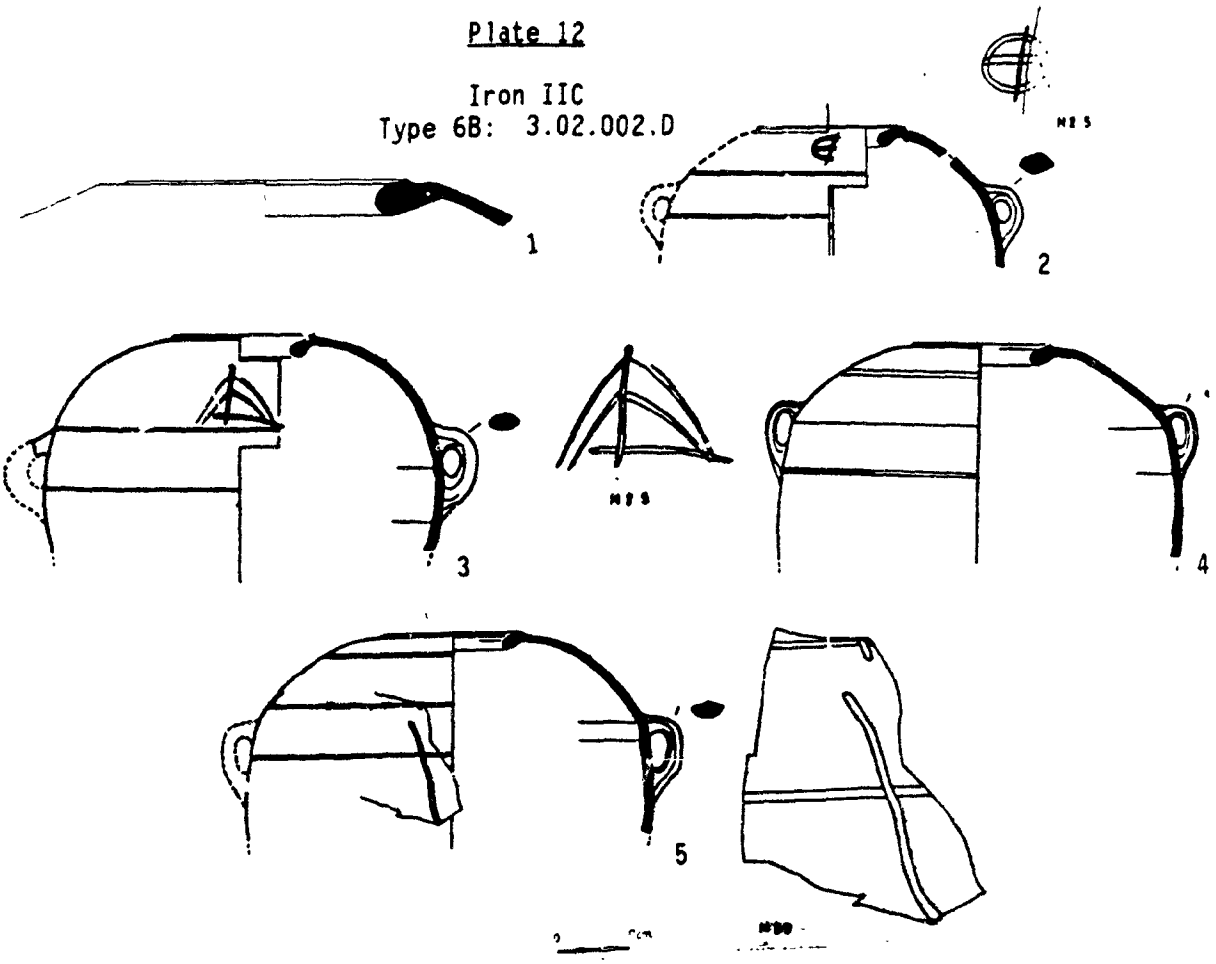


Plate 12

Iron IIC
Type 6B: 3.02.002.D



Type 6C: 3.01.005.D

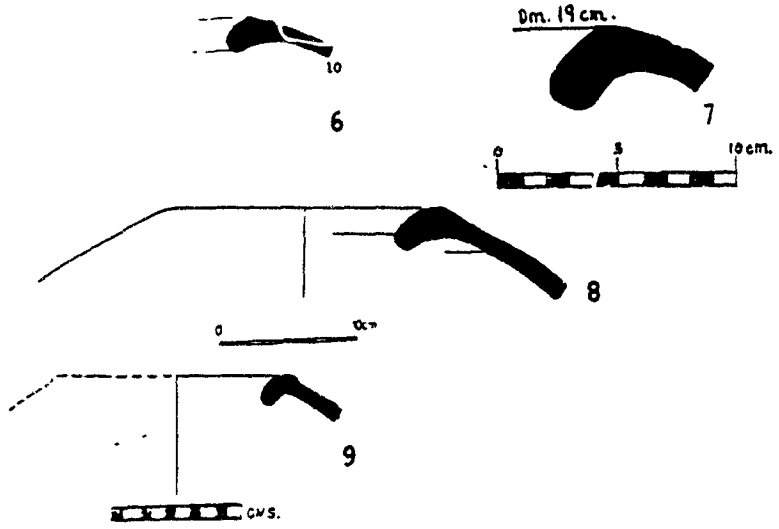


Plate 13

Iron IIC
Type 6D: 3.01.001.D

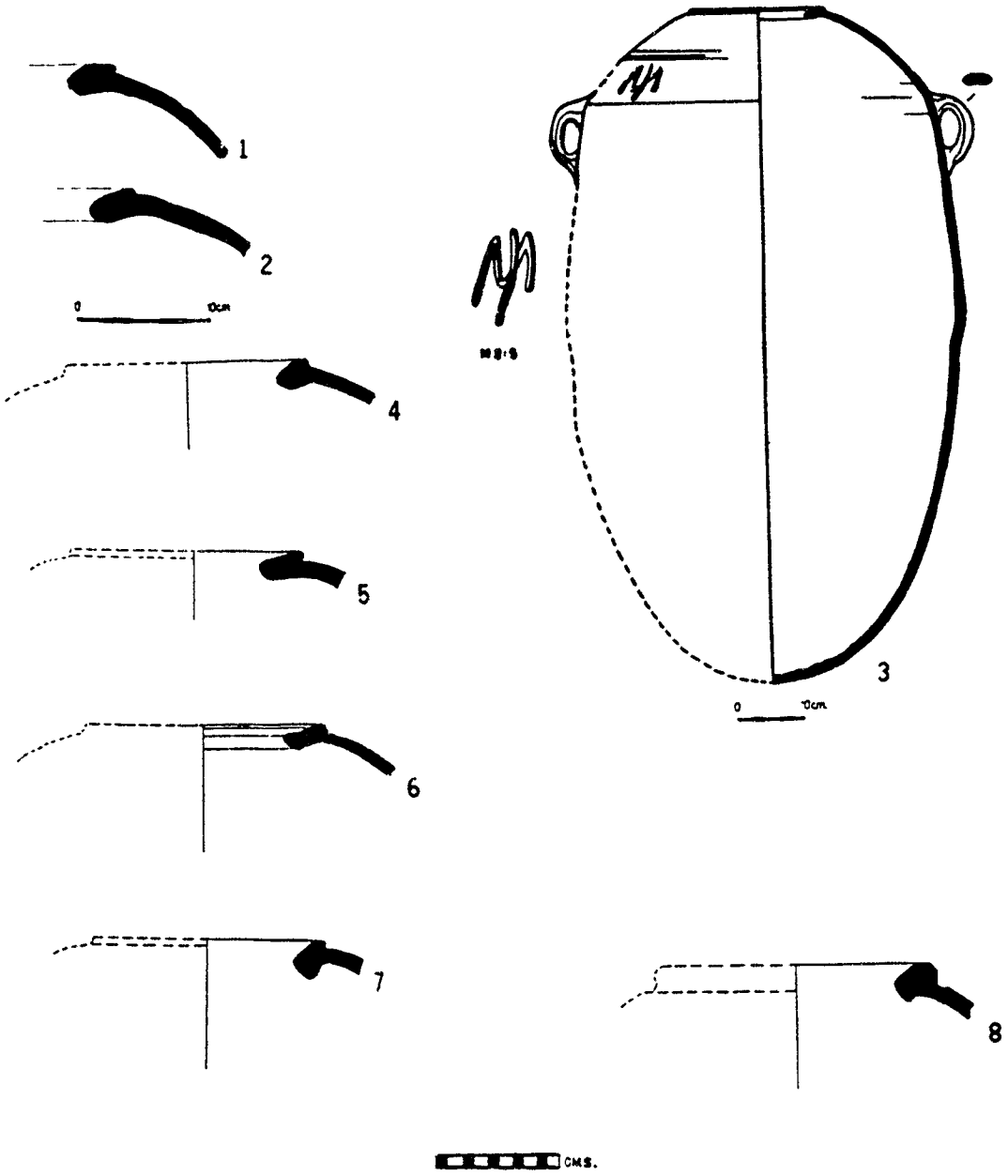


Plate 14

Iron IIC
Type 6E: 3.01.002.D

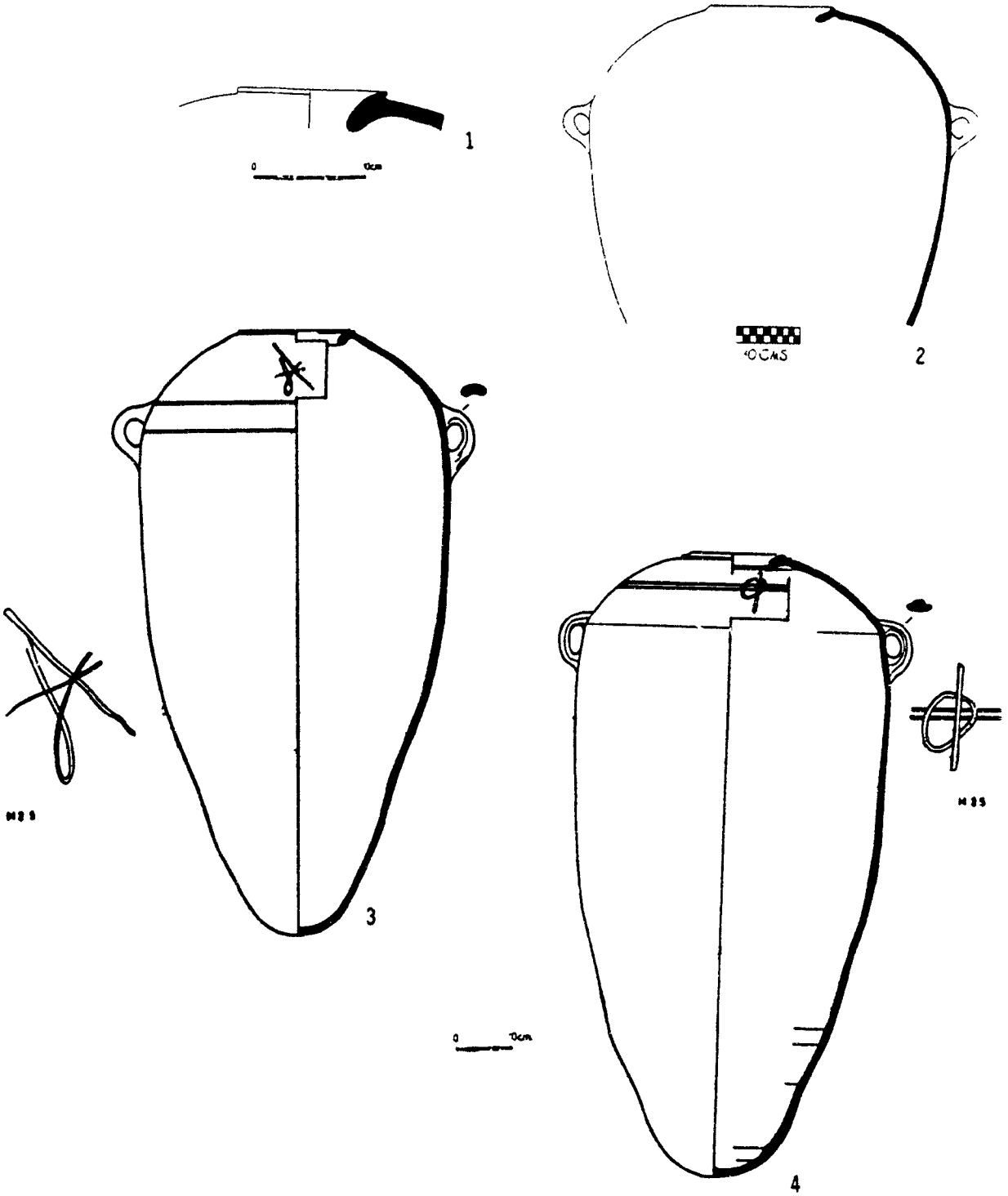


Plate 14, con't

Iron IIC
Type 6E: 3.01.002.D

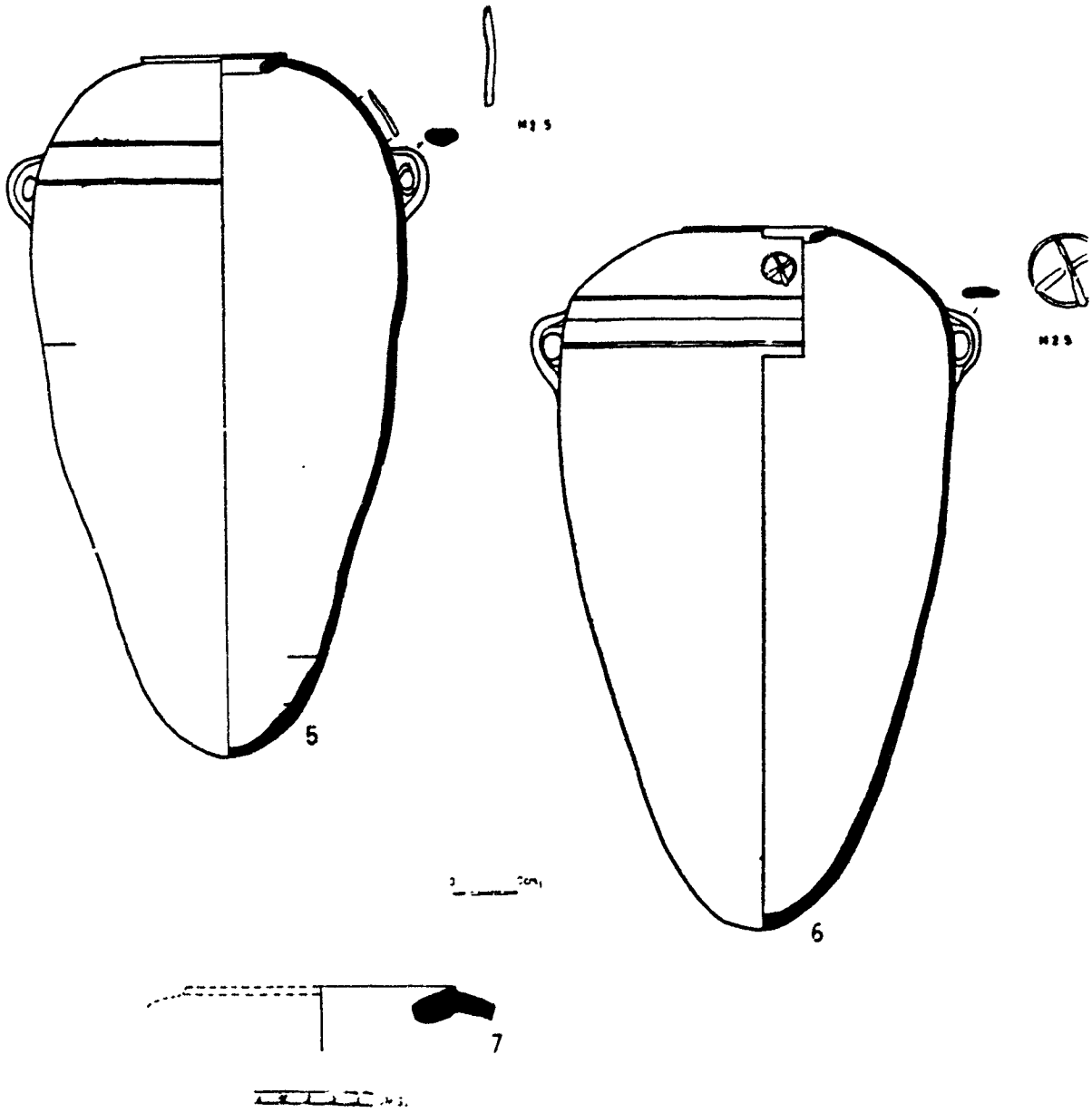


Plate 15

Iron IIC
Type 6F: 3.03.001.D

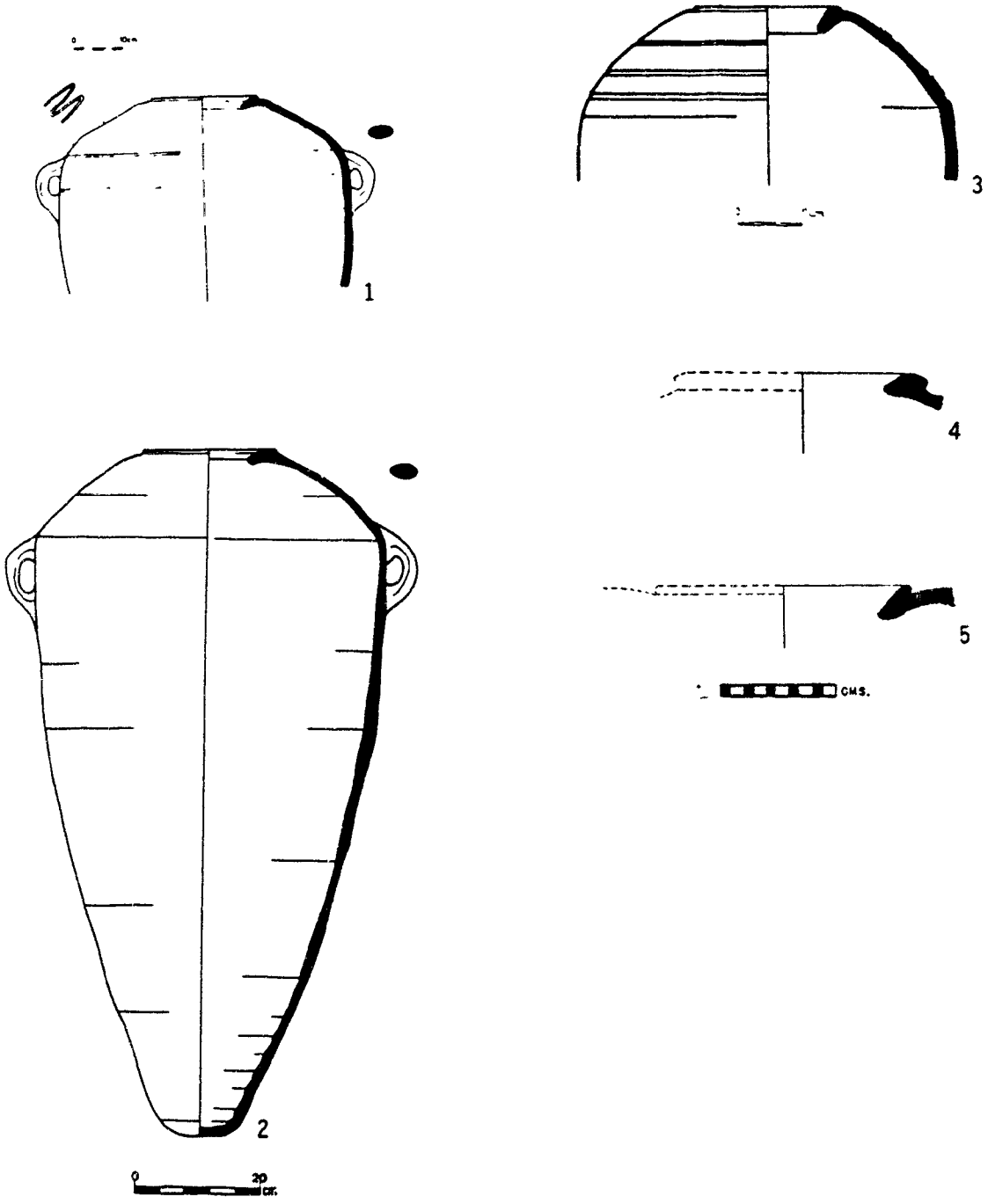


Plate 16

Iron IIC
Type 6G: 3.03.002.D

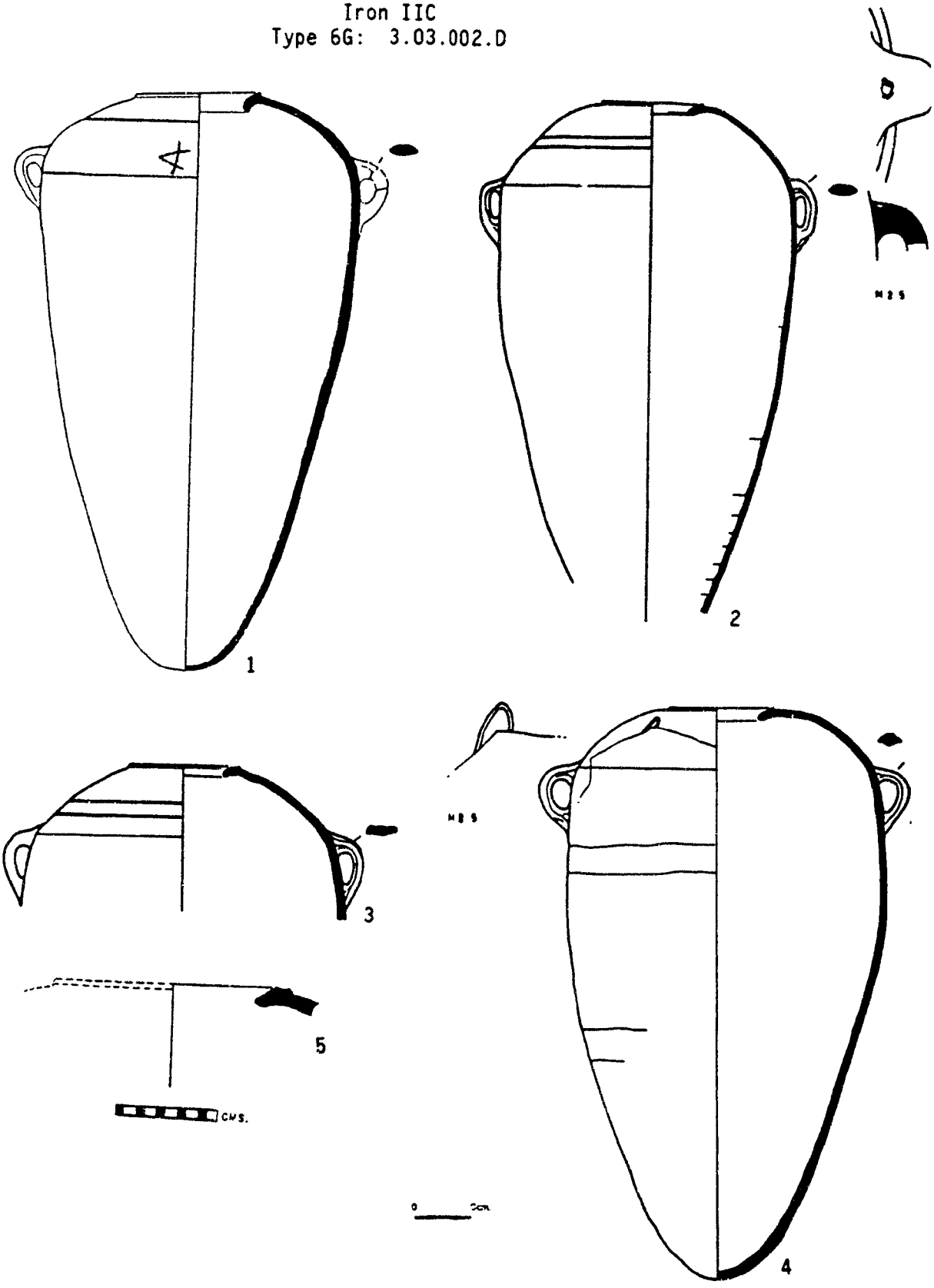


Plate 17

Iron IIC
Type 7A: 5.03.003.D

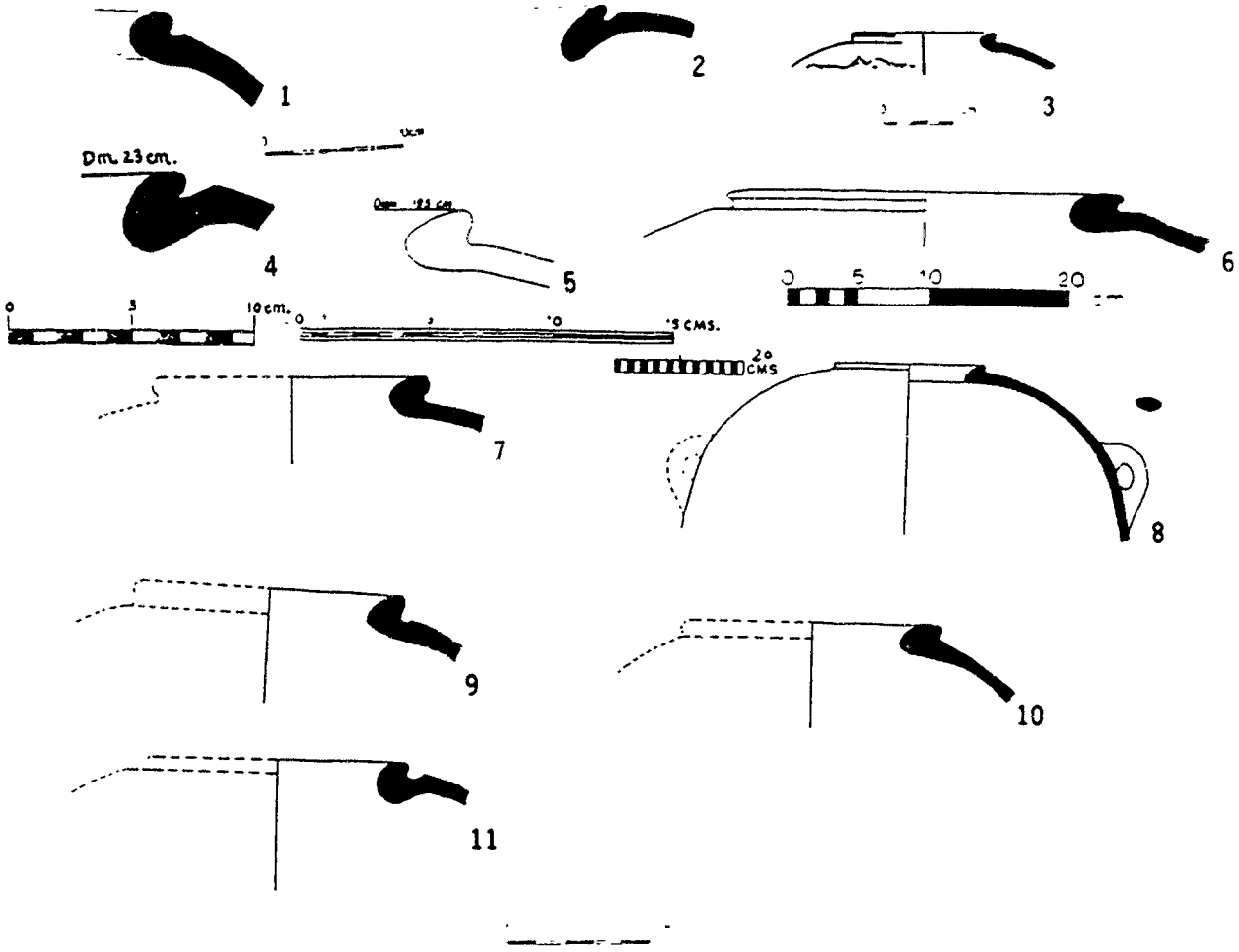


Plate 18

Date Unknown
Untyped Pithoi

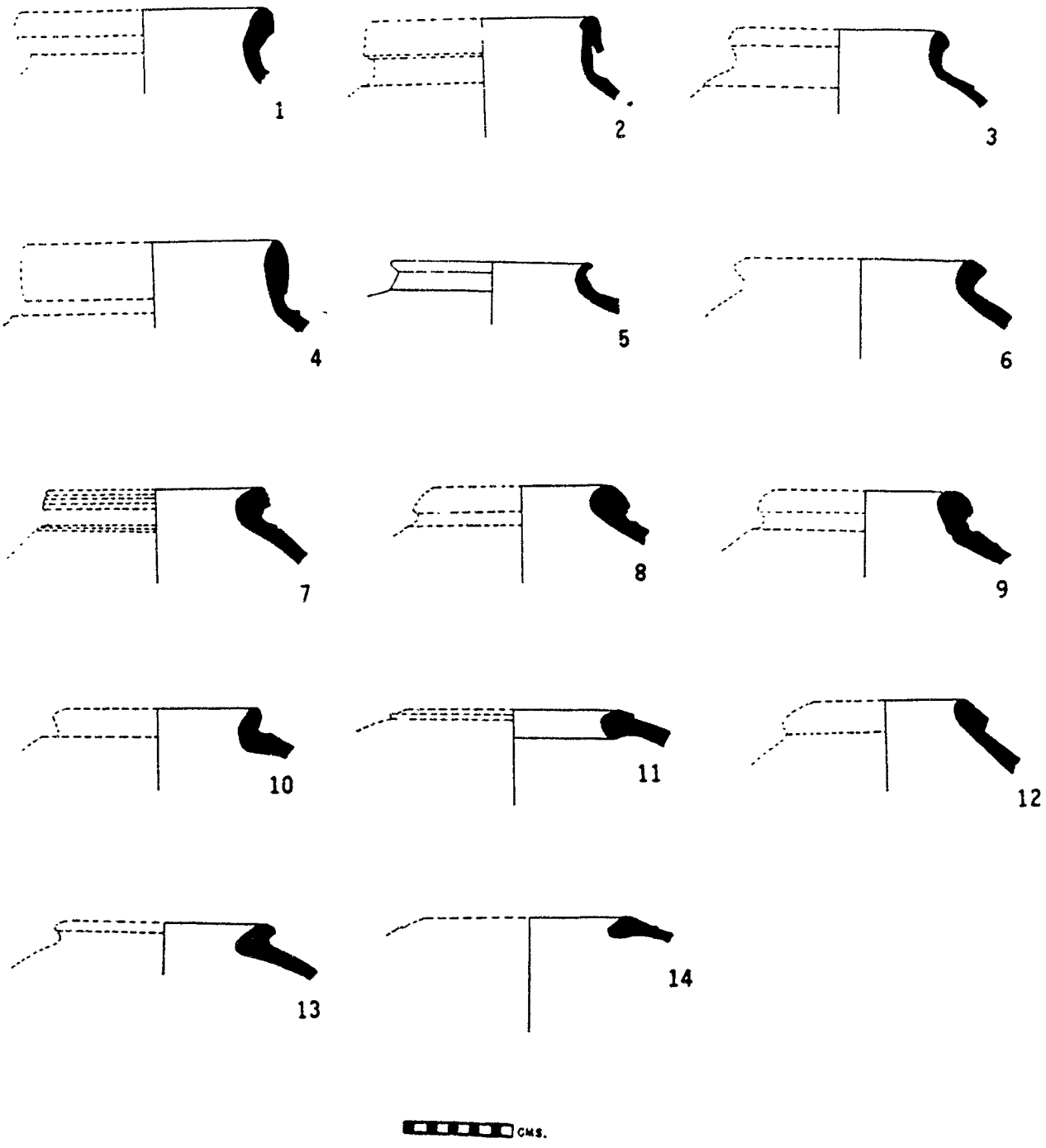


Plate 19

Iron IA
Untyped Pithoi

Iron IB
Untyped Pithoi

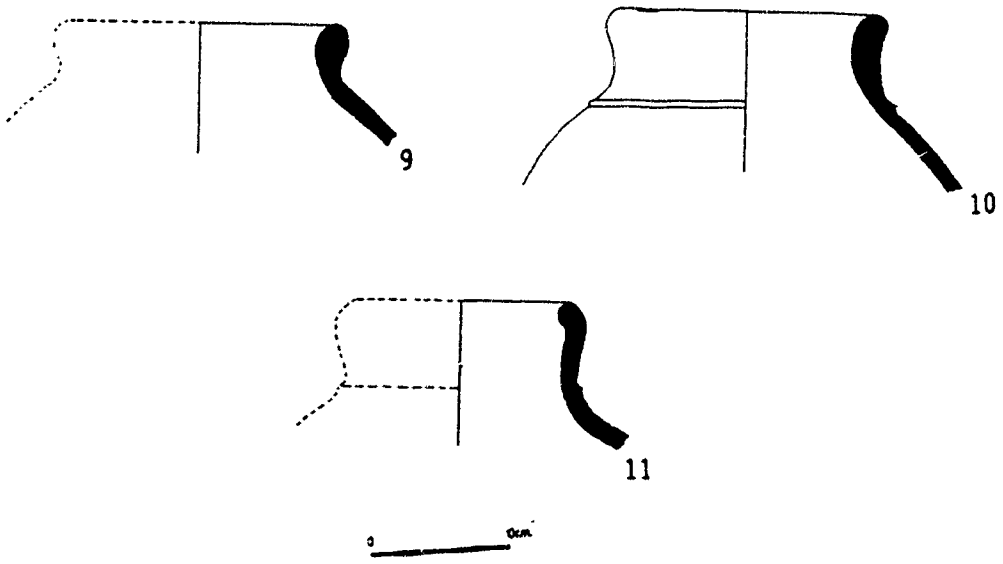


Plate 20

Transitional Period
Untyped Pithoi

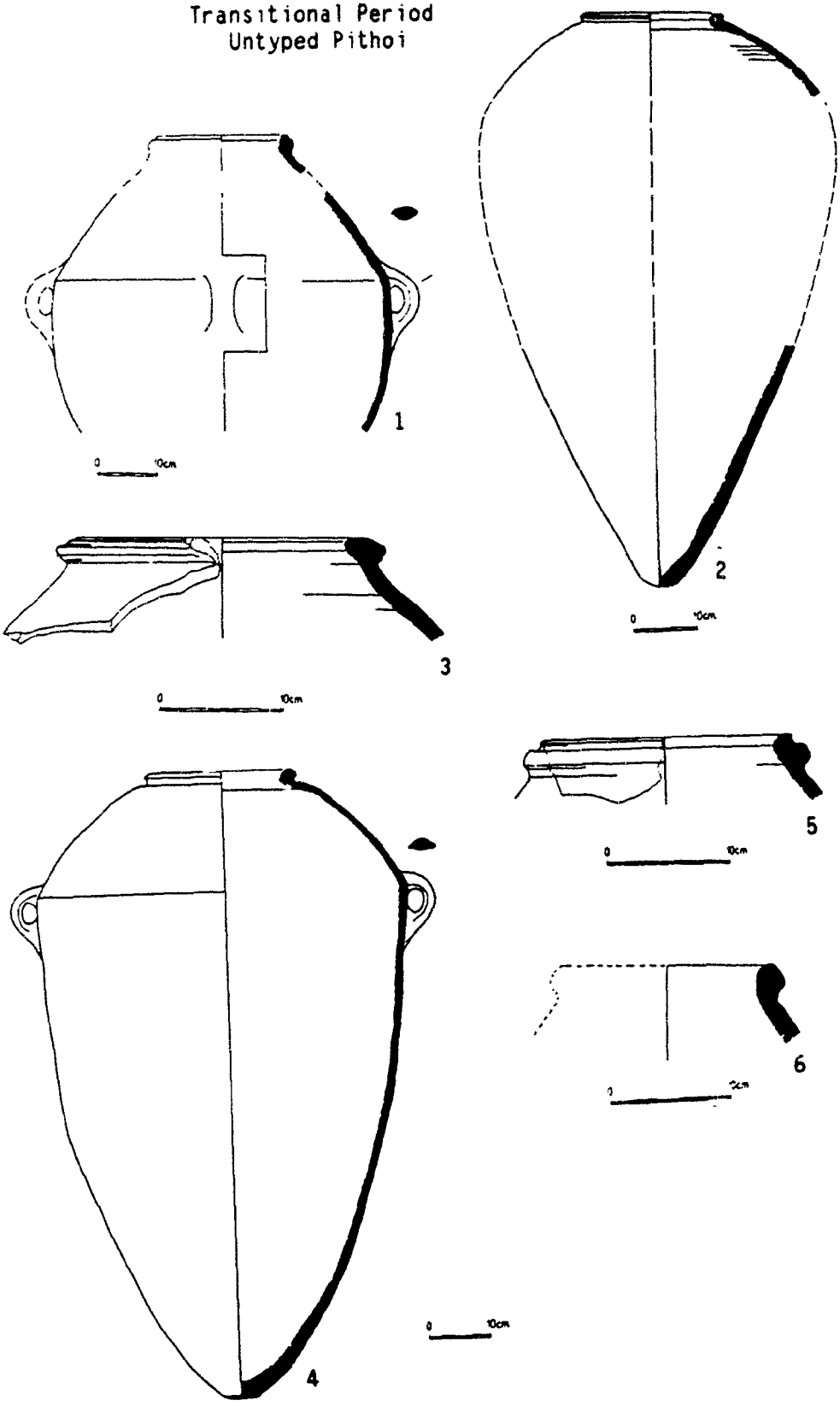
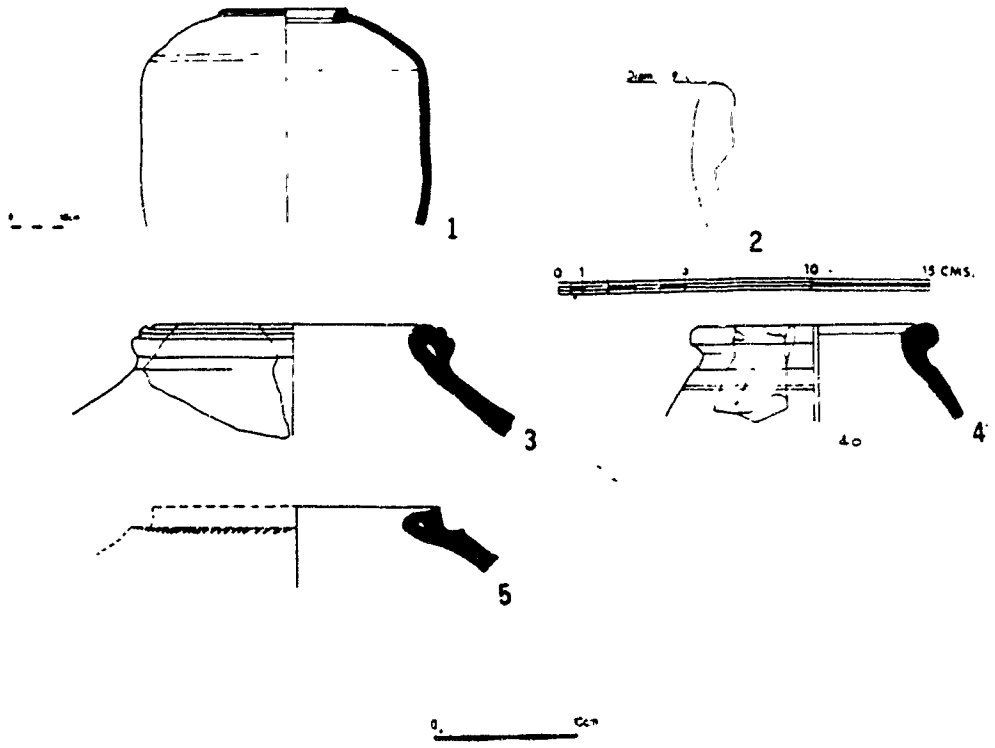


Plate 21

Iron IIA
Untyped Pithoi



Iron IIB
Untyped Pithoi

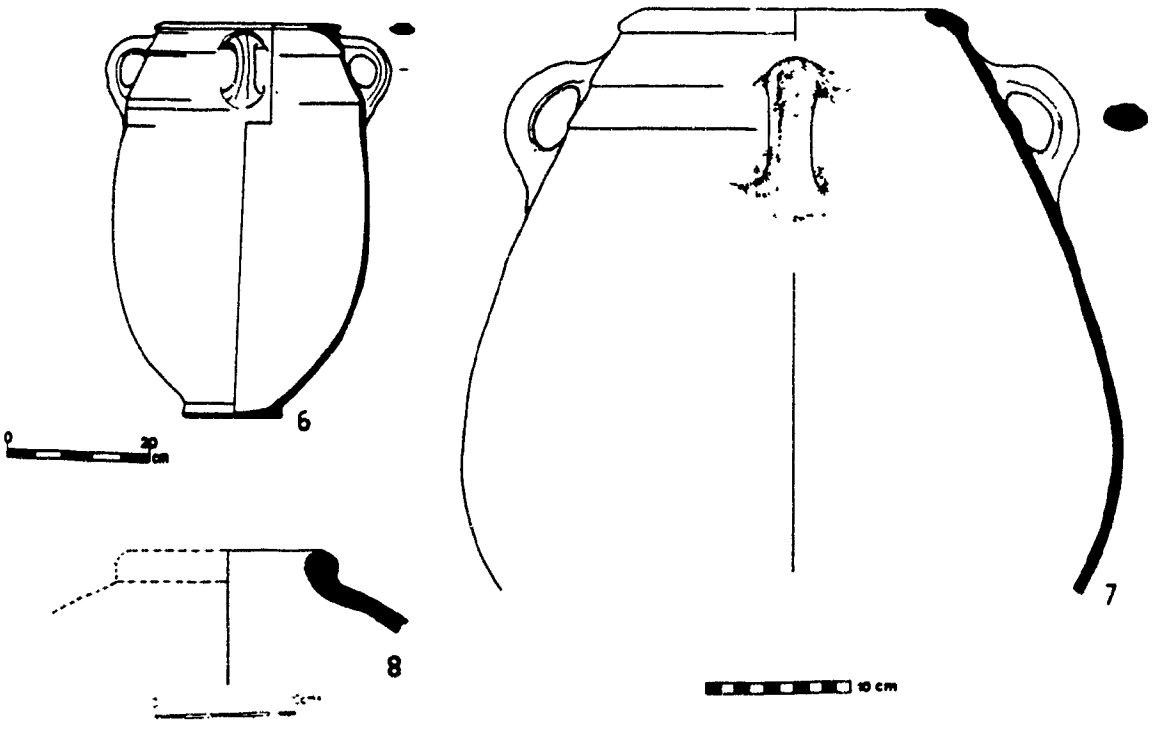


Plate 22

Iron IIC
Untyped Pithoi

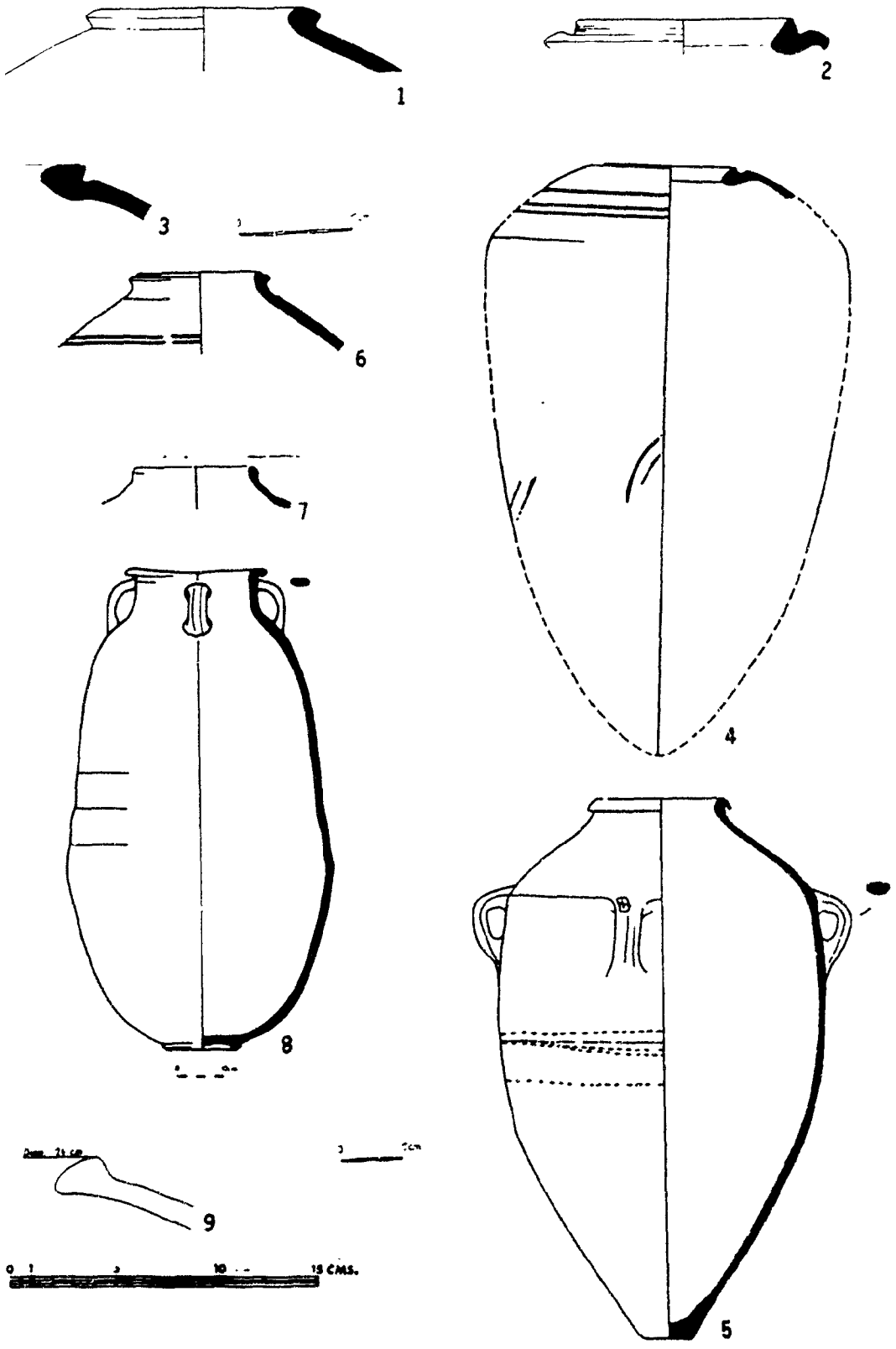
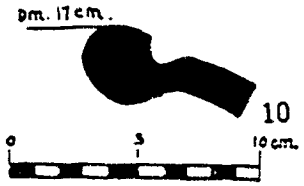
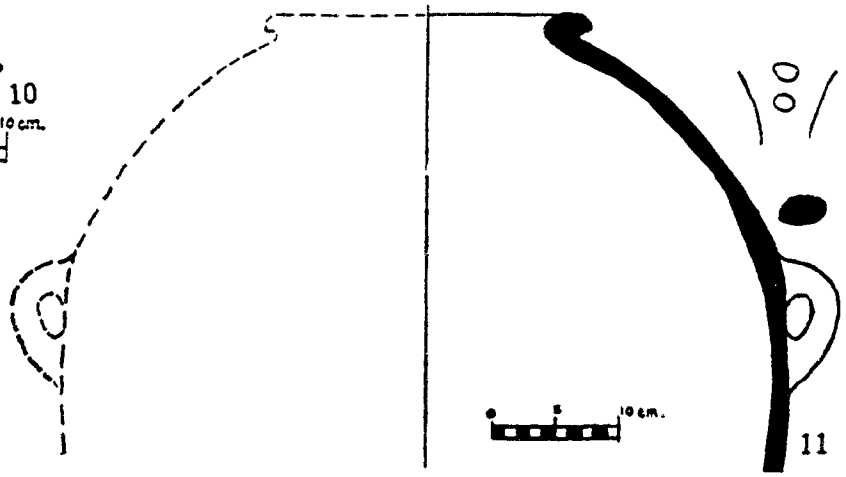
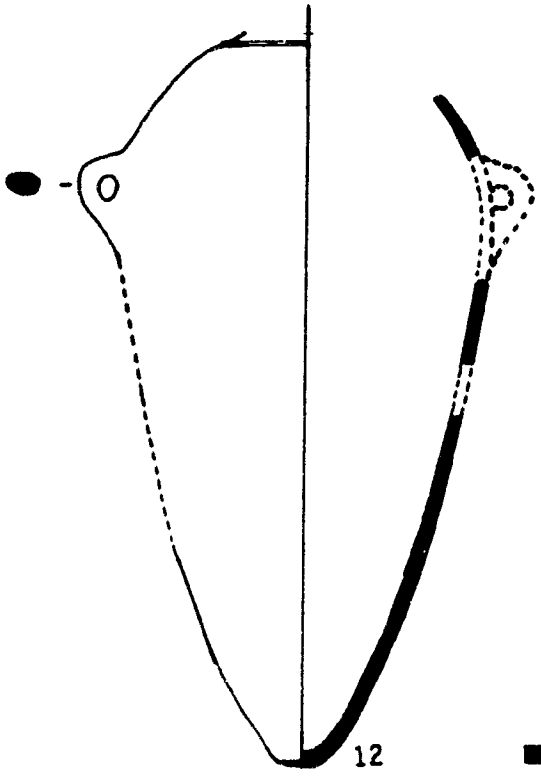


Plate 22, con't

Iron IIC
Untyped Pithoi







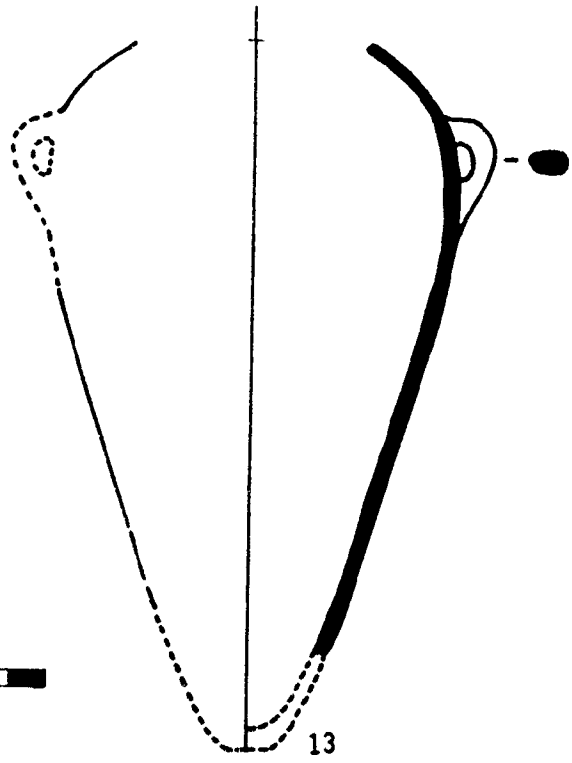
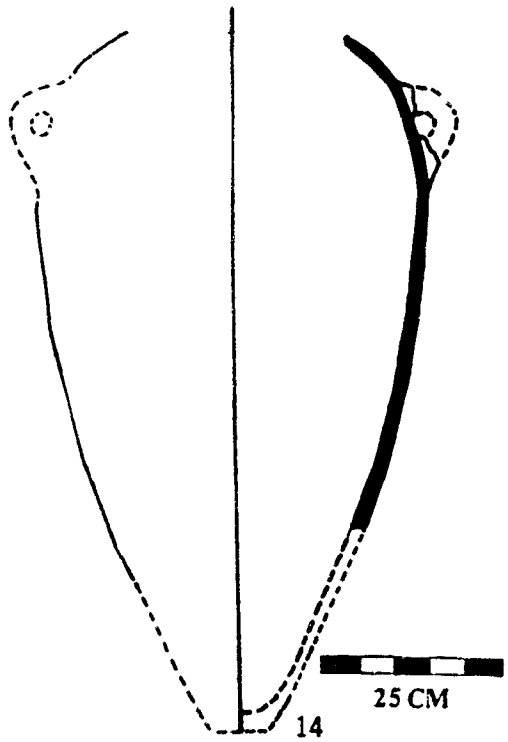


Plate 22, con't

Iron IIC
Untyped Pithoi



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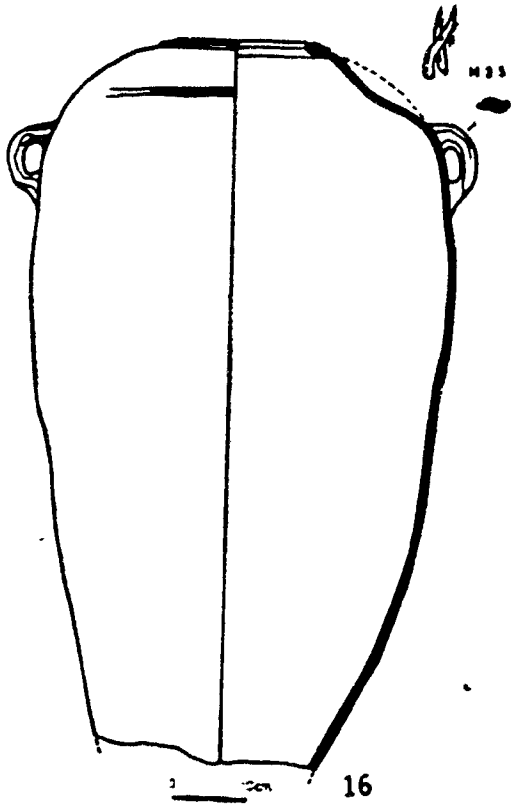

16

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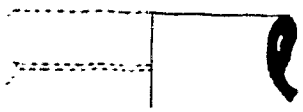
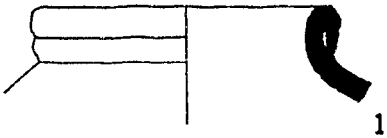


17

18



19

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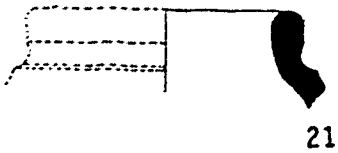

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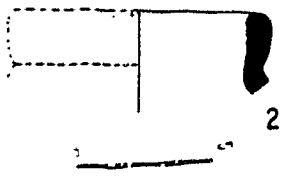

22

Plate 22, con't

Iron IIC
Untyped Pithoi

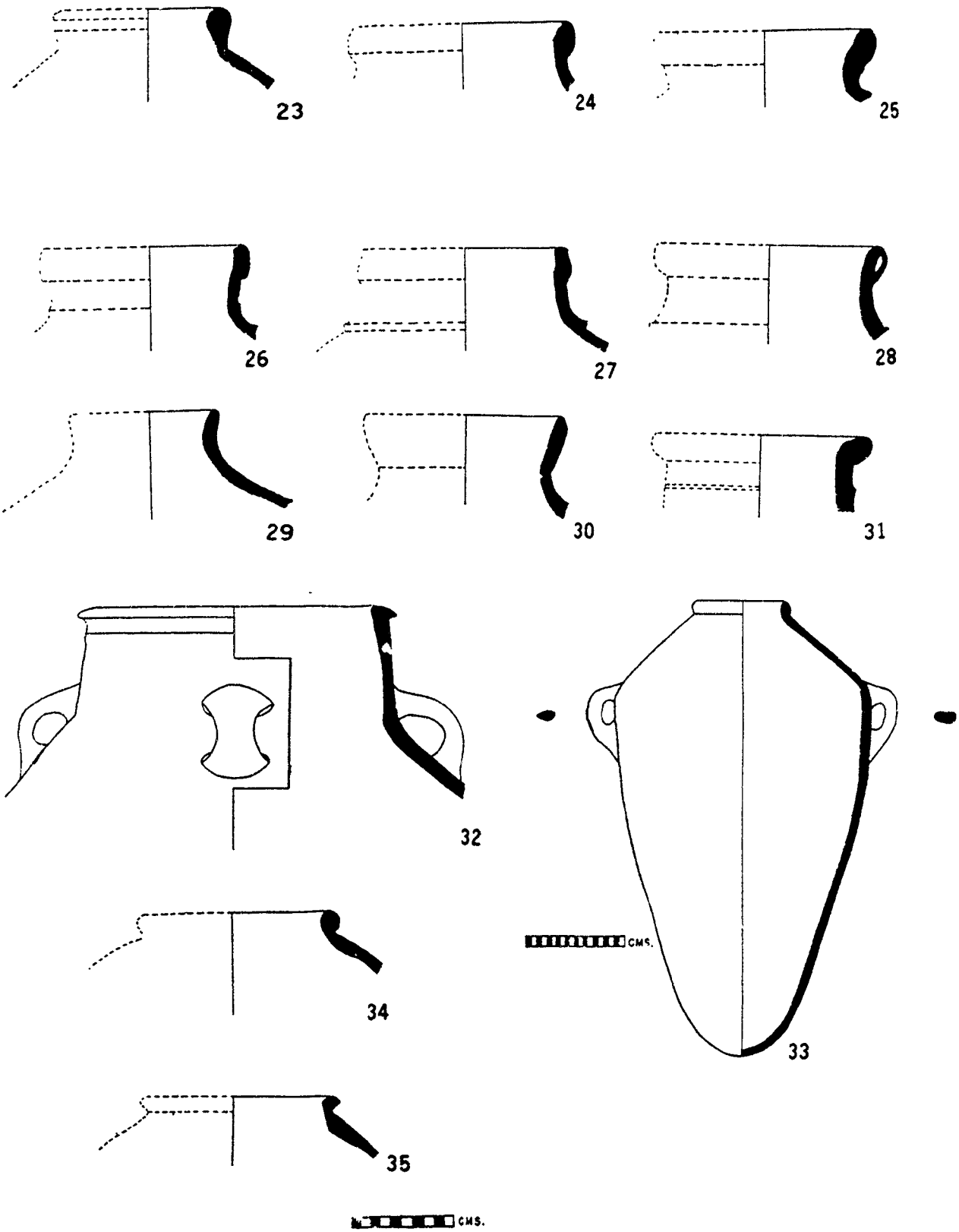

Plate 22, con't

Iron IIC
Untyped Pithoi

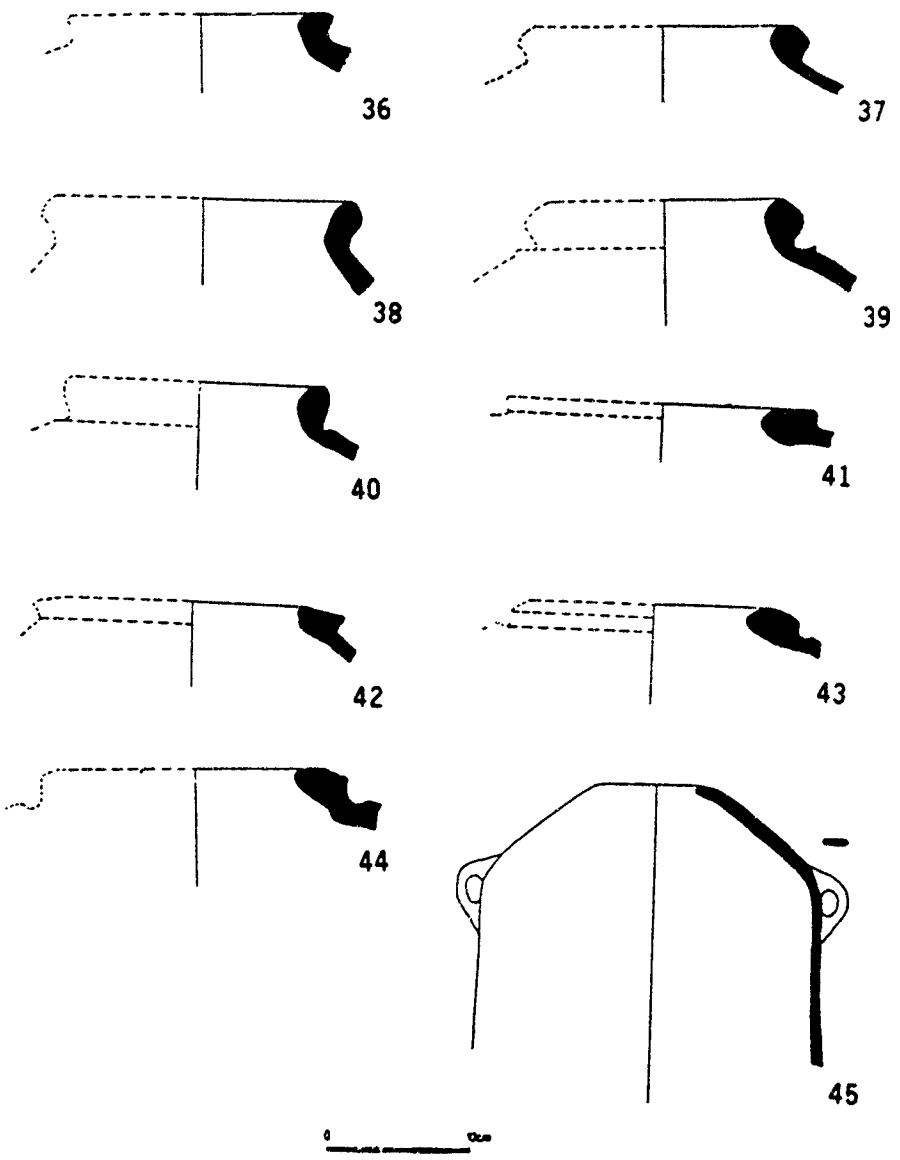

Plate Lists

Iron IA: Type 1A 4.02.005.A
- Plate 1:1 Giloh (Mazar 1981a: Pt. 9:2)

Iron IA: Type 1B 4.02.001.A
- Plate 1:2 Giloh (Mazar 1981a: Pt. 9:3)
- Plate 1:3 Giloh (Mazar 1981a: Pt. 9:5)
- Plate 1:4 Giloh (Mazar 1981a: Pt. 9:9)
- Plate 1:5 Giloh (Mazar 1981a: Pt. 9:10)
- Plate 1:6 Masos (Fritz, Kempinski 1983b: Pt. 140:12)

Transitional: Type 2A 1.02.001.A
- Plate 2:1 Shiloh (Buhl, Holm-Nielsen 1969: Pt. 15:186)

Transitional: Type 2B 1.02.001.A
- Plate 2:2 Shiloh (Buhl, Holm-Nielsen 1969: Pt. 15:188)
- Plate 2:3 Shiloh (Buhl, Holm-Nielsen 1969: Pt. 16:191)

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- Plate 3:1 Shiloh (Buhl, Holm-Nielsen 1969: Pt. 15:187)

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- Plate 3:2 Shiloh (Buhl, Holm-Nielsen 1969: Pt. 15:189)

Transitional: Type 3A 4.02.005.B/C
- Plate 3:3 Shiloh (Buhl, Holm-Nielsen 1969: Pt. 16:190)
- Plate 3:4 Shiloh (Buhl, Holm_Nielsen 1969: Pt. 16:192)

Transitional: Type 3B 4.01.005.B/C
- Plate 4:1 Masos (Fritz, Kempinski 1983b: Pt. 155:4)
- Plate 4:2 Masos (Fritz, Kempinski 1983b: Pt. 157:14)

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- Plate 4:3 Gibeah (Lapp 1981: Pt. 48:1)

Iron IIA: Type 4B 1.02.001.C/B
- Plate 4:4 Nasbeh (Wampler 1947: Pt. 2:13)

Iron IIA: Type 4C 1.01.005.B/C
- Plate 4:5 Nasbeh (Wampler 1947: Pt. 1:7)
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Iron IIA: Type 4D 1.01.001.C/B
- Plate 4:7 Gibeah (Lapp 1981: Pt. 48:2)

Iron IIA: Type 4E 1.03.005.C/B
- Plate 5:1 Nasbeh (Wampler 1947: Pt. 4:52)

Iron IIA: Type 4F 1.03.005.C/B
- Plate 5:2 Nasbeh (Wampler 1947: Pt. 1:11)
- Plate 5:3 Nasbeh (Wampler 1947: Pt. 2:21)
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Plate	5:7	'Eton	(Zimhoni 1985: Pt. 4:14)
Plate	5:8	Gibeon	(Pritchard 1964: Pt. 44:2)
Plate	5:9	'Ira	(Beit-Arieh, unpublished: Pt. 47:3)
Plate	5:10	Nasbeh	(Wampler 1947: Pt. 5:66)
Plate	5:11	Nasbeh	(Wampler 1947: Pt. 5:67)
Plate	5:12	Nasbeh	(Wampler 1947: Pt. 6:92)
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Iron IIC: Type 5B 2.02.001.D

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Plate	6:2	Nasbeh	(Wampler 1947: Pt. 5:62)

Iron IIC: Type 5C 2.02.001.D

Plate	6:3	Beth Zur	(Sellers 1968: Pt. 15:9)
Plate	6:4	Beth Zur	(Sellers 1968: Pt. 15:10)
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Plate	6:6	Nasbeh	(Wampler 1947: Pt. 6:93)

Iron IIC: Type 5D 2.02.002.D

Plate	7:1	Abu et-Twein	(Mazar 1981b: Pt. 5:3)
Plate	7:2	'Ain Shems	(Grant, Wright 1939: Pt. 65:5)
Plate	7:3	'Ira	(Beit-Arieh, unpublished: Pt. 47:6)
Plate	7:4	Nasbeh	(Wampler 1947: Pt. 5:73)
Plate	7:5	Nasbeh	(Wampler 1947: Pt. 5:75)
Plate	7:6	Nasbeh	(Wampler 1947: Pt. 6:87)

Iron IIC: Type 5E 2.01.005.D

Plate	7:7	Beth Zur	(Sellers 1968: Pt. 15:11)
Plate	7:8	Gibeah	(Sinclair 1960: Pt. 23:15)
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Plate	7:11	'Ira	(Beit-Arieh, unpublished: Pt. 46:4)
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Iron IIC: Type 5F (Standard) 2.01.001.D

Plate	8:1	'Ira	(Beit-Arieh, unpublished: Pt. 50:8)
Plate	8:2	Lachish	(Tufnell 1953: Pt. 94:466)
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Plate	9:2	Beersheba	(Aharoni 1973: Pt. 58:33)
Plate	9:3	Beersheba	(Aharoni 1973: Pt. 58:34)
Plate	9:4	Beersheba	(Aharoni 1973: Pt. 58:35)
Plate	9:5	Beersheba	(Aharoni 1973: Pt. 58:36)
Plate	9:6	Beersheba	(Aharoni 1973: Pt. 65:1)
Plate	9:7	Beersheba	(Aharoni 1973: Pt. 65:2)
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Plate 9:10 Beersheba (Aharoni 1973: Pt. 65:7)
Plate 9:11 Beersheba (Aharoni 1973: Pt. 67:2)
Plate 9:12 Beersheba (Aharoni 1973: Pt. 71:18)
Plate 9:13 Beersheba (Aharoni 1973: Pt. 73:6)
Plate 9:14 Beersheba (Aharoni 1973: Pt. 73:7)
Plate 9:15 Beersheba (Aharoni 1973: Pt. 73:8)
Plate 9:16 Beit Mirsim (Albright 1943: Pt. 13:1)
Plate 9:17 Beit Mirsim (Albright 1943: Pt. 13:2)
Plate 9:18 Beit Mirsim (Albright 1943: Pt. 13:4)
Plate 9:19 'Eton (Zimhoni 1985: Pt. 7:11)

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Plate 10:1 'Ajrud (Ayalon 1985a: Pt. 8:31)
Plate 10:2 'Ira (Beit-Arieh, unpublished: Pt. 46:1)
Plate 10:3 'Ira (Beit-Arieh, unpublished: Pt. 46:3)
Plate 10:4 'Ira (Beit-Arieh, unpublished: Pt. 47:5)
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Plate 10:6 'Ira (Beit-Arieh, unpublished: Pt. 49:4)
Plate 10:7 'Ira (Beit-Arieh, unpublished: Pt. 50:1)
Plate 10:8 'Ira (Beit-Arieh, unpublished: Pt. 50:2)
Plate 10:9 Nasbeh (Wampler 1947: Pt. 4:59)
Plate 10:10 Nasbeh (Wampler 1947: Pt. 5:70)

Iron IIC: Type 5H 2.03.001.D
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Iron IIC: Type 6A 3.02.001.D
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Plate 11:9 Gibeah (Lapp 1981: Pt. 49:28)
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Plate 12:1 Gibeon (Pritchard 1964: Pt. 43:13)
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Plate 12:3 'Ira (Beit-Arieh, unpublished: Pt. 49:1)
Plate 12:4 'Ira (Beit-Arieh, unpublished: Pt. 50:5)
Plate 12:5 'Ira (Beit-Arieh, unpublished: Pt. 50:7)

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Plate 12:6 'Ain Shems (Grant, Wright 1939: Pt. 65:10)
Plate 12:7 Beth Zur (Sellers 1968: Pt. 15:14)
Plate 12:8 'Eton (Zimhoni 1985: Pt. 8:3)
Plate 12:9 Nasbeh (Wampler 1947: Pt. 6:84)

Iron IIC: Type 6D 3.01.001.D
Plate 13:1 'Ain Shems (Grant, Wright 1939: Pt. 65:6)

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Plate 13:4	Nasbeh	(Wampler 1947: Pt. 5:78)
Plate 13:5	Nasbeh	(Wampler 1947: Pt. 5:80)
Plate 13:6	Nasbeh	(Wampler 1947: Pt. 5:82)
Plate 13:7	Nasbeh	(Wampler 1947: Pt. 5:85)
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Iron IIC: Type 6E 3.01.002.D

Plate 14:1	Abu et-Twein	(Mazar 1981b: Pt. 5:4)
Plate 14:2	Bethel	(Kelso 1968: Pt. 67:9)
Plate 14:3	'Ira	(Beit-Arieh, unpublished: Pt. 47:7)
Plate 14:4	'Ira	(Beit-Arieh, unpublished: Pt. 48:2)
Plate 14:5	'Ira	(Beit-Arieh, unpublished: Pt. 48:3)
Plate 14:6	'Ira	(Beit-Arieh, unpublished: Pt. 50:3)
Plate 14:7	Nasbeh	(Wampler 1947: Pt. 5:79)

Iron IIC: Type 6F 3.03.001.D

Plate 15:1	Arad	(Herzog 1984: Pt. 19:5)
Plate 15:2	Beersheba	(Aharoni 1973: Pt. 65:12)
Plate 15:3	'Ira	(Beit-Arieh, unpublished: Pt. 46:7)
Plate 15:4	Nasbeh	(Wampler 1947: Pt. 5:76)
Plate 15:5	Nasbeh	(Wampler 1947: Pt. 5:81)

Iron IIC: Type 6G 3.03.002.D

Plate 16:1	'Ajrud	(Ayalon 1985a: Pt. 8:32)
Plate 16:2	'Ira	(Beit-Arieh, unpublished: Pt. 46:8)
Plate 16:3	'Ira	(Beit-Arieh, unpublished: Pt. 46:9)
Plate 16:4	'Ira	(Beit-Arieh, unpublished: Pt. 47:1)
Plate 16:5	Nasbeh	(Wampler 1947: Pt. 6:83)

Iron IIC: Type 7A 5.03.003.D

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Plate 17:4	Beth Zur	(Sellers 1968: Pt. 15:12)
Plate 17:5	Gibeah	(Lapp 1981: Pt. 49:21)
Plate 17:6	Gibeon	(Pritchard 1964: Pt. 38:8)
Plate 17:7	Nasbeh	(Wampler 1947: Pt. 4:55)
Plate 17:8	Nasbeh	(Wampler 1947: Pt. 5:71)
Plate 17:9	Nasbeh	(Wampler 1947: Pt. 5:72)
Plate 17:10	Nasbeh	(Wampler 1947: Pt. 5:77)
Plate 17:11	Nasbeh	(Wampler 1947: Pt. 6:88)

Date Unknown: Untyped Pithoi

Plate 18:1	Nasbeh	(Wampler 1947: Pt. 2:17)
Plate 18:2	Nasbeh	(Wampler 1947: Pt. 2:20)
Plate 18:3	Nasbeh	(Wampler 1947: Pt. 2:24)
Plate 18:4	Nasbeh	(Wampler 1947: Pt. 2:26)
Plate 18:5	Nasbeh	(Wampler 1947: Pt. 3:42)
Plate 18:6	Nasbeh	(Wampler 1947: Pt. 4:47)
Plate 18:7	Nasbeh	(Wampler 1947: Pt. 4:48)
Plate 18:8	Nasbeh	(Wampler 1947: Pt. 4:49)

Plate 18:9 Nasbeh (Wampler 1947: Pt. 4:50;
Plate 18:10 Nasbeh (Wampler 1947: Pt. 4:54)
Plate 18:11 Nasbeh (Wampler 1947: Pt. 4:61)
Plate 18:12 Nasbeh (Wampler 1947: Pt. 5:68)
Plate 18:13 Nasbeh (Wampler 1947: Pt. 5:74)
Plate 18:14 Nasbeh (Wampler 1947: Pt. 6:91)

Iron IA: Untyped Pithoi
Plate 19:1 Giloh (Mazar 1981a: Pt. 9:4)
Plate 19:2 Giloh (Mazar 1981a: Pt. 9:6)
Plate 19:3 Giloh (Mazar 1981a: Pt. 9:8)
Plate 19:4 Giloh (Mazar 1981a: Pt. 9:11)
Plate 19:5 Giloh (Mazar 1981a: Pt. 9:12)
Plate 19:6 Giloh (Mazar 1981a: Pt. 9:13)
Plate 19:7 Giloh (Mazar 1981a: Pt. 9:14)
Plate 19:8 Giloh (Mazar 1981a: Pt. 9:15)

Iron IB: Untyped Pithoi
Plate 19:9 Nasbeh (Wampler 1947: Pt. 2:12)
Plate 19:10 Nasbeh (Wampler 1947: Pt. 2:28)
Plate 19:11 Nasbeh (Wampler 1947: Pt. 2:30)

Transitional: Untyped Pithoi
Plate 20:1 Masos (Fritz, Kempinski 1983b: Pt. 137:13)
Plate 20:2 Masos (Fritz, Kempinski 1983b: Pt. 143:9)
Plate 20:3 Masos (Fritz, Kempinski 1983b: Pt. 151:8)
Plate 20:4 Masos (Fritz, Kempinski 1983b: Pt. 155:3)
Plate 20:5 Masos (Fritz, Kempinski 1983b: Pt. 160:13)
Plate 20:6 Nasbeh (Wampler 1947: Pt. 2:15)

Iron IIA: Untyped Pithoi
Plate 21:1 Arad (Herzog 1984: Pt. 9:16)
Plate 21:2 Gibeah (Lapp 1981: Pt. 48:3)
Plate 21:3 Masos (Fritz, Kempinski 1983b: Pt. 158:3)
Plate 21:4 Masos (Fritz, Kempinski 1983b: Pt. 159:8)
Plate 21:5 Nasbeh (Wampler 1947: Pt. 5:65)

Iron IIB: Untyped Pithoi
Plate 21:6 Beersheba (Aharoni 1973: Pt. 55:20)
Plate 21:7 Aroer (Biran, Cohen 1981: Pt. 8:3)
Plate 21:8 Nasbeh (Wampler 1947: Pt. 3:39)

Iron IIC: Untyped Pithoi
Plate 22:1 Abu et-Twein (Mazar 1981b: Pt. 5:6)
Plate 22:2 Abu et-Twein (Mazar 1981b: Pt. 5:9)
Plate 22:3 'Ain Shems (Grant, Wright 1939: Pt. 65:9)
Plate 22:4 'Ajrud (Ayalon 1985a: Pt. 10:33)
Plate 22:5 'Ajrud (Ayalon 1985a: Pt. 10:34)
Plate 22:6 'Ajrud (Ayalon 1985a: Pt. 10:35)
Plate 22:7 'Ajrud (Ayalon 1985a: Pt. 10:36)
Plate 22:8 Arad (Herzog 1984: Pt. 29:13)
Plate 22:9 Gibeah (Lapp 1981: Pt. 49:22)
Plate 22:10 Beth Zur (Sellers 1968: Pt. 15:13)

Plate 22:11 Beth Zur	(Sellers 1968: Pt. 20:7)
Plate 22:12 Dibon	(Tushingham 1972: Pt. 19:2)
Plate 22:13 Dibon	(Tushingham 1972: Pt. 19:3)
Plate 22:14 Dibon	(Tushingham 1972: Pt. 19:4)
Plate 22:15 'Eton	(Zimhoni 1985: Pt. 8:11)
Plate 22:16 'Ira	(Beit-Arieh, unpublished: Pt. 46:2)
Plate 22:17 Nasbeh	(Wampler 1947: Pt. 1:3)
Plate 22:18 Nasbeh	(Wampler 1947: Pt. 1:4)
Plate 22:19 Nasbeh	(Wampler 1947: Pt. 1:5)
Plate 22:20 Nasbeh	(Wampler 1947: Pt. 1:6)
Plate 22:21 Nasbeh	(Wampler 1947: Pt. 1:8)
Plate 22:22 Nasbeh	(Wampler 1947: Pt. 1:9)
Plate 22:23 Nasbeh	(Wampler 1947: Pt. 1:10)
Plate 22:24 Nasbeh	(Wampler 1947: Pt. 2:14)
Plate 22:25 Nasbeh	(Wampler 1947: Pt. 2:16)
Plate 22:26 Nasbeh	(Wampler 1947: Pt. 2:19)
Plate 22:27 Nasbeh	(Wampler 1947: Pt. 2:23)
Plate 22:28 Nasbeh	(Wampler 1947: Pt. 2:27)
Plate 22:29 Nasbeh	(Wampler 1947: Pt. 2:29)
Plate 22:30 Nasbeh	(Wampler 1947: Pt. 2:31)
Plate 22:31 Nasbeh	(Wampler 1947: Pt. 2:32)
Plate 22:32 Nasbeh	(Wampler 1947: Pt. 3:37)
Plate 22:33 Nasbeh	(Wampler 1947: Pt. 3:38)
Plate 22:34 Nasbeh	(Wampler 1947: Pt. 3:40)
Plate 22:35 Nasbeh	(Wampler 1947: Pt. 3:41)
Plate 22:36 Nasbeh	(Wampler 1947 Pt. 3:43)
Plate 22:37 Nasbeh	(Wampler 1947: Pt. 3:44)
Plate 22:38 Nasbeh	(Wampler 1947: Pt. 3:46)
Plate 22:39 Nasbeh	(Wampler 1947: Pt. 4:51)
Plate 22:40 Nasbeh	(Wampler 1947: Pt. 4:53)
Plate 22:41 Nasbeh	(Wampler 1947: Pt. 4:57)
Plate 22:42 Nasbeh	(Wampler 1947: Pt. 4:58)
Plate 22:43 Nasbeh	(Wampler 1947: Pt. 5:63)
Plate 22:44 Nasbeh	(Wampler 1947: Pt. 5:64)
Plate 22:45 Nasbeh	(Wampler 1947: Pt. 6:90)

Appendix 1

REGNAL CHRONOLOGY PERTAINING TO IRON AGE ERETZ ISRAEL

BCE	ERETZ ISRAEL				MESOPOTAMIA	
	The Divided Monarchy					
	Judah		Israel			
	Rehoboam	931-914	Jeroboam I	931-909	Asshur-dan II	935-913
	Abijah	914-911				
900	Asa	911-870				
			Nadab	909-908	Adad-nirari II	912-892
			Baasha	908-885		
			Elah	885-884	Asshurnasirpal II	884-860
			Zimri	884		
850	Jehoshaphat	871-846				
			Omri	884-873		
			Ahab	875-853		
			Ahaziah	853-852	Shalmaneser III	859-825
	Jehoram	851-843	Jehoram	852-841		
	Ahaziah	843-842				
	Athaliah	842-836	Jehu	841-814		
800	Joash	836-796				
					Shamshi-adad V	824-812
			Jehoahaz	814-798	Adad-nirari III	811-784
	Amaziah	796-767	Jehoash	798-782		
	Uzziah	791-740	Jeroboam II	786-746		
750	Jothan	751-735	Zechariah	746-745		
			Shallum	745	Tiglath-pileser III	745-727
			Menahem	745-736		
			Pekahiah	736-735		
	Ahaz	742-726	Pekah	736-734		
			Hoshea	731-722	Shalmaneser V	726-722
			FALL OF SAMARIA	722-721	Sargon II	721-705
700	Hezekiah	726-697			Sennacherib	704-681
650	Manasseh	697-642			Esarhaddon	680-669
	Amon	642-640			Asshurbanapal	668-627
	Josiah	640-609				
	Jehoahaz	609			Nabopolassar	626-605
600	Jehoiakim	608-597			Nebuchadnezzar	604-562
	Jehoiachin	597				
	FIRST DEPORTATION					
	Zedekiah	597-586				
	FALL OF JERUSALEM					
	SECOND DEPORTATION					
	EXILE					
↓						
550					Nabonidus	556-539
					RISE OF PERSIA	
					Cyrus II	550-530

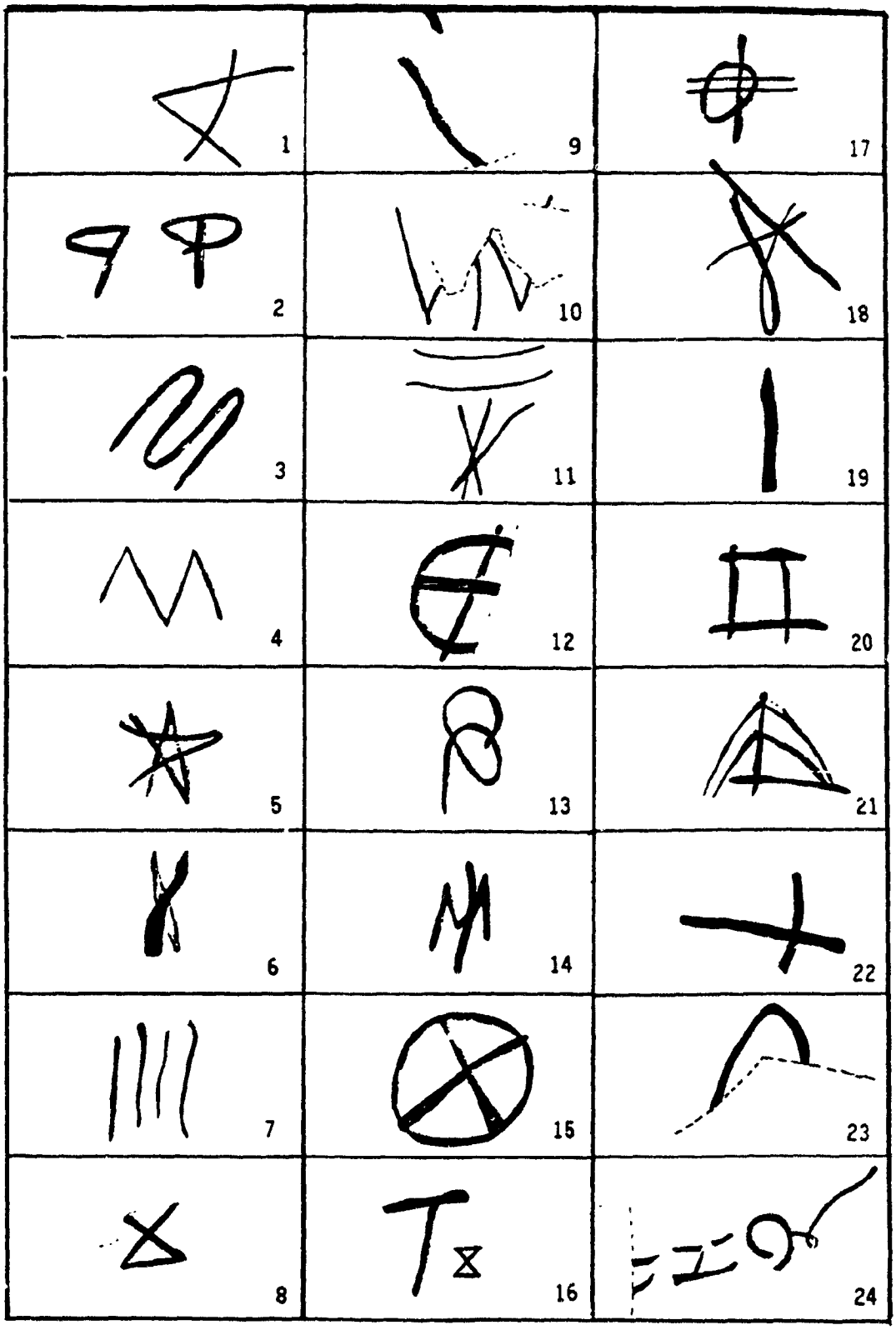
Appendix 2

Duration of time (million years)	Million years before today	Age	Period	Cisjordan	Transjordan	Arabian Peninsula
6	6	Cenozoic	Quaternary	SEA		LAND
17	23		Pliocene, Miocene			
43	66		Oligocene, Eocene			
55	121	Mesozoic	Senonian, Turonian, Cenomanian, Lower Cretaceous			
40	161		Jurassic			
35	196		Triassic			
30	226	Paleozoic	Permian			
70	296		Carboniferous			
40	336		Devonian			
30	366		Silurian			
70	436		Ordovician			
60	496		Cambrian			
~2,000	~3,000	Precambrian (Archaic)	Precambrian			

Transgressions and regressions in the Middle East; after L. Picard, 1943 (Orni, Efrat 1971:10).

Appendix 3

Illustrations of potter's marks present in the study sample.



Appendix 3, con't

1. Kuntillet 'Ajrud (Ayalon 1985a:34)
2. Kuntillet 'Ajrud (Beck 1982:6)
3. Tel Arad (Herzog 1984:18)
4. Tel 'Ira, 933/1 (Beit-Arieh, unpublished)
5. Tel 'Ira, 1022/1 (Beit-Arieh, unpublished)
6. Tel 'Ira, 1032/1 (Beit-Arieh, unpublished)
7. Tel 'Ira, 1049/1 (Beit-Arieh, unpublished)
8. Tel 'Ira, 1060/1 (Beit-Arieh, unpublished)
9. Tel 'Ira, 1089/1 (Beit-Arieh, unpublished)
10. Tel 'Ira, 1096/1 (Beit-Arieh, unpublished)
11. Tel 'Ira, 1097/1 (Beit-Arieh, unpublished)
12. Tel 'Ira, 1099/1 (Beit-Arieh, unpublished)
13. Tel 'Ira, 1116/1 (Beit-Arieh, unpublished)
14. Tel 'Ira, 1121/1 (Beit-Arieh, unpublished)
15. Tel 'Ira, 1135/1 (Beit-Arieh, unpublished)
16. Tel 'Ira, 4378/1 (Beit-Arieh, unpublished)
17. Tel 'Ira, 4419/1 (Beit-Arieh, unpublished)
18. Tel 'Ira, 4430/1 (Beit-Arieh, unpublished)
19. Tel 'Ira, 4432/1 (Beit-Arieh, unpublished)
20. Tel 'Ira, 4438/1 (Beit-Arieh, unpublished)
21. Tel 'Ira, 4469/1 (Beit-Arieh, unpublished)
22. Tel 'Ira, 4474/1 (Beit-Arieh, unpublished)
23. Tel 'Ira, 4512/1 (Beit-Arieh, unpublished)
24. Tel 'Ira, 4525/1 (Beit-Arieh, unpublished)

Appendix 4
Raw Statistical Data

(Compiled by the author)

	line	name	data	locale	rim profile	rim descript1	rim descript2	neck shape	neck height	color inside
1	1	1	7	1	3	3	2	2	2	2
2	2	1	7	1	3	3	2	2	2	3
3	3	1	7	1	3	3	10	2	2	3
4	4	1	7	1	4	2	4	2	2	3
5	5	1	7	1	6	5	2	2	2	2
6	7	1	7	1	5	4	9	2	2	3
7	8	2	7	2	3	2	4	2	2	24
8	9	2	7	2	4	4	4	2	2	29
9	10	2	7	2	3	5	10	2	2	29
10	11	2	7	2	6	4	2	7	3	29
11	12	2	7	2	5	6	2	/	3	24
12	13	2	7	2	2	3	2	2	2	11
13	14	2	7	2	6	4	8	2	2	24
14	16	3	5	2	3	3	10	2	2	19
15	17	3	7	2	3	2	3	2	2	3
16	18	3	7	2	4	4	3	2	2	3
17	19	3	7	2	4	2	2	5	6	17
18	20	4	6	2	3	2	3	2	2	3
19	22	6	6	2	2	5	10	2	2	3
20	23	6	7	2	3	2	3	2	2	2
21	24	6	7	2	3	2	3	2	2	17
22	25	6	7	2	3	4	3	2	2	2
23	26	6	7	2	3	2	3	2	2	3
24	27	6	7	2	3	2	3	2	2	2
25	28	6	7	2	3	2	3	2	2	3
26	29	6	7	2	3	2	3	2	2	27
27	30	6	7	2	3	2	4	2	2	27
28	31	6	7	2	3	2	3	2	2	3
29	32	6	7	2	4	4	3	2	2	24
30	33	6	7	2	3	2	3	2	2	3
31	34	6	7	2	2	5	10	2	2	10
32	35	6	7	2	3	2	3	2	2	3
33	36	6	7	2	3	3	3	2	2	3
34	37	6	7	2	2	3	10	2	2	3
35	38	7	7	3	3	2	3	2	2	32
36	39	7	7	3	3	2	3	2	2	32
37	40	7	7	3	3	2	3	2	2	32
38	41	8	7	3	6	4	8	2	2	11
39	42	8	7	3	3	3	10	2	2	11
40	43	8	7	3	4	2	3	2	2	11
41	44	8	7	3	2	5	10	2	2	11
42	45	8	7	3	4	2	2	2	2	11
43	46	8	7	3	4	2	3	2	2	11
44	47	8	7	3	4	2	5	2	2	11
45	48	9	7	1	4	2	4	2	2	30
46	49	9	7	1	3	4	3	7	3	19
47	52	10	7	1	3	3	4	2	2	22
48	53	10	7	1	3	3	4	2	2	22
49	54	10	7	1	3	2	2	2	2	22
50	55	10	7	1	6	4	8	2	2	22
51	56	10	7	1	3	3	5	2	2	32
52	57	10	7	1	4	2	2	2	2	22
53	58	10	7	1	4	3	3	2	2	22
54	59	10	7	1	6	4	2	2	2	32
55	60	11	7	4	1	1	1	1	1	16
56	61	11	7	4	1	1	1	1	1	16
57	62	11	7	4	1	1	1	1	1	16
58	63	12	7	1	3	3	2	2	2	33
59	64	12	7	1	3	2	3	2	2	2
60	65	12	7	1	4	2	2	2	2	5
61	66	12	7	1	4	4	2	2	2	5
62	67	13	5	1	2	3	2	7	3	24
63	68	13	5	1	2	2	3	7	3	34
64	69	13	5	1	2	2	7	4	5	24
65	70	13	7	1	3	2	2	2	2	11
66	74	13	7	1	3	3	3	2	2	24
67	75	13	7	1	6	4	8	2	2	11
68	76	13	7	1	3	4	3	2	2	24
69	77	13	7	1	3	2	2	2	2	35
70	78	13	7	1	3	2	2	2	2	24
71	80	13	7	1	4	3	3	2	2	35
72	81	13	7	1	3	4	3	2	2	35
73	82	13	7	1	4	3	3	2	2	30
74	83	14	7	1	6	4	8	2	2	13
75	84	14	7	1	4	3	5	2	2	24
76	85	14	7	1	3	3	2	2	2	25
77	86	15	2	1	5	3	2	3	6	2
78	87	15	2	1	5	3	3	3	5	2

	color group1	color outside	color group2	inclusions	SITE	date	location
1	2	2	2	13	ABU	IIc	chc
2	2	3	2	2	ABU	IIc	chc
3	2	3	2	8	ABU	IIc	chc
4	2	3	2	8	ABU	IIc	chc
5	2	2	2	8	ABU	IIc	chc
6	2	3	2	2	ABU	IIc	chc
7	5	24	5	2	AJR	IIc	negev
8	6	29	6	2	AJR	IIc	negev
9	6	29	6	2	AJR	IIc	negev
10	6	29	6	2	AJR	IIc	negev
11	5	24	5	2	AJR	IIc	negev
12	2	11	2	10	AJR	[illegible]	negev
13	5	24	5	11	AJR	IIc	negev
14	4	19	4	17	ARA	IIa	negev
15	2	3	2	17	ARA	IIc	negev
16	2	3	2	17	ARA	IIc	negev
17	4	17	4	7	ARA	IIc	negev
18	2	3	2	8	ARO	IIb	negev
19	2	3	2	4	SHE	IIb	negev
20	2	2	2	7	SHE	IIc	negev
21	4	17	4	7	SHE	IIc	negev
22	2	2	2	7	SHE	IIc	negev
23	2	3	2	7	SHE	IIc	negev
24	2	2	2	7	SHE	IIc	negev
25	2	3	2	7	SHE	IIc	negev
26	5	27	5	7	SHE	IIc	negev
27	5	27	5	7	SHE	IIc	negev
28	2	3	2	7	SHE	IIc	negev
29	5	24	5	7	SHE	IIc	negev
30	2	3	2	7	SHE	IIc	negev
31	2	10	2	4	SHE	IIc	negev
32	2	3	2	7	SHE	IIc	negev
33	2	3	2	14	SHE	IIc	negev
34	2	3	2	14	SHE	IIc	negev
35	6	32	6	1	BEI	IIc	sheph
36	6	32	6	1	BEI	IIc	sheph
37	6	32	6	1	BEI	IIc	sheph
38	2	11	2	6	BEITS	IIc	sheph
39	2	11	2	3	BEITS	IIc	sheph
40	2	11	2	3	BEITS	IIc	sheph
41	2	11	2	3	BEITS	IIc	sheph
42	2	11	2	6	BEITS	IIc	sheph
43	2	11	2	3	BEITS	IIc	sheph
44	2	11	2	3	BEITS	IIc	sheph
45	6	30	6	1	BETHL	IIc	chc
46	4	19	4	1	BETHL	IIc	chc
47	4	22	4	2	BETHZ	IIc	chc
48	4	22	4	13	BETHZ	IIc	chc
49	4	22	4	2	BETHZ	IIc	chc
50	4	22	4	2	BETHZ	IIc	chc
51	6	32	6	2	BETHZ	IIc	chc
52	4	22	4	2	BETHZ	IIc	chc
53	4	22	4	2	BETHZ	IIc	chc
54	6	32	6	2	BETHZ	IIc	chc
55	4	16	4	14	DIB	IIc	transj
56	4	16	4	5	DIB	IIc	transj
57	4	16	4	14	DIB	IIc	transj
58	2	33	2	14	ETO	IIc	chc
59	2	2	2	15	ETO	IIc	chc
60	2	5	2	16	ETO	IIc	chc
61	2	5	2	14	ETO	IIc	chc
62	5	24	5	17	GIBH	IIa	chc
63	4	34	4	7	GIBH	IIa	chc
64	5	24	5	17	GIBH	IIa	chc
65	2	11	2	13	GIBH	IIc	chc
66	5	24	5	4	GIBH	IIc	chc
67	2	11	2	4	GIBH	IIc	chc
68	5	24	5	4	GIBH	IIc	chc
69	3	26	5	4	GIBH	IIc	chc
70	5	24	5	4	GIBH	IIc	chc
71	3	35	3	7	GIBH	IIc	chc
72	3	35	3	17	GIBH	IIc	chc
73	6	30	6	15	GIBH	IIc	chc
74	3	13	3	17	GIBN	IIc	chc
75	5	24	5	4	GIBN	IIc	chc
76	5	25	5	13	GIGN	IIc	chc
77	2	2	2	7	GIL	Ia	chc
78	2	2	2	[illegible]	GIL	Ia	chc

	line	name	data	locale	rim profile	rim descript1	rim descript2	neck shape	neck height	color inside
79	88	15	2	1	5	3	10	3	5	2
80	89	15	2	1	5	3	6	3	6	2
81	90	15	2	1	6	2	2	3	4	2
82	91	15	2	1	2	4	3	3	5	2
83	92	15	2	1	5	3	2	3	5	2
84	93	15	2	1	5	3	3	4	5	2
85	94	15	2	1	5	5	2	4	5	2
86	95	15	2	1	2	3	2	4	5	2
87	96	15	2	1	5	2	3	3	5	2
88	97	15	2	1	6	5	2	3	5	2
89	98	15	2	1	5	2	3	3	5	2
90	100	16	7	2	3	2	4	2	2	27
91	101	16	7	2	3	4	4	2	2	14
92	102	16	7	2	3	2	4	2	2	17
93	103	16	7	2	3	2	2	2	2	15
94	104	16	7	2	3	4	3	2	2	15
95	105	16	7	2	3	3	4	2	2	20
96	106	16	7	2	4	4	3	2	2	11
97	107	16	7	2	4	4	4	2	2	14
98	108	16	7	2	4	4	4	2	2	15
99	109	16	7	2	4	4	4	2	2	2
100	110	16	7	2	4	3	4	2	2	20
101	111	16	7	2	3	3	2	2	2	14
102	113	16	7	2	3	2	4	2	2	2
103	114	16	7	2	3	3	10	2	2	21
104	115	16	7	2	4	2	4	2	2	11
105	116	16	7	2	4	3	3	2	2	17
106	117	16	7	2	4	2	4	2	2	15
107	118	16	7	2	4	2	4	2	2	14
108	119	16	7	2	4	3	4	2	2	2
109	120	16	7	2	4	3	3	2	2	15
110	121	16	7	2	3	2	4	2	2	23
111	122	16	7	2	3	2	4	2	2	11
112	123	16	7	2	3	2	4	2	2	27
113	124	16	7	2	3	2	4	2	2	14
114	125	16	7	2	4	2	4	2	2	8
115	126	16	7	2	4	2	3	2	2	6
116	127	16	7	2	4	3	4	2	2	23
117	128	16	7	2	3	4	6	2	2	8
118	129	16	7	2	4	3	4	2	2	14
119	130	16	7	2	3	2	3	2	2	11
120	131	17	7	3	3	2	3	2	2	24
121	133	18	4	2	2	2	3	7	3	3
122	134	18	2	2	5	3	3	3	6	3
123	135	18	4	2	6	4	8	2	2	27
124	136	18	4	2	2	3	10	2	2	3
125	137	18	4	2	6	2	8	2	2	5
126	138	18	4	2	5	2	2	7	3	23
127	139	18	4	2	5	2	2	3	5	3
128	140	18	5	2	3	3	6	2	2	2
129	141	18	5	2	6	2	2	2	2	25
130	143	18	4	2	3	2	7	2	2	24
131	147	19	7	1	5	2	6	4	4	5
132	148	19	7	1	2	4	6	7	3	3
133	149	19	7	1	5	3	6	4	4	2
134	150	19	7	1	2	5	2	5	6	8
135	151	19	5	1	2	2	2	5	4	15
136	152	19	7	1	2	2	2	3	4	14
137	153	19	7	1	2	2	2	5	4	7
138	154	19	7	1	2	3	2	5	4	15
139	155	19	5	1	2	4	6	5	4	3
140	156	19	3	1	5	3	2	7	3	2
141	157	19	5	1	2	3	6	7	3	2
142	158	19	7	1	5	4	2	3	5	35
143	159	19	4	1	5	3	2	7	3	3
144	160	19	7	1	5	3	2	3	5	2
145	161	19	1	1	5	3	2	3	5	7
146	163	19	7	1	2	2	3	3	6	2
147	164	19	1	1	6	5	11	6	5	35
148	165	19	5	1	2	4	6	6	5	11
149	166	19	5	1	2	2	2	6	5	3
150	167	19	7	1	2	2	2	6	6	2
151	168	19	1	1	5	3	2	3	4	1
152	169	19	5	1	2	4	3	5	5	1
153	170	19	1	1	2	4	3	6	5	1
154	171	19	7	1	5	3	6	3	5	1
155	172	19	3	1	5	2	2	3	5	3
156	173	19	7	1	5	4	2	4	4	7

	color group1	color outside	color group2	inclusions	SITE	date	location
79	2	2	2	7	GIL	Ia	chc
80	2	2	2	7	GIL	Ia	chc
81	2	2	2	7	GIL	Ia	chc
82	2	2	2	7	GIL	Ia	chc
83	2	2	2	7	GIL	Ia	chc
84	2	2	2	7	GIL	Ia	chc
85	2	2	2	7	GIL	Ia	chc
86	2	2	2	7	GIL	Ia	chc
87	2	2	2	7	GIL	Ia	chc
88	2	2	2	7	GIL	Ia	chc
89	2	2	2	7	GIL	Ia	chc
90	5	27	5	2	IRA	Ia	negev
91	3	14	3	2	IRA	Ia	negev
92	4	17	4	2	IRA	Ia	negev
93	3	15	3	7	IRA	Ia	negev
94	3	15	3	2	IRA	Ia	negev
95	4	20	4	2	IRA	Ia	negev
96	2	11	2	7	IRA	Ia	negev
97	3	14	3	7	IRA	Ia	negev
98	3	15	3	13	IRA	Ia	negev
99	2	2	2	17	IRA	Ia	negev
100	4	20	4	4	IRA	Ia	negev
101	3	14	3	17	IRA	Ia	negev
102	2	2	2	2	IRA	Ia	negev
103	4	2	2	4	IRA	Ia	negev
104	2	11	2	17	IRA	Ia	negev
105	4	17	4	17	IRA	Ia	negev
106	3	15	3	7	IRA	Ia	negev
107	3	6	2	4	IRA	Ia	negev
108	2	2	2	4	IRA	Ia	negev
109	3	15	3	17	IRA	Ia	negev
110	4	23	4	14	IRA	Ia	negev
111	2	11	2	4	IRA	Ia	negev
112	5	27	5	14	IRA	Ia	negev
113	3	21	4	4	IRA	Ia	negev
114	2	8	2	14	IRA	Ia	negev
115	2	6	2	4	IRA	Ia	negev
116	4	23	4	14	IRA	Ia	negev
117	2	8	2	13	IRA	Ia	negev
118	3	14	3	4	IRA	Ia	negev
119	2	11	2	7	IRA	Ia	negev
120	5	24	5	1	LAC	Ia	shegh
121	2	3	2	16	MAS	trans	negev
122	2	3	2	16	MAS	Ia	negev
123	5	27	5	1	MAS	trans	negev
124	2	3	2	16	MAS	trans	negev
125	2	5	2	1	MAS	trans	negev
126	4	23	4	13	MAS	trans	negev
127	2	3	2	16	MAS	trans	negev
128	2	2	2	16	MAS	IIa	negev
129	5	25	5	1	MAS	IIa	negev
130	5	24	5	1	MAS	trans	negev
131	2	14	3	3	NAS	IIc	chc
132	2	3	2	7	NAS	IIc	chc
133	2	2	2	15	NAS	IIc	chc
134	2	8	2	15	NAS	IIc	chc
135	3	15	3	17	NAS	IIa	chc
136	3	14	3	4	NAS	IIc	chc
137	2	7	2	3	NAS	IIc	chc
138	3	7	2	3	NAS	IIc	chc
139	2	2	2	3	NAS	IIa	chc
140	2	2	2	17	NAS	Ib	chc
141	2	2	2	15	NAS	IIa	chc
142	3	35	3	12	NAS	IIc	chc
143	2	3	2	4	NAS	trans	chc
144	2	7	2	4	NAS	IIc	chc
145	2	7	2	7	NAS	unkn...	chc
146	2	14	3	4	NAS	IIc	chc
147	3	35	3	16	NAS	unkn...	IIc
148	2	11	2	15	NAS	IIa	chc
149	2	3	2	9	NAS	IIa	chc
150	2	8	2	17	NAS	IIc	chc
151	1	2	2	3	NAS	unkn...	chc
152	1	2	2	10	NAS	IIa	chc
153	1	7	2	5	NAS	unkn...	chc
154	1	13	3	17	NAS	IIc	chc
155	2	3	2	10	NAS	Ib	chc
156	2	7	2	7	NAS	IIc	chc

	line	name	data	locale	rim profile	rim descript1	rim descript2	neck shape	neck height	color inside
157	174	19	3	1	3	2	2	6	5	7
158	175	19	7	1	5	2	2	4	6	2
159	176	19	7	1	5	3	2	3	5	11
160	181	19	7	1	6	4	2	5	7	14
161	182	19	7	1	2	3	2	7	3	29
162	183	19	6	1	2	3	2	2	2	2
163	184	19	7	1	2	3	2	2	2	35
164	185	19	7	1	6	4	2	2	2	15
165	186	19	1	1	6	4	2	7	3	7
166	187	19	7	1	2	3	10	2	2	35
167	188	19	7	1	2	3	2	2	2	6
168	189	19	7	1	3	4	3	2	2	2
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170	191	19	1	1	6	5	2	2	2	2
171	192	19	1	1	6	5	2	8	3	7
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173	194	19	1	1	2	3	2	8	3	3
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176	197	19	7	1	5	3	2	8	3	5
177	198	19	1	1	5	4	2	8	3	2
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179	200	19	7	1	3	2	3	2	2	9
180	201	19	7	1	3	3	3	2	2	2
181	202	19	7	1	6	5	2	2	2	7
182	203	19	7	1	3	2	5	2	2	35
183	204	19	7	1	3	4	3	2	2	2
184	205	19	1	1	3	3	4	2	2	14
185	206	19	7	1	3	3	6	2	2	7
186	207	19	7	1	3	4	5	2	2	3
187	208	19	7	1	3	4	5	2	2	6
188	209	19	5	1	3	4	5	2	2	2
189	210	19	7	1	3	3	2	2	2	7
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191	212	19	1	1	3	2	3	2	2	2
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193	214	19	7	1	3	2	4	2	2	2
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199	220	19	7	1	4	4	3	2	2	13
200	221	19	7	1	6	4	8	2	2	16
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203	224	19	7	1	4	2	3	2	2	35
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213	234	19	7	1	3	4	2	2	2	15
214	235	19	1	1	4	4	4	2	2	3
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218	239	20	4	1	2	3	2	3	4	6
219	240	20	4	1	2	2	2	3	5	6
220	241	20	4	1	2	3	6	3	6	6
221	242	20	4	1	2	4	2	3	5	6
222	243	20	4	1	5	3	2	3	5	6
223	244	20	4	1	2	3	3	3	6	6
224	245	20	4	1	5	3	2	3	4	6

	color group1	color outside	color group2	inclusions	SITE	date	location
157	2	7	2	15	NAS	IIb	chc
158	2	2	2	15	NAS	IIc	chc
159	2	11	2	14	NAS	IIc	chc
160	3	14	3	7	NAS	IIc	chc
161	6	29	6	7	NAS	IIc	chc
162	2	2	2	7	NAS	IIb	chc
163	3	15	3	7	NAS	IIc	chc
164	3	7	2	3	NAS	IIc	chc
165	2	7	2	12	NAS	unkn...	chc
166	3	35	3	7	NAS	IIc	chc
167	2	2	2	3	NAS	IIc	chc
168	2	2	2	3	NAS	IIc	chc
169	3	13	3	7	NAS	IIc	chc
170	2	2	2	7	NAS	unkn...	chc
171	2	7	2	4	NAS	unkn...	chc
172	2	7	2	3	NAS	unkn...	chc
173	2	2	2	3	NAS	unkn...	chc
174	2	2	2	3	NAS	IIc	chc
175	2	3	2	7	NAS	IIa	chc
176	2	7	2	7	NAS	IIc	chc
177	2	2	2	9	NAS	unkn...	chc
178	2	2	2	7	NAS	IIc	chc
179	2	9	2	17	NAS	IIc	chc
180	2	2	2	3	NAS	IIc	chc
181	2	7	2	3	NAS	IIc	chc
182	3	35	3	9	NAS	IIc	chc
183	2	29	6	7	NAS	IIc	chc
184	3	2	2	4	NAS	unkn...	chc
185	2	35	3	7	NAS	IIc	chc
186	2	2	2	7	NAS	IIc	chc
187	2	6	2	3	NAS	IIc	chc
188	2	2	2	3	NAS	IIa	chc
189	2	3	2	7	NAS	IIc	chc
190	2	2	2	3	NAS	IIc	chc
191	2	2	2	9	NAS	unkn...	chc
192	2	2	2	4	NAS	IIc	chc
193	2	2	2	3	NAS	IIc	chc
194	2	11	2	14	NAS	IIc	chc
195	3	2	2	4	NAS	IIc	chc
196	3	5	2	3	NAS	IIc	chc
197	2	7	2	3	NAS	unkn...	chc
198	2	2	2	7	NAS	IIc	chc
199	3	13	3	3	NAS	IIc	chc
200	4	16	4	3	NAS	IIc	chc
201	2	7	2	3	NAS	IIc	chc
202	2	7	2	3	NAS	IIc	chc
203	3	35	3	7	NAS	IIc	chc
204	2	2	2	7	NAS	IIc	chc
205	2	11	2	7	NAS	IIc	chc
206	2	7	2	3	NAS	IIc	chc
207	2	2	2	3	NAS	IIc	chc
208	2	3	2	7	NAS	IIc	chc
209	2	7	2	4	NAS	IIc	chc
210	3	15	3	4	NAS	IIc	chc
211	2	7	2	7	NAS	IIc	chc
212	2	7	2	7	NAS	IIc	chc
213	3	15	3	3	NAS	IIc	chc
214	2	3	2	7	NAS	unkn...	chc
215	3	13	3	3	NAS	IIc	chc
216	2	2	2	3	NAS	IIc	chc
217	2	2	2	3	NAS	IIc	chc
218	2	11	2	13	SHI	trans	chc
219	2	11	2	13	SHI	trans	chc
220	2	11	2	13	SHI	trans	chc
221	2	11	2	13	SHI	trans	chc
222	2	11	2	13	SHI	trans	chc
223	2	11	2	13	SHI	trans	chc
224	2	11	2	13	SHI	trans	chc

Works Cited

Abbreviations

AASOR	Annual of the American Schools of Oriental Research
ASOR	American Schools of Oriental Research
AJA	American Journal of Archaeology
BA	The Biblical Archaeologist
BASOR	Bulletin of the American Schools of Oriental Research
EAEHL	Encyclopedia of Archaeological Excavations in the Holy Land
EI	Eretz Israel (Hebrew)
IEJ	Israel Exploration Journal
PEQ	Palestine Exploration Quarterly
TA	Tel Aviv

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