A STUDY OF THE PRESENCE OF LITHICS IN THE SOUTHERN LEVANT FROM THE LATE NEOLITHIC TO THE END OF THE IRON AGE

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ABSTRACT

Excavations in the Levant have exposed a broad range of occupational phases, complete with a wide variety of artifacts. Archaeological publications from sites dating to the Pottery Neolithic through the Iron Age suggest a rapid decline in lithic technology, coinciding with the introduction of ceramics and metallurgy into the region.

An examination of 46 sites from the southern Levant was conducted to determine to what degree lithics were present in sites dating from these periods. In order to organize the large amount of data required for this research a database was created. Nineteen fields were established in order to collect, compare and analyze data. Through the examination of the characteristics of these sites it became clear that lithic material continues to be present at sites dating from the Pottery Neolithic through the Iron Age.

This analysis demonstrated that although lithic assemblages become smaller and more specialized, they are still present and should receive the same degree of treatment found at sites dating from Epipaleolithic through Pre-Pottery Neolithic sites. The combination of a decline in lithic production and the introduction of new technologies in post-Neolithic periods have caused a decrease in attention given to lithic material. This lack of interest in post-Neolithic lithic analysis is clearly demonstrated through the inconsistent treatment of these lithic artifacts.

It is suggested that the thorough investigation and publication of lithic material from Pre-Pottery Neolithic sites be applied equally to lithic material from sites in subsequent periods to ensure a more complete understanding of cultures in the Levant from the Pottery Neolithic through the Iron Age.

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Finally, I would like to express my thanks to my family and friends for the love and support over the last several years. My mother has always had the talent of finding the right words to say just when I needed them. Her words of wisdom have always provided me with strength and the ability to persevere through the years. I would like to thank my husband Troy for his unending words or encouragement, for his ability to make me smile in any situation and for his participation in an international road trip in search of that one last book I needed. Thank You.

LIST OF FIGURES

CHAPTER 1

INTRODUCTION, BACKGROUND AND RESEARCH METHODOLOGY

1.1 Introduction

Humankind has utilized stone more extensively than any other material. Stone was the primary material used for tools for more than 2,000,000 years. Lithics did not disappear from the archaeological record with the introduction of the new technologies of ceramics and metals. However, in archaeological reports dealing with sites from the Pottery Neolithic through the Iron Age, lithic material frequently is ignored or disregarded. This thesis demonstrates not only that lithic artifacts continue to be present in the Levant during the Pottery Neolithic through to the Iron Age, but that lithic artifacts played an important role in these periods. The goal of this thesis is to investigate the reasons why lithics have not had a more prominent role in excavation, recovery and reports on these later periods.

The thesis focuses on 46 sites from Jordan and Israel where lithics are present in the archaeological record from the Pottery Neolithic to the Iron Age. For the reader who is not familiar with Levantine archaeology maps have been provided for visual reference (Figure 1-7). There is also a limited examination of the Pre-Pottery Neolithic sites of Jericho, Beidha, and Ain Ghazal as the basis of comparison for the treatment of lithics at later sites. Studies of the Pottery Neolithic through the Iron Age shift attention from lithic assemblages to ceramic and metal artifacts. However, the absence of

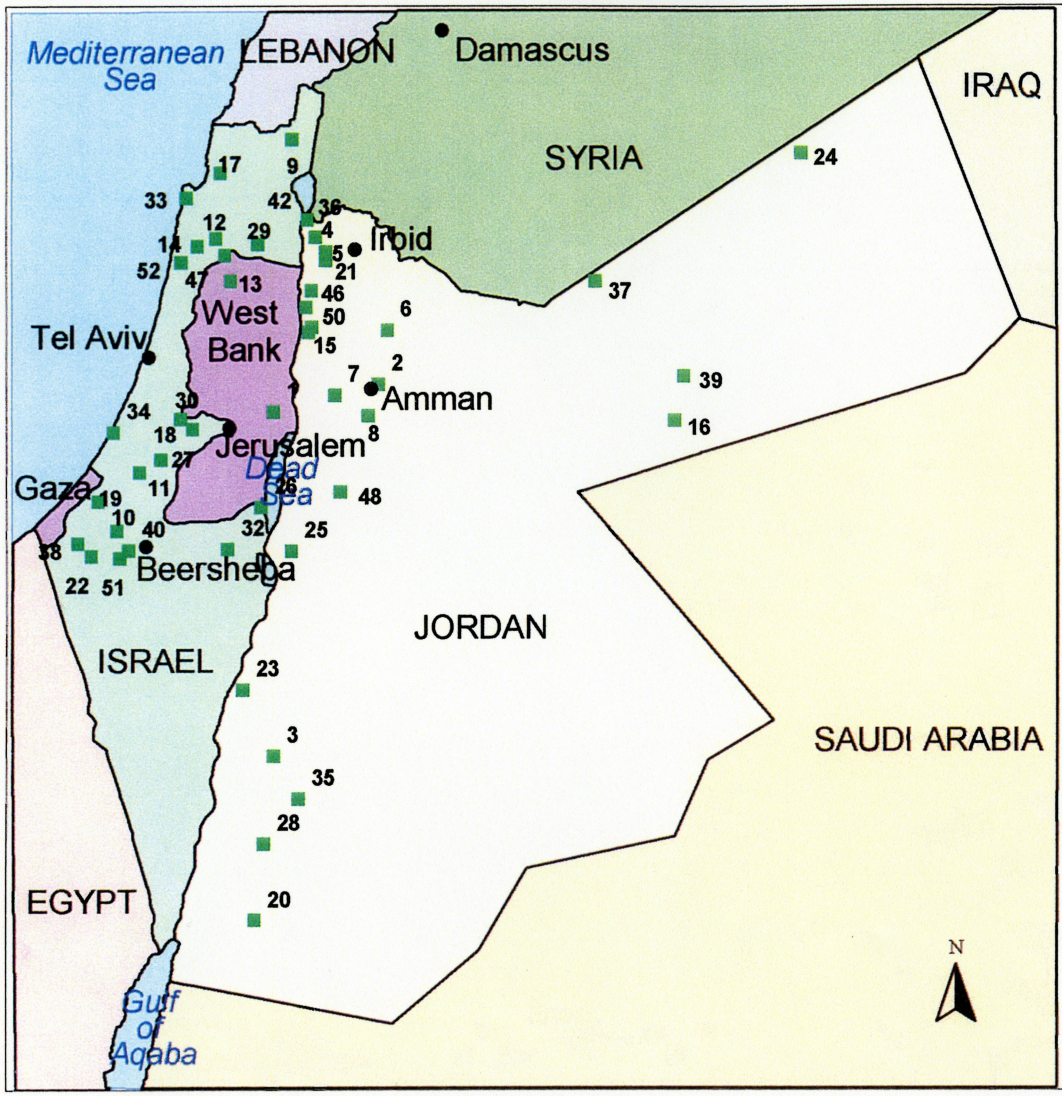


Figure 1: All Sites

SITE LIST

20	'Ain Abu Nekheileh	12	Nahal Zehora (Wadi Rabah)
2	'Ain Ghazal	34	Nizzanim
28	'Ain el-Jammam	42	Sha'ar Ha Golan
32	Arad	22	Shiqmim
35	Basta	4	Tabaqat al-Buma
25	Bab edh Dhra'	52	Tel Mevorakh
40	Beersheba	51	Tell Abu Matar
3	Beidha	50	Tell Deir 'Alla
24	Burqu/Ruweishid	10	Tel Halif
48	Dhiban	8	Tell Jawa
39	Dhuweila	17	Tell Kaisan
13	Ein el Jarba	14	Tell Qiri
29	En Shudud	15	Tell Um Hammad
30	Gezer	46	Tell es-Saidiyeh
19	Grar	36	Tell ash-Shuna North
18	Hartuv	11	Tell el-Hesi
9	Hazor	16	Tell el-Hibr
37	Jawa North	23	Wadi Fidan
6	Jebel Abu-Thawwab	7	Wadi Shueib
1	Jericho	5	Wadi Ziqlab
27	Lachish	21	Wadi el Yabis
47	Megiddo		
38	Nahal Besor (Shiqmim)		
26	Nahal Mishmar		
33	Nahal Oren		

Legend

Archaeological Site

Major City

detailed analyses in publications seems to suggest, contrary to actual fact, that lithic tools decline to a point where they are considered to be insignificant. Yet lithics did not simply disappear, although they were manufactured in smaller quantities.

Publications from Levantine sites dating from the Pottery Neolithic to the Iron Age have produced limited information regarding lithic assemblages for several reasons. It has been assumed that lithics no longer played as important a role as previously in the more recent period sites. A lack of interest in lithics has created a situation where artifacts that could have provided important information were set aside for possible review later or simply discarded altogether. This is demonstrated by the assemblages from 'Ain el-Jammam, Dhuwelia, Nahal Besor, Tell esh-Shuna North, Tell Jawa and Wadi Shueib.

Pottery has come to be a more useful cultural and chronologically diagnostic artifact. If an archaeologist is more interested in identifying ceramics or metal artifacts, lithics are more likely to be overlooked because of their capacity to blend into the environment. Recent archaeological practices have suggested that the artifacts that have suffered the fate of being at the bottom of priority lists for sites from the Pottery Neolithic onward are lithics. Locus sheets which do not include lithic material as an artifact type used at some of these sites are a further indication of this practice.

This thesis demonstrates that lithics did continue to exist and are able to contribute to the understanding of a site as a whole. There were many reasons why lithics continued to be manufactured, although in smaller numbers. The raw material for manufacturing was readily available. Moreover, lithic production was more cost-effective than metallurgy. The required materials and technologies for metallurgy were

not readily available in all areas and were cost-intensive. It seems clear that lithic tools are important in the Levant during the Bronze and Iron Ages. Yet some archaeologists do not regard them as culturally significant.

1.2 Research Strategy

While researching this thesis it became apparent that there is an enormous amount of published material to be investigated. The first stage of this research was an extensive literature review, which encompassed reports and texts on excavated archaeological sites in the southern Levant from the Pre-Pottery Neolithic through to the height of the Iron Age. The information obtained from this was used to establish the state of archaeological research with respect to lithics for these periods. In total, more than 75 sites were initially analyzed for this thesis. Sites were removed from the study when it became clear either that they did not fit within the appropriate time periods or that there was no evidence that lithic material was present. The remaining 46 sites (Figure 1) have a minimum of one published report, while some have volumes hundreds of pages in length.

Examination of the 46 sites indicated patterns of archaeological practices in the Levant with respect to the treatment of lithic material. To facilitate organization and analysis, information relevant to these sites has been gathered, sorted, and entered into a MicroSoft Access database. The database has been designed not only to serve as a quick reference tool, but also to examine a variety of aspects regarding archaeological excavations and can detect any similarities, differences, patterns or biases in their treatment of lithics. Chapter 3 provides an in-depth examination of 12 of the 46 sites and their lithic assemblages: three of these are control sites from the Pre-Pottery Neolithic

and nine are sites from the Pottery Neolithic through to the Iron Age (Figure 2). Brief discussions or comparative remarks with respect to some of the remaining 34 sites have been included in Chapter 3 and Chapter 4 to provide a more complete account of Levantine lithic analysis in post Pre-Pottery Neolithic periods.

1.3 Database Format

The database created using MicroSoft Access contains 46 sites (see Appendix A). In order to identify each site's individual characteristics, 19 fields were established. These fields encompass a wide range of topics in order to provide a complete representation of each site. This section will provide a detailed description of each of the fields used in the database and the thesis as a whole. The fields included are: **site number, site name, political location, sub-area, period of site, topography, seasons excavated, focus of excavation, lithics present, discussion of lithic, locations of lithic, comparative information provided, statistical information provided, quantity of published material** and **lithic criteria provided**. The 46 sites were assigned a **site number** that reflects the order in which the sites were entered into the database.

Political location (see Appendix A, Table 1) refers to the countries or territories in which the sites exist. The southern Levant refers to the nations of Israel and Jordan. The field **sub-area** (see Appendix A, Table 1) refers to each site's geographical location demarcated by central, north, east, south, and west within the specified country. These fields are present for information purposes; no further correlations will be made. It is important to establish the **period(s) of the site** (see Appendix A, Table 1) in each case to determine the chronology of occupation of each settlement. The primary periods

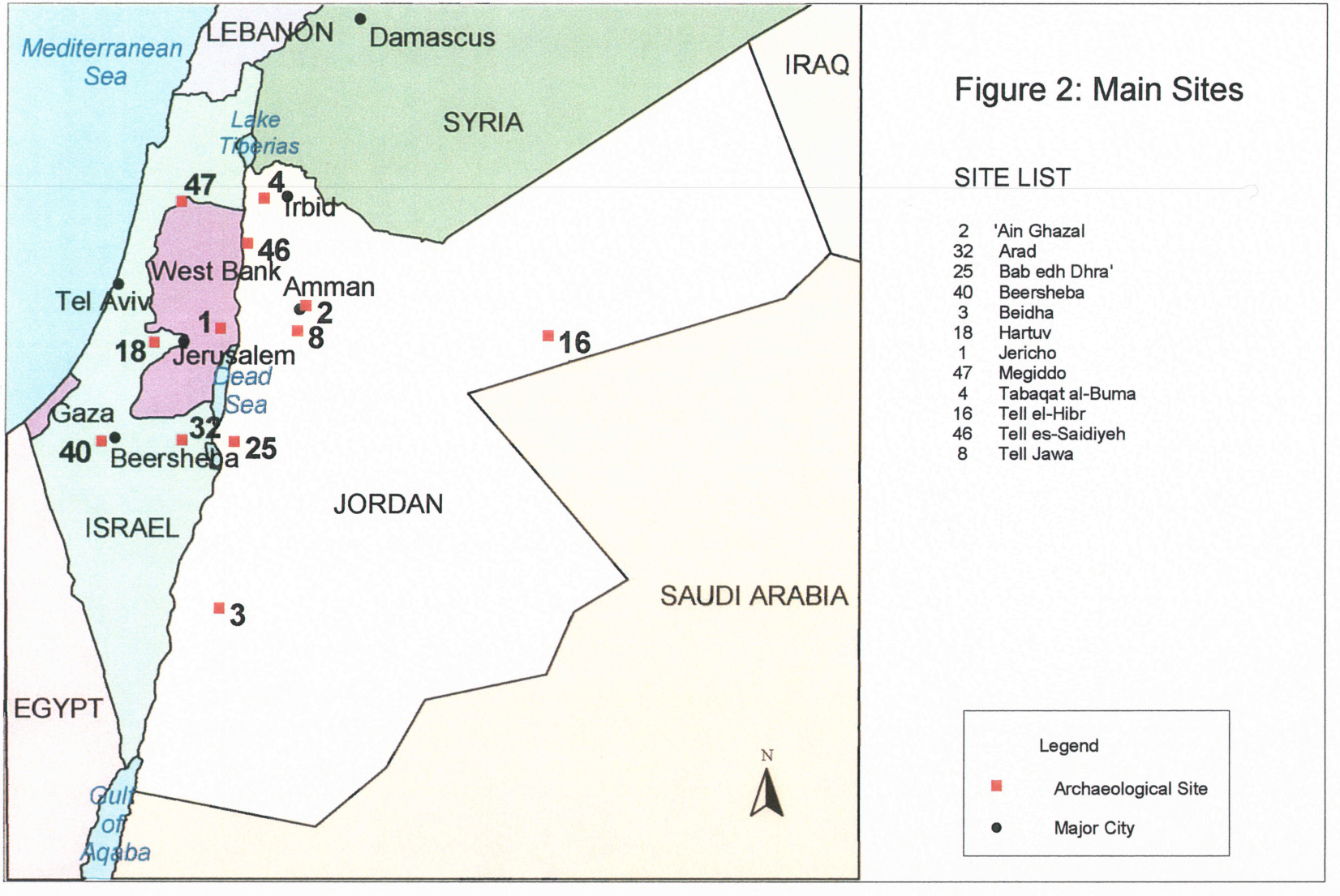


Figure 2: Main Sites

SITE LIST

2	'Ain Ghazal
32	Arad
25	Bab edh Dhra'
40	Beersheba
3	Beidha
18	Hartuv
1	Jericho
47	Megiddo
4	Tabaqat al-Buma
16	Tell el-Hibr
46	Tell es-Saidiyeh
8	Tell Jawa

Legend

■ Archaeological Site

● Major City

included in this field are: Pre-Pottery Neolithic A and B, Pottery Neolithic A and B, Chalcolithic, Early Bronze, Middle Bronze, Late Bronze, Iron A, Iron B. Some site reports also indicate that Roman, Byzantine, Umayyad, Ayyubid-Mameluke, and Modern occupational levels were identified. A majority of sites experienced multiple occupations, while only a few are single period sites.

The **topography** (see Appendix A, Table 2) field examines the general terrain of the 46 sites. The categories include: *wadi/nahal*/river or brook; *'ain/'en*/spring; *jebel/har*/mountain; *tell/tel*/mound and mudflats. Different types of terrain may require different considerations throughout the excavation process. Through the examination of the types of terrain, one may determine if there are trends relating to the presence of lithic material associated with the abovementioned categories.

It is important to establish the **number of seasons excavated** (see Appendix A, Table 2) to determine to the extent of work at a site. The total number of seasons excavated also provides a comparative tool when one examines amount of publications from each site.

The **primary focus of excavation** field (see Appendix A, Table 2) refers to the purpose and goals of the project. Archaeologists go out into the field with some sense of what it is that they are looking for. There are a few common approaches that may become the excavation's focus. The main focus of an excavation could be the architecture, burials, lithics, ceramics, and small finds such as coins or paleobotanical samples. The excavators of sites, such as Wadi Ziqlab and 'Ain Ghazal, provide very detailed outlines of their research designs; however, the majority of excavation reports provide limited or no information about their research design.

The **excavator's or excavation background** field (see Appendix A, Table 3) deals with the background or nationality of the individual, or the homeland of the institution that was responsible for the site and its remains. This information may shed light on excavation objectives and the format of research designs.

The **use of the site** field (see Appendix A, Table 3) refers to its type or ancient function. The sites examined include a rock shelter, agricultural areas, farmstead, nomadic camps, villages and fortified cities. The type or function of a site is used to determine how many sites fall within each type category, and if similar sites are likely to exhibit comparable quantitative and qualitative analyses regarding lithic technology.

The **potential problems** field (see Appendix A, Table 3) acknowledges that many of the sites in the Levant have experienced some form of interference or destruction long after the sites were abandoned in antiquity. Excavators are often confronted with a number of contemporary interferences while excavating in the Levant. Some of the disturbances include: modern agriculture, modern construction, fires, bombings/war destruction, modern pollution, the change in coastlines or earthquakes. It is important to determine whether or not there have been any disturbances at sites so that we can be certain with respect to the contexts of their discoveries.

The **primary dating techniques** field (see Appendix A, Table 4) examines the way in which the artifacts were dated. The architecture of a site is often the primary source for establishing a date; however, other artifacts may also provide important dating information. These include pottery, small finds such as coins, lithics, paleobotanical evidence, and documentary sources. Chronometric techniques, such as radiocarbon, are also included.

The field **lithics present** (see Appendix A, Table 4) includes whether or not lithic material was recovered on an excavation, and whether or not the published material of each site states the presence of lithic material during the course of survey or excavation. Each of the 46 sites did have lithic material present.

The **discussion of lithics** field (see Appendix A, Table 4) is very important in the examination of the sites for this thesis. It refers to the extent of consideration of lithic artifacts at each site and subsequent reporting and publication. In order to learn from the lithics that are discovered at a site, publications should contain as much information about the artifacts as possible. There are four possible choices in this field.

First, "extensively discussed" refers to a very detailed description of the lithics, such as that given in Steven Rosen's work on Hartuv. To be considered "extensively discussed," the published material needs to provide the quantity, material, tool type, measurements, and contextual information (site reference number, stratum, locus, pottery pail number, and elevation), and detailed drawings and descriptions of the artifacts recovered. The sites that fit into this category generally have entire articles or chapters in published volumes and appendices dedicated to the lithic artifacts.

"Moderately discussed" includes quantity, material and possible lithic type, measurements of the artifact, and rough/limited drawings of some of the lithics. Sites that fall under this heading tend to provide discussions of five to ten pages. "Limited discussion" refers to reports which include the quantity of lithics recovered, material type, and typology. The majority of sites that fall under this heading have descriptions that are a couple pages in length.

The **location of lithics** field (see Appendix A, Table 4) refers to the area where the lithics were recovered within the site. The possible locations include: in survey surface scatters, in the fill, in a stratified context; or else it is noted that the location was not provided by the excavator. It is vital that the provenience of artifacts has been established in order to determine whether or not the discovery was contextual.

The **comparative information provided** field (see Appendix A, Table 5) includes the use of comparative references to analyze, compare and contrast each site's assemblage. It is very important for understanding not only the individual site itself, but also the time period(s) to which each site belongs. The four categories refer to the number of sites included in the overall analysis of an individual site. The options are "excellent: 10+ sites," "good: 5-9 sites," "poor: 1-4 sites" and "none: 0 sites."

The **statistical information** provided field (see Appendix A, Table 5) indicates if quantitative analysis has been applied to the data to provide further information. Whether or not quantitative information is "present" or "not present" is given. Of the 46 sites examined 25 (54%) sites provided quantitative information.

The **quantity of published material** field (see Appendix A, Table 5) focuses directly on the amount of attention that has been paid to lithic assemblages at each of the 46 sites. This is important for comparative purposes, indicating whether there are limited amounts of published material on lithic assemblages for Pottery Neolithic through Iron Age in contrast to the more extensive published material on the Pre-Pottery Neolithic sites. The categories are "extensive: 21+ pages," "very good: 11-20 pages," "good: 5-10 pages," "poor: 1-4 pages."

The **lithic criteria** field (see Appendix A, Table 5) is related to the previous category of "discussion of lithics," with one notable difference. This category uses a checklist to describe the way that the study documented the lithic material uncovered. These criteria include measurements of the artifact, the type of material, description of colour and texture of the material, photographs or drawings of lithic, contextual information (stratum, locus, and elevation), and use-wear analysis. In addition to these points, it is also noted whether or not the publications provide detailed information about all or only a limited number of all the artifacts found.

In conclusion, the examination of these publications reveals that the amount and importance of lithics have decreased greatly in publications of sites of the Pottery Neolithic through to the Iron Age periods. The following section will examine the possible reasons for this decrease.

1.4 Lithics, Ceramics and Metals in Archaeological Analysis

The dissemination of ceramics and metallurgy in the post-Neolithic Levant was the result of a more settled lifestyle for those inhabiting the region in antiquity. These materials also provide archaeologists with new and more detailed information. In Palaeolithic through Pre-Pottery Neolithic periods lithics are the primary artifact found. This section will provide a brief outline of the differing amounts of information that can be gathered from lithics, ceramics and metallurgy.

Stone tools first appeared approximately 2.6 million years ago in eastern Africa. The major artifacts that have survived until the introduction of ceramics and metal after 10,000 B.P. are made of stone. Since stone tool types change over time, archaeologists

have developed a nomenclature to classify these changes. Quite often these classifications are based on tool function and grouped into industries according to the initial site at which they were identified. Thus, as Joukowsky notes:

> ... Oldowan industry, from Oldoway (another way of spelling Olduvai) refers to tools like those first found at Olduvai Gorge. The Acheulian industry, found at Saint Acheul in France, gave its name to a type of hand-axe fashioned between 150,000 and 75,000 years ago... [Joukowsky 1980: 312].

Levantine lithic industries include Ghassulian, Beersheba and Natufian, to name a few.

It is important to analyze the function of lithic tools as they allow us to reconstruct the activities and adaptations of ancient cultures. In order to determine the function of a specific tool a series of factors must be examined. These include the manufacturing techniques (presence of cortex, type of percussion bulb, burning or heating of material, and type of striking platform), source of raw material, colour of material, use-wear and morphology. To provide an accurate description of each lithic multiple measurements are also taken.

Relative chronology can be established through the combination of data from lithic analysis in conjunction with stratigraphic evidence. Analyses of the raw material can indicate if communications and trade patterns existed between sites. Therefore, it is important that the material from one site be examined, compared and contrasted with those from other sites. A site's subsistence patterns and development of environmental adaptations can be reconstructed through the study of lithics in conjunction with faunal and floral analyses.

Spectrographic analysis, chemical or wear-pattern studies can also provide the archaeologist with important information. Edge-wear analysis determines what specific

tools were used for. Replication studies are used to understand tool-making techniques and changing tool-production strategies over the course of millennia.

The analysis of ceramic artifacts has provided archaeologists with detailed information about past cultural groups. Ceramic analysis has grown into a specialized field within archaeology. Joukowsky states:

> The distinctive attributes (subsets) of ceramic vessels can be classified and used by the analyst to create a type series which, when completed, can be applied to all the pottery found at a particular site, and eventually, with similar series at other sites to determine how closely they are related [Joukowsky 1980: 332].

Distinctive attributes of ceramics include features such as the rim, handle, base, spout, and decoration. In conjunction with these features, the measurements, shape, colour, hardness, slip/wash/glaze and function of the item all play a role in establishing the "type" of ceramic vessels present. Laboratory tests for ceramics include clay analysis, thin-section, spectrography and refiring. Clay analysis is used to determine the original source of the material, while thin-section analysis examines ceramic material to identify the minerals and inclusions present within the clay.

Because of continuously evolving styles over time, ceramics have provided archaeologists with artifact classes that can be relatively dated within a small time period and to a specific region. The recovery of great quantities of ceramics in the Near East has provided archaeologists with a precise chronology. Unlike lithics that tend to give a wider range of dates, ceramics can be dated within a century.

Copper and gold were the first metals used by humans at approximately 8,000 B.C.E., but in a relatively short period of time bronze, iron, silver, tin and lead would become important in the economies of ancient cultures. In antiquity "metals were used in

the manufacture of weapons, arms and armour, tools, sculpture, ornaments, money and vessels for eating and drinking" (Joukowsky 1980: 402). The shape, whether it is cast or wrought, function, manufacturing techniques, measurements, and decoration are all part of the analysis of metal objects. The vast range of attributes that metal artifacts can exhibit and their regular evolution over time mean that, as in the case of ceramics, diagnostic types have been determined and used for relative chronologies.

This brief examination of the relative importance of lithics, ceramics and metal objects has demonstrated that each of these artifact types provides its own unique insights into the history of an individual site or an entire time period. It is true that more specific data can be gathered from ceramics, and metals, but lithics still reveal the nature of tool-making and their importance in the material cultures of the past. The persistence and functionality of lithics suggest that ancient cultures have relied on this material for survival and adaptation over millennia. Although some archaeologists studying the post-Pottery Neolithic in the Levant may have felt that lithics did not fit into their research design, and that they would not yield the same amount of information as other artifacts, lithics should not be disregarded because of personal or professional bias. [See Appendix C for the author's experience excavating at an Iron Age Site in Jordan]

CHAPTER 2

THE ANALYSIS OF LITHICS IN LEVANTINE ARCHAEOLOGY

2.1 Introduction

Lithic analysis in Levantine archaeology began with the work of W. Flinders Petrie and his colleagues at the end of the nineteenth century. The early scientific study of large hill-like occupation sites or tells, such as Tell el-Hesi, by Petrie, Bliss and Spurrel, laid the groundwork for future archaeological investigations of lithics at prehistoric sites (Rosen 1997: 18). These early investigations demonstrated that the cultures that had once inhabited the Levant were highly developed in their ability to create functional objects out of specific stone types. They created typological classifications and set the foundations for future archaeologists.

The twentieth-century excavator Randall Macalister, who is most noted for his work at Gezer in central Israel from 1902-1909, devoted an entire chapter of his monograph to flint knapping. He also added notes on flint tools in his chapter on agriculture (Macalister 1912: 32-34, 121-128; Rosen 1997: 18). The "ribbon knives," later known as Canaanean blades, were originally identified by Macalister (Rosen 1997: 18). In recent years, however, Macalister's methods have been questioned. As Rosen states:

> The use of *baksheesh* to encourage workers to turn over valuable objects (e.g. Woolley 1954: 31) might have been a valuable aid in the recovery of those objects, but it probably also served to discourage recovery of more mundane objects. Of course, the analytic value of lithic waste had not yet been recognized by pre-historians, let alone those archaeologists working in later periods. At most sites, the stone tools were ignored altogether, but then, so were most artifacts, including potsherds [Rosen 1997: 18].

W.G. Dever, who also excavated at Gezer, felt that Macalister had tried to formulate a holistic view of life in ancient times, which was based on the investigation of a variety of material cultures, including lithics (Dever *et al.* 1970: 2).

René Neuville provided the first attempts at a systematization of post-Neolithic lithics while working in sites in the Judean desert in the early 1930s. His attempts at synthesis were incorporated into the general views of Levantine prehistory and archaeology for many of the following decades (Rosen 1997: 18). In the late 1930s, Joan Crowfoot began analyzing lithics from Garstang's excavations at Jericho. This work on the Jericho lithics produced a volume more than 150 pages in length. As a result of her extensive work on this project, which will be further discussed in Chapter 3, Crowfoot became a Levantine lithic specialist. Through the research efforts of these individuals a firm foundation was established for the analysis of lithic material from Pre-Pottery Neolithic and early ceramic period sites in the Levant. The initial studies and publications of Neuville and Crowfoot provided guidelines or points of reference for future lithic researchers.

The archaeological agendas of the early decades of the twentieth century were very different from today's processual and post-processual approaches. The primary focus for archaeology in the 1930s was to establish typological sequences that would be used to characterize time periods and cultures (Rosen 1997: 18). It is important to note

that during the early part of the twentieth century the chronological and stratigraphic sequences such as Pre-Pottery Neolithic A, Pre-Pottery Neolithic B, Early Pottery Neolithic (A or B), Later Pottery Neolithic (A or B), Chalcolithic, and Early Bronze Age had not yet been defined. Given the state of lithic investigation in the 1930s, Garrod made a major contribution when she suggested that the Early Bronze Age Canaanean lithic technology was closely related to that of the Natufian period, even though this proved to be inaccurate (Rosen 1997: 18).

In the decades that followed, lithic analysis continued to develop. The recognition and definition of standardized types of lithic tools and assemblages were developed from the 1930s through the 1970s (Rosen 1997: 18). Slowly, descriptive reports began to appear on lithic assemblages from a wide spectrum of sites, demonstrating the usefulness of lithics in the understanding of a site's history. When compared to the greater amount of information that was learned from ceramic analysis, only limited success was achieved in the use of lithic analysis for chronological and cultural definition. The huge gap between the information being produced from lithic analysis, in contrast to ceramic analysis, resulted in a decrease in investigations of lithic artifacts. More than 40 years would pass before a renewed attempt at synthesis, including a basic overview of Levantine prehistory, would occur (Rosen 1997: 18).

In the late 1970s and early 1980s, although chipped stone tools continued to appear in the material remains from post-Neolithic sites in the Levant, few lithic specialists were included in excavation teams (Rosen 1997: 18). Lithic specialists were part of the excavation team at only a limited number of sites examined in this thesis. They include 'Ain Ghazal, Bab edh Dhra', Beidha, En Shadud, Gezer, Hartuv, Jericho,

Megiddo, Shiqmim, Tabaqat al-Buma, and Tell el-Hesi. Moreover, few archaeological reports contain much more than several paragraphs, accompanied by an occasional drawing or photograph, devoted to lithics. This is clearly demonstrated in 17 (37%) site publications in this thesis. These sites are: 'Ain el-Jammam, Beersheba, Dhiban, Hazor, Jebel Abu-Thawwah, Lachish, Nahal Besor, Tel Mevorakh, Tell Abu Matar, Tell es-Sa'idiyeh, Tell Deir Alla, Tell Kaisan, Tell Um Hammad, Wadi Shueib and Wadi Yabis.

Often the information provided is vague and possibly inaccurate. Only on rare occasions, as seen in publications from Bab edh-Dhra, En Shadud, Gezer, Grar, Hartuv, Nizzanim, Sha'ar Hagolan, Shiqmim Tabaqat al-Buma, Tell el-Hesi and Tell Qiri does one find a lengthy and detailed analysis of a lithic assemblage from a ceramic period site in the southern Levant. Publications such as these provide a detailed account of not only how and where lithic assemblages were uncovered, but describe each tool type. The material type, colour and texture are considered along with the measurements of each tool. Comparative and quantitative studies are used to create correlations between assemblages and reveal insights into the state of ceramic period lithics as a whole. It should be noted that the majority of these site reports on lithic assemblages have been written by Steven Rosen.

In *Lithics After the Stone Age*, Steven Rosen discusses the reasons for the neglect of lithic analysis in post-Neolithic sites in the Levant. This neglect was not only a result of the limitations that lithics present in the development of a chronological stratigraphy (Rosen 1997: 18). Prior to the 1970s post-Neolithic Levantine archaeology had established a scholarly trajectory different from that in North America and Europe. Rosen states that, "Near Eastern texts (and, for that matter, classical texts as well), most

especially the Bible, provided both a scholarly and a public stimulus to archaeological work" (Rosen 1997: 19).

The work of the prominent Levantine scholar, W.F. Albright, demonstrates the typical course of archaeological study of this period, using a combination of textual investigation, field archaeology and ceramic analysis. Artifacts that did not provide a direct link to specific historical questions did not receive the proper consideration or analysis. With the primary focus placed upon textual information, discussions concerning lithics, faunal analysis, and archaeobotany rarely appeared in published material prior to the 1970s. In North America and Europe the focus of archaeological studies of similar periods was very different as there are no textual references available to guide excavations (Rosen 1997: 19). Rosen states:

> Thus, the different academic trajectories, dictated by differences both in data and in underlying ideologies (beyond the scope of this work), resulted in markedly different research objectives. One consequence of this process was the relative neglect of chipped stone assemblages in the post-Neolithic assemblages of the Levant [Rosen 1997: 19].

The result of this form of neglect can be seen in the following sites examined for this thesis: 'Ain al-Jammam, Beersheba, Burqu/Ruweishid, Ein el-Jarba, Nahal Mishmar, Nahal Oren, Tell ash-Shuna North, Tell es-Sa'idiyeh, Tell Deir Alla, Tell Kaisan, and Wadi Shueib. The results of the study and analysis of the recovered lithics from these sites only appeared in publications many years after the completion of the excavations, often by individuals who were not members of the original excavation team.

2.2 Lithic Analysis Today

It is crucial that when a site is excavated, it is examined as a whole, with a multi-faceted approach. Because of their large numbers, lithic artifacts recovered from Epi-paleolithic and pre-Pottery Neolithic sites are considered to be valuable and are the subject of extensive analysis. This can be clearly seen in the reports of the prehistoric sites of 'Ain Ghazal by Rollefson (1980-present), Beidha by Kirkbride (1958-1983) and Jericho by Garstang and Kenyon (1930-1936, 1952-58). In the last 25 years, lithic analysts have been able to use an increasing range of new techniques to explore questions relating to style, use, technological change, and economic systems (Siggers 1997: 1). These new techniques include use-wear analysis and retouch identification. The 1980 Masters thesis, *The Stone Tools from Tel Halif, Israel: A Technological Perspective*, by M. Warburton, of Washington State University Anthropology Department, provides an example of these new techniques in practice. It examines the blade technology from the Early Bronze and Iron II periods at Tel Halif, Israel. The analysis consisted of:

> (1) morphological analysis of the archaeological sample, (2) replication of the entire manufacturing sequence, (3) comparison of the replicated tools with the archaeological sample, (4) experimental use of the replication tools in activities similar to those postulated for the Tell's Bronze and Iron Age inhabitants, (5) wear pattern analysis of the potentially utilized archaeological tools, and (6) comparison of the experimentally used tools with the archaeological sample [Warburton 1980: iv].

Lithics from the more recent Pottery Neolithic through to Iron Age sites need the same consideration as has been devoted to earlier pre-Pottery Neolithic implements. Yet an examination of the past and recent studies of lithics from these periods in the southern Levant indicates that this area of research has been neglected (Siggers 1997: 1). This view is echoed in an article by Isaac Gilead, where he states:

> For the Beersheva Chalcolithic Site, which must have yielded thousands of flint artifacts, only a preliminary description of a small sample from Horvat Beter is available (Yeivin 1959: 40-44). Since many of these implements were thrown away, these pieces are no longer available for further study [Gilead 1984: 3].

Steven Rosen, a recent pioneer in the analysis of lithics from the post-Neolithic periods in the Levant, believes that scholars working on Bronze and Iron Age periods often seem to have been unaware of the breadth of archaeological evidence. Their training included the study of biblical texts, and as a result there is a de-emphasis of certain aspects of material culture (Rosen 1997: 18). It appears that lithic artifacts lose their status simply because they do not relate to scholarly texts as immediately as other types of artifacts do. This is shown by the biblical sites such as Beersheba, Hazor, Megiddo, Tell es-Sa'idiyeh, Tell Deir Alla and Gezer examined in this thesis. The published material from these sites provides limited data regarding lithic analysis, compared to the lengthy discussions of other artifacts, such as ceramics or architecture.

Given the importance placed on biblical texts by archaeologists dealing with the Bronze and Iron Ages, some consideration should be placed on biblical quotations such as: "And Joshua made knives of flint and circumcised the children of Israel at Gibeath-ha-Araloth" (Joshua 5:3). The narrative context suggests that Joshua and such events were situated in the Bronze Age (Rosen 1997: 11). Such quotations provide a perspective on continued lithic use and archaeologists who use biblical texts should apply the information towards an understanding of all the artifacts uncovered at a site, including lithic tools.

The result of the interest in other highly diagnostic artifacts can be seen in the limited number of lithic assemblages studied from Bronze Age and Iron Age sites in the

Levant. Therefore, it is difficult to clearly define lithic technologies during these periods when only a limited amount of published material exists. Archaeologists believe that the Canaanean blade was the predominant lithic tool of this period; however, because large amounts of lithic material go unnoticed or lack analysis, other tool types may have been missed. Of the 46 sites examined in this thesis, 22 sites have less than 10 pages of published material directly discussing lithics: 'Ain Abu Nekheileh, 'Ain el-Jammam, Beersheba, Burqu/Rwueishid, Dhiban, Dhuwelia, Ein el-Jarba, Gezer, Hazor, Jebel Abu-Thawwab, Lachish, Nahal Besor, Nahal Mishmar, Tel Mavorakh, Tell Abu Matar, Tell es-Sa'idiyeh, Tell Deir Alla, Tell Jawa, Tell Kaisan, Tell Um Hammad, Wadi Shueib, and Wadi Yabis.

2.3 The Decline of Lithics in the Post-Pottery Levant

It is erroneous to assume that lithic technology was quickly eliminated after the introduction of ceramics and metallurgy in the Near East. However, there was a significant decline in the variety of domestic and expedient tools, such as scrapers, notches, denticulates, borers, burins and choppers, as the new technologies became popular. The assemblages from Arad, Bab edh Dhra', Beersheba, Jericho, Gezer, Grar, Megiddo, Nizzanim, Tell el-Hesi, Tell Halif and Tell Qiri reflect this decline. By the Iron Age, the sickle blade is the dominant chipped stone tool in the Levant (Rosen 1984: 504) indicating that lithic assemblages have become more specialized and have less variety. For the archaeologist, metal artifacts and ceramics provide more reliable methods of dating than lithics. Many more types of diagnostic pottery and metal objects

are used to establish relative, and in conjunction with radiocarbon, absolute chronological sequences.

When villages began to grow into city-states, people became wealthier and metal provided a new and prestigious material for tools, weapons and ritualistic objects. The latter make up the majority of copper artifacts found during the Chalcolithic period (Rosen 1984: 504). However, the lack of metal arrowheads and the small numbers of chipped stone ones from the Chalcolithic is probably due to the decline in the importance of hunting (Rosen 1984: 504).

The decline in the production and use of lithics may not be linked as deeply to the evolution of ceramics and metal technologies as previously believed, but rather it may be due to the establishment of settled communities, as demonstrated at Shiqmim. It has been suggested that the rapid advancement in the new technologies was the result of the adoption of a less nomadic lifestyle. Increased numbers of small towns and large fortified cities, which began to emerge at the beginning of the Bronze Age, changed the way of life of the inhabitants. The excavation of Shiqmim by Levy in the 1980s uncovered architectural features indicating that the settlement of Shiqmim had been planned (Levy 1987: 179). This new, more specialized, proto-urban lifestyle that developed in the southern Levant in the Chalcolithic and Early Bronze periods provided the necessary infrastructure allowing the new technologies to flourish. Prior to the Chalcolithic period, large numbers of people were predominantly nomadic and this did not provide the proper environment for the creation and accumulation of personal luxury items, such as metal implements. A less mobile lifestyle permits an individual or group to try new endeavours and technologies.

Rosen describes three phases of change or transition in the replacement of lithics. The first phase occurred in the period between the Chalcolithic and the Early Bronze Age, when there was an overall decline in lithics even though there is not a great increase in metal technology, as revealed in the lithic assemblages from 'Ain Ghazal and Jericho. The first decline occurs more than 1000 years after the introduction of metallurgy in the Chalcolithic (Rosen 1996b: 151). Flint tools continue to be more easily produced and more cost effective for many centuries. Rosen states, "The first replacement, of flint axes by copper ones, seems to have been a result of expanded trade routes and exchange systems and their ease of manufacture, rather than properties of the respective tools themselves" (Rosen 1996b: 151-152).

In the second phase, during the Late Bronze and Early Iron Ages, the assemblages of chipped stone tools became much smaller and more specialized in form and function. One of the most dominant lithic tools of that period was the sickle blade. The final phase is marked by the virtual disappearance of lithics in the Iron Age (Rosen 1996b: 134-135, 151). Iron technology was introduced to replace bronze, but the disappearance of flint sickle blades occurred as a consequence of the introduction of iron and not bronze in the Levant (Rosen 1996b: 152).

The introduction of iron technology in the Late Bronze/Early Iron Ages was a turning point in tool production in the Levant. Prior to this there had been essentially no difference in efficiency between sickles of bronze or flint. With the creation of iron sickles a clear difference in efficiency emerged, resulting in a decrease in the use of stone for sickle blades. There is very little information regarding flint assemblages in the Levant after the Iron Age. Their absence in the published materials would suggest that

lithics played a very small role in the technologies and economies of the Persian, Hellenistic, Roman, Byzantine and Islamic periods. This disappearance is not total, however, since there is clear usage of lithics in the form of threshing teeth on farms in twentieth-century Turkey and Cyprus (Whallon 1978; Rosen 1984: 504).

Since the replacement of lithics is not straightforward, it is important to understand the factors that contributed to this decline. Without the recovery of lithic artifacts and their proper analysis and resultant publication, such understanding will not be achieved. Some of the factors suggested by Rosen (1984: 504) that are relevant and should be followed up by future research include: the increase in trade with metal rich areas during the Chalcolithic; the presence of a high quality lithic material in Jordan and Israel; the higher cost of metals; the differences in efficiency of metal and stone tools; and the different amounts of labour required to produce both.

Rosen's work provides insight into the complex transition from lithics technology to metallurgy. During the Early Bronze I-II periods, trade ties between areas in the Sinai and the southern Negev strengthened. This early urban period witnessed an increase in the availability and popularity of metal tools in the Levant. Metal ore was very expensive to transport, and those providing metal tools had to attract buyers with high quality goods. Certain tool types disappeared more quickly than others. Flint axes/celts and awls/drills disappear from the archaeological record during this period as the lithic tool kit became more specialized (Rosen 1984: 504). Rosen's research into the reasons why lithics disappeared presents some interesting conclusions. In the 1996 article, "The Decline and Fall of Flint," Rosen states:

> The replacement of chipped stone technologies by metallurgy cannot be viewed as a simple linear process, nor as the complementary rise and fall

> of competing technologies. Both technologies are complex arrays of distinct sub-technologies, each of which has its own developmental trajectory [Rosen 1996b: 129].

Field reports, published articles and books on archaeological sites of the post-Neolithic periods tend to provide only a limited summary of lithic assemblages such as at 'Ain Abu Nekheileh, 'Ain el-Jamman, Beersheba, Burqu/Rwueishid, Dhiban, Dhuwelia, Ein el-Jarba, Gezer, Hazor, Jebel Abu-Thawwab, Lachish, Nahal Besor, Nahal Mishmar, Tel Mavorakh, Tell Abu Matar, Tell es-Sa'idiyeh, Tell Deir Alla, Tell Jawa, Tell Kaisan, Tell Um Hammad, Wadi Shueib, and Wadi Yabis. There is a strong need for the development of models and analogies in order to understand the decline in lithics and to provide a clearer picture of cultural patterns and total assemblages for the sites of these periods. Traditionally, the analysis of material culture from Late Neolithic sites has been based on architectural styles and pottery assemblages (Mellaart 1975; Moore 1985; Siggers 1997: 2). The attention to detail that is given to architecture, ceramics and other artifacts is not given to lithics in the majority of published materials. This lack of analysis and discussion regarding lithics becomes particularly evident in studies of the Bronze and Iron Ages, as documented at sites such as Beersheba, Lachish, Megiddo, Tel Mevorakh and Tell Deir Alla.

2.4 Examples of Analyses of Lithic Assemblages

In the past two decades there has been a strong increase in interest in post-Pottery Neolithic lithic technology in the Levant. Through the works of individuals such as Steven Rosen and Julian Siggers, this previously neglected area of study has begun to edge its way into archaeological research. Beginning in the late 1970s, Steven Rosen has

attempted to address the fact that the publications of many Pottery Neolithic through to Bronze and Iron Age sites lack adequate presentations of lithic artifacts. His work on the lithic assemblages at sites such as Gezer, Shiqmim, Hartuv, and En Shadud has demonstrated the type of detailed analysis that is possible when working with later period lithics in the Levant (Rosen 1985, 1986, 1987, 1996(a), 1997).

Of the 46 sites that were included in this thesis, four are reported in Masters theses or Ph.D. dissertations. The works were particularly useful in providing examples of what type of lithic analysis is possible in ceramic period sites in the Levant. It appears that beginning in the late 1970s graduate students became interested in this area of research. The catalyst for this interest has been difficult to establish. It is possible that these students had access to lithic assemblages and were simply curious to know more about them. With a limited amount of published material available concerning post-Neolithic lithic assemblages, the prospect of delving into a new area of research may have been a strong motivator.

In 1977 W.M. Hammond analyzed the lithics of Tell el-Hesi in *The Raw and the Chipped: An Analysis of Correlations between Raw Material and Tools of a Lithic Industry from Tell el-Hesi, Israel.* Bab ehd-Dhra' was the topic of *Formal and Functional Analyses of the Chipped Stone Tools from Bab edh-Dhra, Jordan,* by M. McConaughy in 1979. Lithics from Tell Halif were the focus of *The Stone Tools from Tell Halif, Israel: A Technological Perspective*, by M. Warburton in 1980. Finally, Late Neolithic material was analyzed in *The Lithic Assemblage from Tabaqat al-Buma: A Late Neolithic Site in Wadi Ziglab, Northern Jordan,* by J. Siggers in 1997. Theses and dissertations such as these can provide detailed understanding of an excavated site as

whole, or about individual types of artifacts, in ways that many of these sites seasonal reports do not, because they tend to skim over these artifacts.

Julian Siggers's work at Tabaqat al-Buma demonstrates the revitalization of ceramic period lithics analysis. In *The Lithic Assemblage from Tabaqat al-Buma: A Late Neolithic Site in Wadi Ziglab, Northern Jordan*, Siggers attempts to fill the void of lithic research in the Late Neolithic Levant by examining a sample of chipped stone tools from Tabaqat al-Buma. His work documents and analyzes the large quantity of lithics recovered over the course of eight seasons of excavations (Siggers 1997: i). The results of his investigation suggest that a shift occurred in lithic technology during the Late Neolithic. This shift is characterized by a reliance on flake tools as opposed to the blade-dominated industries of the preceding Neolithic phases (Siggers 1997: i).

Siggers used a multi-disciplinary approach in the examination of the Tabaqat al-Buma lithics. This included not only the classification of the lithics into tool types and detailed analyses of the geology of the region from which the raw material was derived, but also examined the roles and functions of lithics within the site (Siggers 1997: 189-192). This publication provides a complete profile of the lithics of Tabaqat al-Buma itself, as well as their place in Late Neolithic Levant technology. Siggers' work should be viewed as a model for the quality and quantity of information that can be derived from the lithic material at similar sites across the Levant.

The decline of lithics and the introduction of metallurgy are interrelated, as Rosen suggests in his 1984 article, "The Adoption of Metallurgy in the Levant: A Lithic Perspective." Rosen and Siggers are main sources of information regarding this subject because of the lack of other published material. Rosen states that the disappearance of

functional lithics and the adoption of metallurgy (copper, bronze, and later iron/steel) is linked by several factors. These factors include an increase in trade beginning in the Chalcolithic with areas rich in metal sources, such as the nearby Sinai. However, more cost effective high-quality flint material was readily available in Jordan and Israel, compared with the initial scarcity and high cost of metal. Metal tools were more labour-intensive to produce in cost and time than lithic tools. A relative difference also exists in the efficiency of metal and flint tools (Rosen 1984: 504). These factors indicate that metal did not replace flint overnight, but rather in a series of stages.

It is interesting to note that according to Rosen, lithics begin to decline in the archaeological record nearly 1000 years prior to the introduction of metallurgy into the Levant (Rosen 1996b: 151). The transitional phase was neither straightforward nor linear. It should be clear to those working in the area of Pottery Neolithic through Iron Age sites in the Levant that lithic artifacts will be present. The standardized collection practices and methodological approaches of ceramic period lithics do not reflect those of early period sites (Epipaleolithic to Pottery Neolithic). It is critical to understand what factors contributed to archaeologists neglecting lithics in post-Neolithic sites.

CHAPTER 3

SELECTED EXAMPLES OF LITHIC DISCUSSION

3.1 Introduction

Every archaeological site is unique and has distinctive characteristics. In the scrutiny of more than 250 sources consulted, it became evident that there is as much diversity in the publication of lithic artifacts as there is in the sites themselves. Publications are unique; all provide their own insights and revelations. While each of the 46 sites examined in this thesis exhibits its own individual features, many share a number of similarities. Generally, the dominant dating technique used is seriation, focusing on architectural features and ceramics. Information gained from radiocarbon dating is provided by 28% of the sites. Some 24% of the sites include data from lithic material for dating purposes. The location of the lithic material is provided in 69% of the sites, while 28% of sites do not provide any contextual information regarding the recovery of the lithics.

The database has proven to be a valuable tool for organizing a vast quantity of data related to these sites and has provided an effective way to identify, compare and analyze the specific traits each site embodies (see Appendix A). In order to catalogue, compare and examine the sites in the database, 19 fields were established. Each of these fields was described in detail in the introductory chapter. Through the use

of the database, common and unique characteristics or attributes were quickly identifiable.

The 46 sites were grouped into the following three categories: 1) comprehensive; 2) satisfactory; and 3) limited. Discussions of each grouping of site reports are prefaced by a summary of the criteria required to determine the placement of the sites into the comprehensive, satisfactory or limited categories. Of the 46 sites, approximately 32% are considered to be comprehensive, 22% fit into satisfactory, and 46% fall into the limited category. This chapter breaks down the findings of the database in four specific sections. Section 3.2, examines three multi-period sites, with strong representations of Pre-Pottery Neolithic levels, and discusses their specific treatment of lithic artifacts. This analysis established criteria or a model used to compare the treatment of Pottery Neolithic through Iron Age sites. This section will be followed by sections discussing the three above-mentioned categories (comprehensive, satisfactory, limited). These sections provide detailed discussions of the treatment of lithic assemblages of nine sites dating from the Pottery Neolithic through the Iron Age. The 12 sites selected for detailed discussions are representative of the other sites in the database (see Figure 2). A historical overview of each of the sites has been included to provide a context for the reader who is not familiar with Levantine archaeology. Other sites will be introduced where appropriate as corroborative and analogous examples.

3.2 Pre-Pottery Neolithic Sites: Selected for Comparative Purposes

The focus of excavations at Pre-Pottery Neolithic sites is different in many ways from those belonging to the Pottery Neolithic through Iron Age periods. This section will

establish a 'norm' or comparative sample for the treatment of lithic artifacts. The first and most obvious difference is the type of artifacts recovered, such as the abundance of lithics and the absence of pottery in Pre-Pottery Neolithic sites. In publications of Pre-Pottery sites an emphasis is placed on architecture, human or animal remains, and lithic artifacts. It is important to state that lithic technology and morphology is better defined and more precise in its development in Pre-Pottery Neolithic periods. This is due to extensive research and analysis on earlier assemblages for more than a century, and the larger quantities of lithics that make up Pre-Pottery Neolithic assemblages, in addition to comparative data from sites throughout the world. In contrast, lithics at post-Neolithic sites are treated with limited interest, as lithic assemblages become more specialized and smaller in quantity. Significant differences include the types of assemblages recovered, the depth of analysis performed, and the overall importance placed on lithic material from sites ranging from the Pottery Neolithic through to the Iron Age.

In order to demonstrate the difference in the approach and subsequent results this thesis examines three PPN sites: Jericho, 'Ain Ghazal and Beidha. Each of these sites has been the subject of extensive excavations resulting in numerous detailed publications. Each of these sites holds a significant place in the archaeological history of the Levant.

3.2.1 Jericho - Database Site 1

Jericho is located in the southern Jordan Valley, 800 metres below sea level (see Figure 2, Figure 4). The site, specifically Tell as-Sultan, contains a number of occupation levels ranging from the Epipaleolithic through the Iron Age. Tell sites are often associated with multiple occupational levels. The excavation of Jericho exhibits a

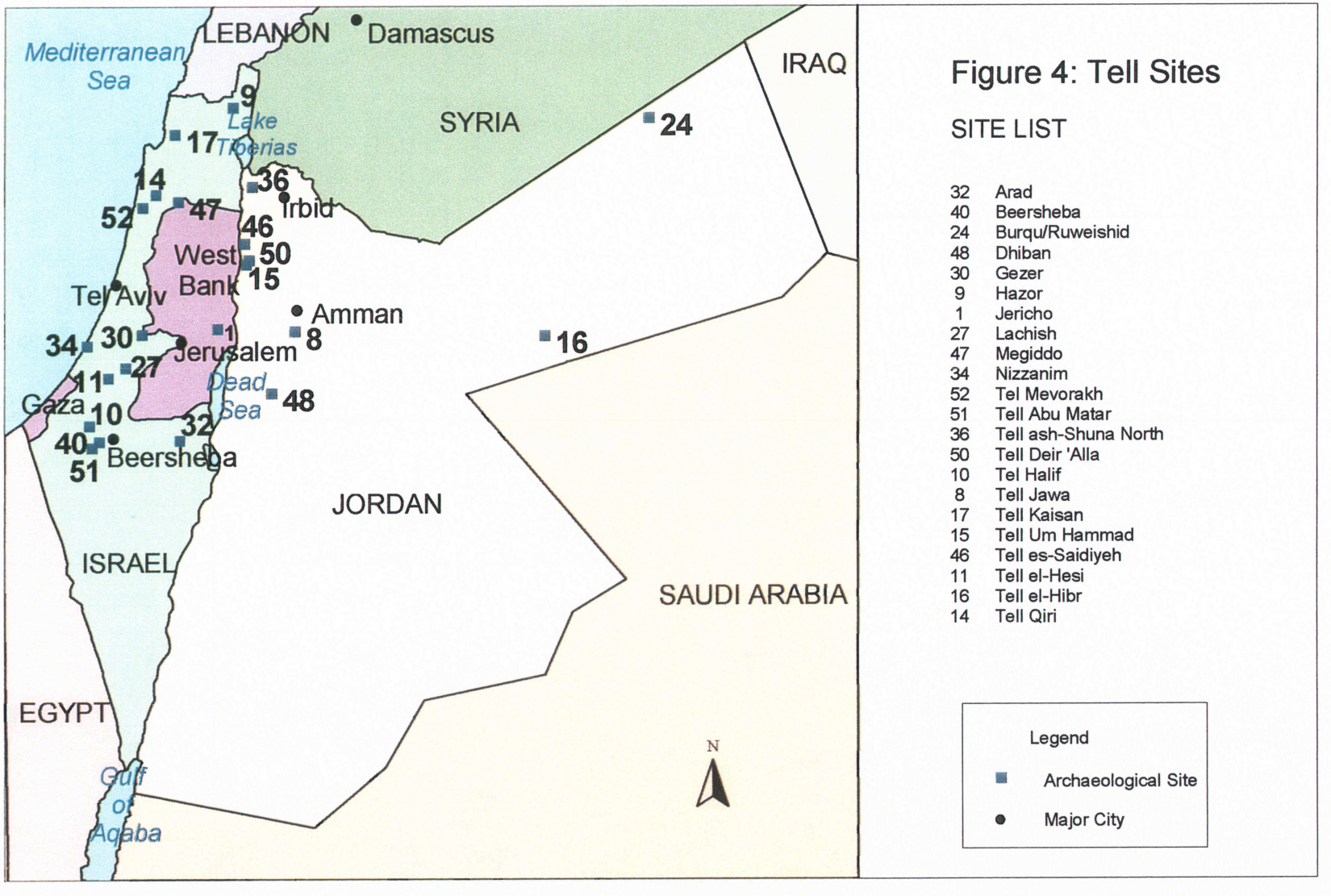


Figure 4: Tell Sites

SITE LIST

32	Arad
40	Beersheba
24	Burqu/Ruweishid
48	Dhiban
30	Gezer
9	Hazor
1	Jericho
27	Lachish
47	Megiddo
34	Nizzanim
52	Tel Mevorakh
51	Tell Abu Matar
36	Tell ash-Shuna North
50	Tell Deir 'Alla
10	Tel Halif
8	Tell Jawa
17	Tell Kaisan
15	Tell Um Hammad
46	Tell es-Saidiyeh
11	Tell el-Hesi
16	Tell el-Hibr
14	Tell Qiri

Legend

Archaeological Site

Major City

stratigraphy of a typical tell site, with one occupation level on top of another. This can provide an archaeologist with the ability to examine the progression or evolution of a site over its history. However, it can also be difficult to determine where once phase ends and another begins. Those excavating tell sites must also be aware of wind and water erosion at these sites, which may result in mixed loci.

There are seven well-differentiated flint industries associated with the Jericho excavations (Crowfoot-Payne 1983: 623). These lithic assemblages span the Epipaleolithic through the Middle Bronze Age. Lithic industries include the Epipaleolithic (Natufian culture), followed by the Sultanian culture in Pre-Pottery Neolithic A. The Pre-Pottery Neolithic B (Tahunian culture) followed, and was replaced by the Pottery Neolithic A (Yarmukian culture). Subsequently later Pottery Neolithic and Ghassulian culture appeared and evolved into the Proto-Urban and Early Bronze Age "Canaanean", which moved into the Middle Bronze Age (Crowfoot-Payne 1983: 623-24).

The first organized excavation was conducted by Carl Watzinger and Ernst Sellin in 1907. Their work uncovered architectural features which provided information as to the evolution of the site. Between 1930 and 1936 Garstang excavated Tell es-Sultan, breaking new ground in Epipaleolithic and Neolithic occupation (Bartlett 1982: 31). In the 1950s Kathleen Kenyon began a new phase of excavations at Jericho. Kenyon was a British archaeologist who had participated in excavations in Zimbabwe, England, Italy and the Levant. The Jericho excavations under Kenyon's direction were supported by the British School of Archaeology in Jerusalem. Kenyon's excavations provided evidence

that the site dated to the Natufian, rather than the Neolithic, as previously believed (http://mnsu.edu/emuseum/information/biography/klmno/kenyon_kathleen.html).

The results of the Jericho excavation and detailed artifact analysis led to an extensive collection of publications on Jericho. The "Introduction" to *Excavations at Jericho V* states: "The aim of the Jericho publications since 1978 has been to publish all the results as quickly as possible to enable independent research by other scholars concerned with the history and archaeology of Palestine" (Kenyon and Holland 1982: xxix). It is clear that those involved are aware of the importance of publishing material on all aspects of the Jericho excavation in a timely manner. Although architecture, ceramics, occupational sequences and trade patterns provide information significant to the dating of Jericho, lithic material also played an important role.

The publications cover a wide range of material including the architecture, ceramics, human and faunal remains and lithics, to name a few. Lithics appear at the site of Jericho in large numbers and are treated with as much interest as any other artifact throughout all periods. Appendix C of *Excavations at Jericho V*, entitled "The Flint Industries of Jericho" by Joan Crowfoot-Payne serves as an example of how lithic artifacts should be excavated, collected and studied. Crowfoot-Payne, a Levantine lithic specialist, provides a detailed representation of each period's lithic artifacts, providing a clear picture of the lithic assemblage and related materials. Detailed written descriptions, drawings, and measurements of tool types are included. Her study identifies the location in which lithic artifacts were discovered. A detailed list of the raw material used in the manufacturing of lithics is presented. Such data enables archaeologists to locate possible sources for the raw material used in lithic production, as well as flaking techniques that

are likely to have been used. Comparative studies from each occupation phase at Jericho have been provided. Regional similarities with lithic artifacts from other sites are also discussed. Percentages of each tool type are noted, together with the specific area of the site or time period in which each artifact was recovered.

The examination and analysis of the flint industries of Jericho have provided archaeologists with an exemplary model of the type of work that can be accomplished on lithic artifacts in the Levant, regardless of the period in question. The Jericho publications demonstrate that not all excavators forget about lithic artifacts.

Crowfoot-Payne's analysis of the Jericho lithics should be considered a guide by those who analyze and write about lithic artifacts. The Jericho study presents photographs and drawings of a wide variety of lithics. Measurements and cross-sectional diagrams provide a three-dimensional view of the lithics. The use of Carbon 14 dating for a variety of artifacts uncovered within the same loci as certain lithics has provided dating information.

Crowfoot-Payne's description of lithics includes comparative information on earlier tool types. A catalogue of tool types was established, with detailed classifications of each specific type and period to which each of the tools belongs. The most prominent tool type is the sickle blade, while tools such as axes and arrowheads appear to be on a decline in the area. This was suggested by the limited numbers of these tool types. More information regarding the lithic material was recovered for the earlier periods, due in part to the larger assemblage size (Epipaleolithic, PPNA and PPNB). The decline in the use of lithic material is reflected in the fact that fewer artifacts appear with the onset of the Bronze Age. Yet along with the numbers associated with each of the tool types,

consistent analysis and discussion continues. Lithics from post-Neolithic periods were dated in relation to the pottery found within the same locus and stratum. Unfortunately, not all loci or elevations were recorded in the publications of lithics at Jericho. Nevertheless, Crowfoot-Payne delivers a thoroughly researched and detailed account of the lithics of Jericho.

3.2.2. Beidha - Database Site 3

The site of Beidha, originally known as Seyl Aqlat, is located within the World Heritage Site of Petra, in southwestern Jordan (see Figure 2, Figure 3). Wadi sites such as Beidha, tend to experience extensive erosion due to the nature of the location. Archaeologists must be aware of the possibility that artifacts from the inside and outside of a site may be related as a result of water flow from strong seasonal rains.

Beidha lies on a river terrace flanked by high sandstone cliffs and beside a steep seasonal torrent bed that has eroded most of the village since abandonment about 6500 B.C.E. The setting of Neolithic Beidha would have been a village backed by a ridge bearing an open forest of juniper, oak and pistachio trees. Environmental studies have shown that the area has experienced significant climatic change since the Neolithic village was first established, over 9000 years ago (Kirkbride 1968: 263). The result of forest clearing to suit the more recent inhabitants has drastically changed the plant life in the area, as seen with an increase in toxic species in the Beidha region (Byrd 1989: 14).

Diana Kirkbride discovered the site of Beidha in 1956 and conducted a total of eight seasons of excavations, starting in 1958 and ending in 1983. Kirkbride faced a number of challenges while excavating at Beidha. The site's proximity to Petra and the

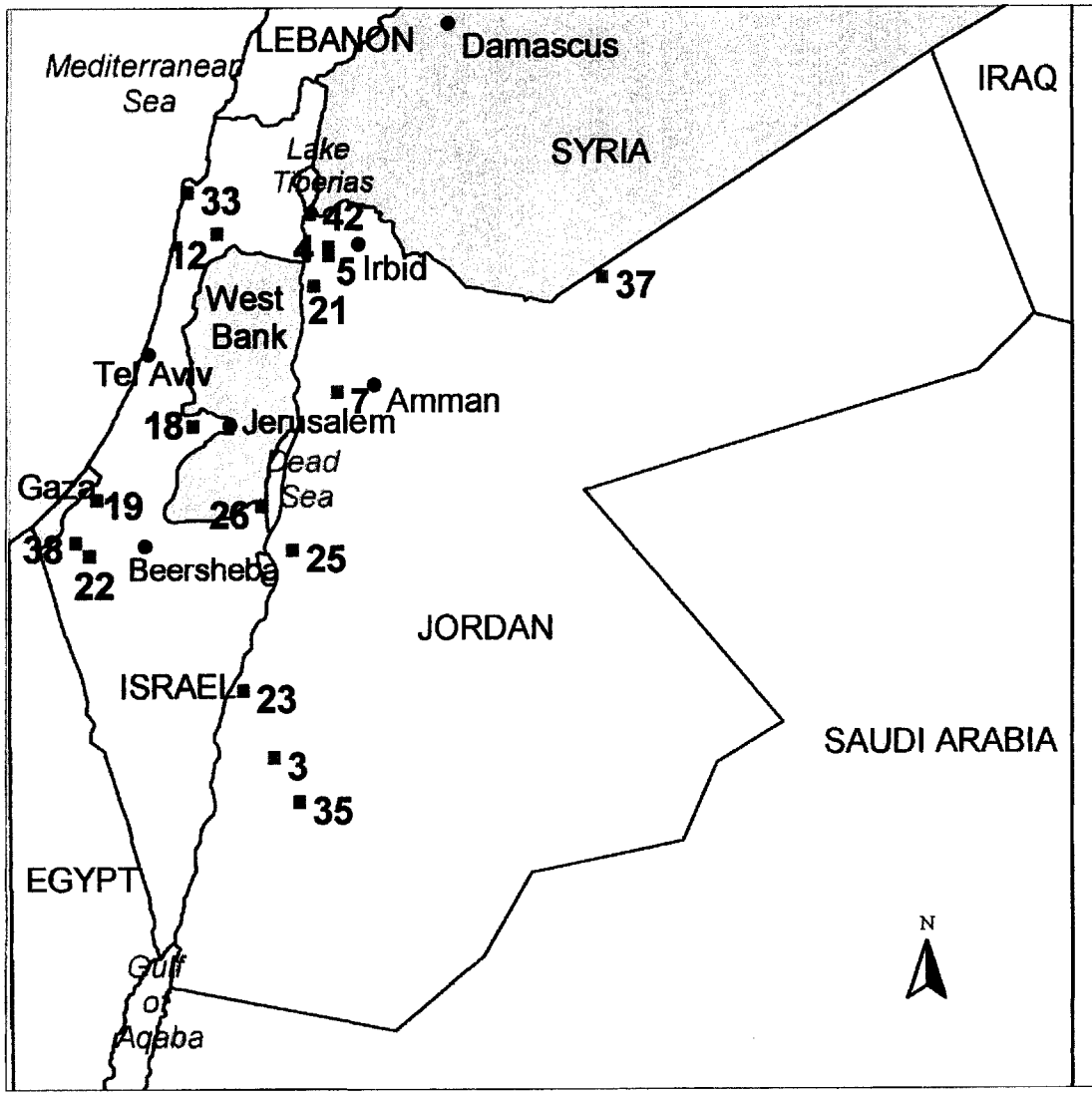


Figure 3: Wadi Sites

SITE LIST

35	Basta
25	Bab edh Dhra'
3	Beidha
19	Grar
18	Hartuv
37	Jawa North
38	Nahal Besor (Shiqmim)
26	Nahal Mishmar
33	Nahal Oren
12	Nahal Zehora (Wadi Rabah)
42	Sha'ar Ha Golan
22	Shiqmim
4	Tabaqat al-Buma
23	Wadi Fidan
7	Wadi Shueib
5	Wadi Ziqlab
21	Wadi el Yabis

Legend

■ Archaeological Site

● Major City

millions of tourist that explore that area each year proved to be a constant source of destruction for the site. Continual soil erosion was the result of annual winter rains that flooded the near-by wadi. There was also a suspension of excavations due to the Arab-Israeli war in 1967 (Byrd 1989: 13). The initial Beidha excavations from 1956-1965 were sponsored by the British School of Archaeology in Jerusalem. The final season in 1983 was supported by the British Institute for Archaeology and History at Amman in collaboration with the Department of Antiquities of Jordan. Kirkbride's research goals for the initial seasons were as follow:

> (1) to investigate the economy of the early Neolithic occupation at the site by conducting broad horizontal excavations, thereby facilitating examination of the relationship between domestic buildings, (2) to examine the relationship between the Beidha Neolithic and contemporary occupations in the Levant and broaden the knowledge of the culture, and (3) to study the relationship between the Neolithic and the Natufian at Beidha [Kirkbride 1960: 137].

Goals for the final season included:

> (a) fine scale recovery of a sample of the chipped-stone assemblage, (b) detailed mapping of in situ artifacts and features, and (c) sampling for botanical, sedimentological, palynological and radio carbon material [Byrd 1989: 13].

During the initial seasons, an area of 750 square meters was excavated on the highest part of the mound, and two trenches were dug on the slope of the mound in order to expose the lowest stratum (Gilead 1975: 168). Kirkbride's excavations uncovered occupation levels dating to the Pre-Pottery Neolithic B (9200 B.C.E. to 6500 B.C.E.), and two separate Natufian occupations (11,300 B.C.E. to 11,000 B.C.E. and 12,500 to 12,000 B.C.E.) (Comer 2003: 109). In the final season an area to the east of the tell and the exposed structures from the 1967 season was excavated, which exposed Natufian phases (Byrd 1989: 22-26). Architecture, lithics and radiocarbon dating were the primary

sources of dating information. However, there were no radiocarbon dates prior to the 1983 season for the Natufian phases (Byrd 1989: 25).

The Natufian occupations are characterized as hunting encampments, with large quantities of Bezoar goat bone. Grinding stones along with lithic artifacts such as sickle blades and non-geometric lithics originally mounted to create harvesting tools were also uncovered in the Natufian occupation layers. These artifacts indicate the collecting of wheat and barley, grains that were later domesticated at Beidha (Comer 2003: 110).

The 1989 publication of *Excavations at Beidha 1: The Natufian Encampment*, by Brian Byrd of the University of Arizona, provides more than 50 pages of detailed discussion on the lithic assemblage at Beidha. Byrd participated in the final season at Beidha which focused on the Natufian horizon. Analysis of the Natufian lithic assemblage focuses on the "nature of the reduction sequence, the type of retouched tools that were produced, and the identification of intrasite spatial or temporal patterns in the distribution of different artifacts types" (Byrd 1989: 27).

Byrd's analysis of the reduction strategy examines the high quality locally available raw material, variability of cores and reduction pieces, and the percentages of the large flake and blade industries present at Beidha. Chapter 5, "Analysis of the chipped-stone assemblage", provides a detailed discussion of individual tool types recovered and their specific morphological variations. It also indicates the material type, contextual information, and the reduction patterns of over 400 cores. Scatter patterns of blades, bladlets, flakes, scrapers, burins, notched and denticulated tools, retouched tool and microlithics are also considered in order to identify high ratios of tools. This provides insights into intrasite relationships and patterns. It appears that lithics made of

flint were either manufactured off site, or at a location that remains unexcavated, while cores made of this material were occasionally manufactured on site. High frequencies of both flakes and blades (although blades are slightly more numerous) produce the possibility that two industries dominated Beidha (Byrd 1989: 33-74). The Beidha lithic assemblage is describes as:

> dominated by microlithic tools (geometrics, nongeometrics, and their fragments), and notched and denticulated tools, constituting almost two thirds of the sample. Scrapers and retouched pieces (over half of which are fragments) are also common, while truncations and burins are infrequent... Geometic microliths are over twice as frequent as nongeometric microliths, and the former are almost exclusively lunates [Byrd 1989: 74].

The publications of the lithic assemblage at Beidha provide information on thousands of artifacts recovered over eight seasons of excavation. Kirkbride and Byrd treat the site and its contents as a whole. Artifacts, especially the vast quantities of lithics, are discussed for their possible or probable functions rather than simply listing the implements by quantity or tool classification. Byrd's monograph provides detailed descriptions of the life cycle of the Beidha lithic assemblage. The location of raw material, the technique in manufacturing and retouch, and the intrasite relationships are identified. This detailed analysis is provided in addition to drawings, measurements, material type, colour and texture, comparative information, quantitative data and percentages of tool types.

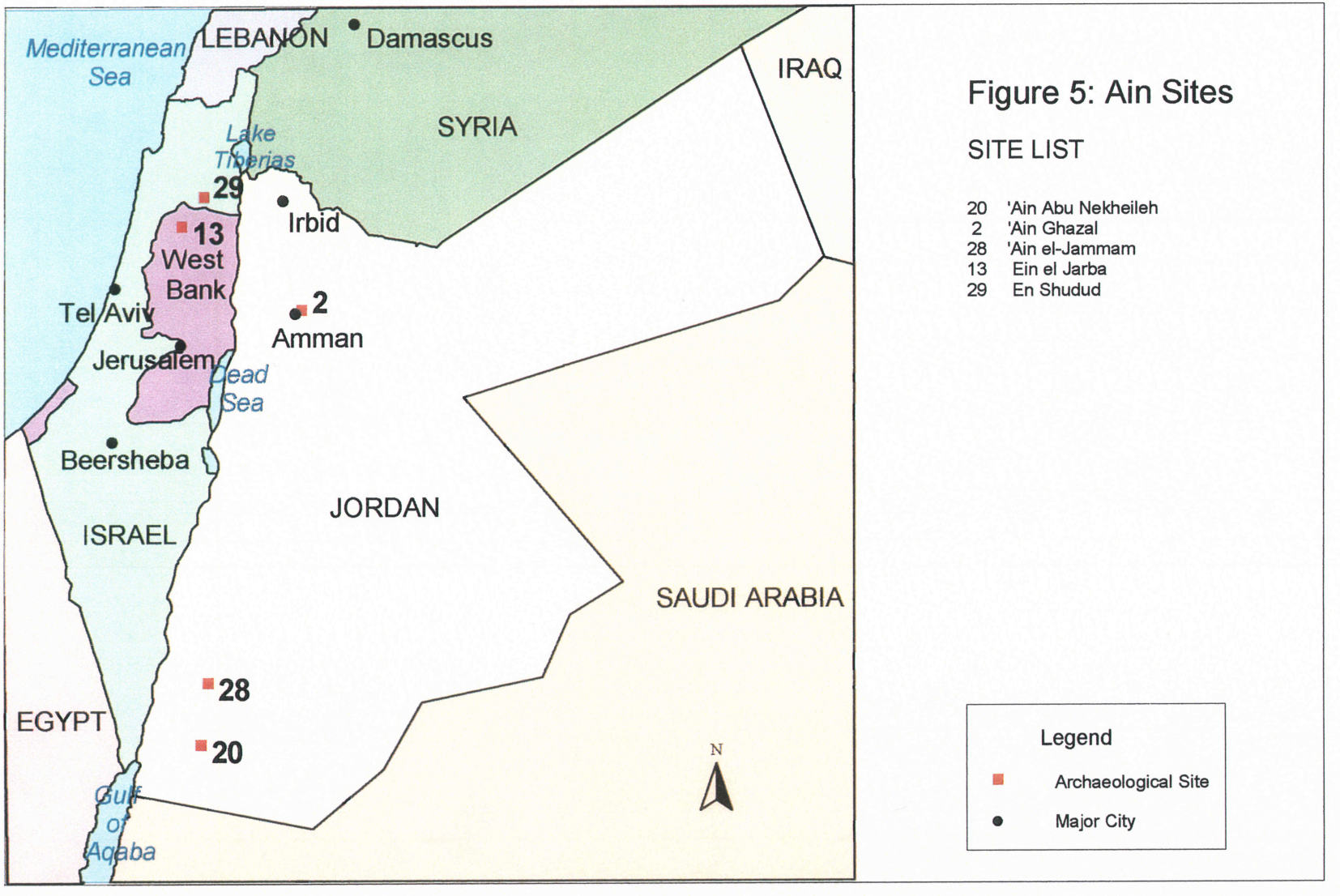
Much of the information regarding the excavations at Beidha is yet to be published. It is likely that studies similar to the 1999 article "*Cultural Site Analysis of Beidha and its Environs*" will be forthcoming (Comer 2003: 105). The abovementioned study collected cultural and environmental data to be integrated into a geographic

information systems program. The major objective was to investigate how cultural and environmental changes were interrelated during the transition from a nomadic way of life to a settled lifestyle (Comer 2003: 105-106). In the spring of 2005 a new monograph entitled *Early Life at Beidha, Jordan: Neolithic Spatial Organization and Vernacular Architecture* by Brian Byrd will be published. The continuing research of sites like Beidha will be not only provide a better understanding of the site itself, but also the wide variety of interrelationships existing among Levantine sites.

3.2.3 'Ain Ghazal - Database Site 2

'Ain Ghazal is the largest Neolithic site in Jordan, and was discovered the way many Near Eastern archaeological sites have been, simply by accident (Bienkowski 1991:4). The close proximity to water plays an important role in the location of all 'ain sites. The presence of water is always a consideration when people are looking for a short or long term settlement location. 'Ain sites also exhibit the effect of water erosion, although an equally common threat to the excavation of these sites appears to be the intrusion of modern construction. In 1974 the site was exposed as the result of construction on the Amman-Zarqa highway (see Figure 2, Figure 5). The construction removed the easternmost section of the PPNB village. A bulldozer section left a large portion of the land undercut representing a "continued threat of erosion in the future" (Rollefson 1983: 1).

Excavations at 'Ain Ghazal began in 1982; sponsorship of the work has been provided by a number of different institutions over the more than two decades of work. These sponsors include the National Geographic Society, the Department of Antiquities


Mediterranean Sea
LEBANON
Damascus
IRAQ
SYRIA
Lake Tiberias
29
Irbid
13
West Bank
Tel Aviv
2
Amman
Jerusalem
Dead Sea
Beersheba
JORDAN
ISRAEL
SAUDI ARABIA
28
EGYPT
20
Gulf of Aqaba
N
Figure 5: Ain Sites
SITE LIST
20 'Ain Abu Nekheileh
2 'Ain Ghazal
28 'Ain el-Jammam
13 Ein el Jarba
29 En Shudud
Legend
Archaeological Site
Major City

of Jordan, the Institute of Archaeology and Anthropology of Yarmouk University, the Cobb Institute of Archaeology at Mississippi State University, San Diego State University and the University of Kansas to name a few (Rollefson 1983: 15; Rollefson, Kafafi and Simmons 1990: 115). Gary Rollefson of San Diego State University has directed the many seasons of excavation at 'Ain Ghazal, which have uncovered four phases of the site's evolution.

The first phase, early PPNB culture, falls between 7500 B.C.E. to 6700 B.C.E. This phase of occupation is characterized by domestic structures made of stone with whitewashed floors, a well developed 'on site' lithic industry producing sickle blades, spears, points, whitewashed anthropomorphic figurines, and individual tombs dug beneath house floors. (www.imarabe.org/temp/expo/jordanie-us/jordanie11.html).

The second phase of occupation, late PPNB culture, occurred between 6700 B.C.E. and 6300 B.C.E., with a growth in the site's population. Multi-family dwellings and smaller buildings which appeared to be temples are typical of this period (www.imarabe.org/temp/expo/jordanie-us/jordanie11.html). The third phase, PNA, began in 6300 B.C.E. The site is characterized by simple houses with dirt floors, plots of land divided by fences, and communal graves. There was a single large structure, a temple. This Yarmoukian period represents the final phase of occupation, which witnessed the introduction of ceramic technology around 5700 B.C.E. (www.imarabe.org/temp/expo/jordanie-us/jordanie11.html).

The goal of the 1982 season was to initiate a salvage excavation to recover as much material as possible. A step trench was excavated in the east-central portion of the site to elucidate the chrono-stratigraphic evolution of 'Ain Ghazal (Rollefson 1983: 3).

The goals for the following seasons were

> to determine more accurately the size of the village and, secondly, to provide stratigraphic correlations of the disparate excavation trenches of 1982, while at the same time expanding horizontal ad vertical exposures of the habitation episodes at 'Ain Ghazal [Rollefson 1985: 44-45].

The quantity of lithic material recovered in the first three seasons (1982-1984) of excavation totalled more than one hundred fifty-thousand specimens (Rollefson 1983: 3, Rollefson 1985: 46, Rollefson and Simmons 1985: 21). Analysis of the first season's lithic material determined that of the 22,871 pieces of lithic material 12% are tools, and 88% debris (Rollefson 1983: 3). These percentages suggest a healthy, permanently settled village. Rollefson believes that the primary location for the manufacturing of tools was outside the areas sampled based on a 1.6% presence of cores (Rollefson 1983:3). As each season progressed, the amount of lithic artifacts increased. By 1995 Rollefson estimated that excavators at 'Ain Ghazal had recovered more than a million lithics (G. Rollefson, personal communication, June 1995).

Gary Rollefson, Zeidan Kafafi and Alan Simmons have all contributed to the understanding of the lithic assemblage at 'Ain Ghazal through the publication of detailed discussions of the material recovered. The article "The Neolithic Village of 'Ain Ghazal, Jordan: Preliminary Report on the 1988 Season" published in 1990 in the *Bulletin of American Schools of Oriental Research*, provides a good example of balanced treatment of all artifacts. The large lithic assemblage is examined through the use of numerous charts to analyze the absolute numbers, relative frequencies and ratios of tool types throughout the PPNC, PPNB and the Yarmoukian at 'Ain Ghazal. The results from the analysis outlined in Table 1 "Debitage Classes Among the Analyzed Chipped Stone Artifacts Samples, at 'Ain Ghazal, 1988" and Table 4 "Chipped Stone Tool Frequencies

in the Analyzed Samples from 'Ain Ghazal, 1988" identify trends in lithic development through the history of the site (Rollefson, Kafafi and Simmons 1990: 97-99). These trends include a high frequency of burins, which out number all other tools recovered at 'Ain Ghazal. The discovery of a Yarmoukian level produced two "burin shops". One surface situated outside a Yarmoukian house revealed 40 burins and 215 burin spalls. The second surface, also outside of a structure, in a different area of the site, produced 63 burins and 21 burin spalls. The burin manufacturing locus was closely examined for correlations with faunal remains and other tools types in order to provide insight into the use of burins during this period. Limited numbers of burins from the Late PNNB suggest that the manufacturing of burins "had already shifted dramatically from pre-6500 B.C. standards, or that 1988 Late PPNB sample is statistically suspicious due to the restricted area and volume from which the samples derived" (Rollefson, Kafafi and Simmons 1990: 99).

The previous discussion is only a sample of the detailed investigation of the lithic assemblage at 'Ain Ghazal. Further analysis, comparison and discussion are provided on a variety of lithics recovered from the three main phases of occupation. This publication, as with all of the reports on the excavations at 'Ain Ghazal, offers a clear view of how information about one artifact class can provide insights into the site as a whole. This report clearly demonstrates that an excavation team can effectively collect and examine both lithics and ceramics in a balanced manner. The many years of excavation at 'Ain Ghazal, with its subsequent publication by Rollefson and his colleagues, provides guidance to those excavating either multi-period sites or simply any site where both lithics and ceramics coexist within the archaeological record.

3.3 Comprehensive Sites

The "comprehensive sites" are required to meet the following criteria dealing with lithic material in a manner comparable to the publications of Pre-Pottery Neolithic lithic assemblages. Each site must have lithic material present. The site must have been the subject of at least two or more seasons of excavations. The lithic material recovered from a site must be in context, with the specific contextual information provided. Published material is required to meet a minimum of 21 pages from one or multiple sources. Comparative information on lithic assemblages from a minimum of 10 sites must be at least briefly provided within the publications. The presence of statistical or quantitative information is required to provide a view of the diversity of the lithic material at a site. All of the following diagnostic features regarding the lithic material must be present: tool classification, measurements of implements, material type, material colour, material texture, drawings of lithics, photographs of lithics and use wear analysis. The following sites fit into the "comprehensive" category: 'Ain Ghazal, Bab edh-Dhra', Beidha, Grar, Hartuv, Jericho, Nahal Zahora I, Nizzanim, Sha'ar Hagolan, Shiqmim, Tabaqat al-Buma, Tell el-Hesi, Tell Halif, Tell Qiri and Wadi Ziglab. The sites of Tabaqat Al-Buma, Bab edh-Dhra', and Hartuv will be discussed in detail in this section.

3.3.1 Tabaqat al-Buma - Database Site 4

The Wadi Ziqlab Survey/Project began in 1987 under the direction of E. Banning, of the University of Toronto. The Wadi Ziqlab survey was situated in an area east of the Israeli border in northwestern Jordan (see Figure 2, Figure 3). The nature and location of this site exhibited water and wind erosion as is common at wadi sites, as well as

restrictions of extended movement outside of the site due to military restrictions. Tabaqat al-Buma is a small site of approximately 800 square meters containing a Pottery Neolithic period farmstead, with major phases of construction at 5500 B.C.E. and 5300 B.C.E. (Banning 1998: 198). The site of Tabaqat al-Buma showed significant promise during the Wadi Ziqlab survey, and in 1990 a full scale excavation began (Banning 1998: 197). Excavations over a 10 year period produced some of the most detailed analysis and interpretation of lithics from the Late Neolithic to date. Over a dozen publications were produced, including a Ph.D. dissertation. With respect to lithics it has been noted:

> Almost 10,000 lithics from the 1992 season of excavation of the Neolithic levels at Tabaqat al-Buma add greatly to the understanding of the predominately 'expedient' lithic technology there [Banning *et al.* 1996: 39].

The goals of the Tabaqat al-Buma Project were to determine the occupational sequences of the site, the nature of Neolithic occupation, and whether the site was only a cemetery or were there domestic remains as well (Banning *et al.* 1992: 43). With these goals in mind, the excavators examined every artifact recovered with the same attention to detail usually reserved for architectural or ceramic remains. They focused much attention on large amounts of lithic material uncovered. The results of the excavation and subsequent analysis clearly indicate that although lithic tool production began to decline in the Late Neolithic, flint implements continued to play an important role in the material culture of the time. Lithic material was primarily used in establishing occupational phases at Tabaqat al-Buma.

The bulk of the artifacts from Tabaqat al-Buma is ceramics and lithics. There are two major categories of lithic tools: "1) flake tools with no or minimal retouch; and, 2) formed tools made of flakes and blades" (Banning and Siggers 1997: 320). The flake

tools make up the major part of the sample. Formed tools are limited to a few classifications, and primarily consist of sickle blades. The lithic assemblage consists mainly of 'expedient' flake tool technology, which were created on an *ad hoc* basis from material readily available in the area (Banning *et al.* 1992: 59). Siggers states:

> The excavation of Tabaqat al-Buma was primarily concerned with the occupation site itself...As the sample of stone tools was selected from the most securely undisturbed contexts, much of the material was from living surfaces near or in the structure. If basic flakes make up the majority of the sample from these areas, it is possible that they reflect the activities taking place there [Sigger 1997: 187].

Of the thousands of lithics uncovered, more than 150 were sickle blades. Tools such as sickle blades, axes, burins and scrapers require a greater investment in time and technique to produce the desired result, in comparison to expedient flake tools (Banning 1996: 39). The formed tools, such as sickle blades, were expected to be more reliable and efficient. Therefore, they were manufactured from better quality material. The nearest source for the material used in formed tools is approximately 15 kilometers north in the Wadi al-Arab and in the northern Jordan Valley to the west. The large amount of highly valuable basalt, needed for agricultural implements, to be found in these areas justified the journey (Banning and Siggers 1997: 325). The flake tools were created from medium to course grained raw materials that were readily available in the immediate area (Banning *et al.* 1992: 59).

Pottery Neolithic stone-tool technology at Tabaqat al-Buma included implements for cereal agriculture, animal husbandry, land clearance, lumber acquisition, and architecture (Siggers 1997: 189-192). Use-wear analysis proved to be valuable in understanding the nature of lithic assemblages, such as that uncovered at Tabaqat al-Buma. Further work needs to be done with regards to the nature of stone tool production,

usage, and the technological mind-set in different environments (Siggers 1997: 191). It is apparent that not all archaeologists of Pottery Neolithic excavations place as high a priority on the study of lithics as Banning and Siggers do. In some cases the mention of lithic assemblages is absent from publication as a result of the excavators' failure to recognize lithics, or to produce publications in a timely manner which include discussions of lithics. Excavations should recognize the potential for all flakes to be tools until they can be examined for microscopic traces of use. Unfortunately, archaeologists are unable to examine these discarded lithic assemblages that could have provided valuable comparative information to sites throughout the Levant (Siggers 1997: 191).

Julian F.C. Siggers' 1997 Ph.D. dissertation examines not only the lithic assemblage itself, but also the impact the changing way of life had on those who lived in the Late Neolithic Levant. He examines how technology relates to the larger behavioural systems of the Late Neolithic life at the site, and also endeavors to understand why the chipped stone technologies from this period were so different in approach and execution from those of preceding Neolithic periods. Finally, he elucidates the implications of his research for our understanding of Neolithic technology on a wider level (Siggers 1997: 177).

Siggers' study not only investigates and answers the questions stated above, but raises new questions and suggestions for further thought, research and archaeological practices. On the first page of his dissertation, he states: "Neolithic studies in this area have long neglected the fundamental changes in lithic technology that took place during this period" (Siggers 1997: 1). There is clearly a need for a rejuvenated approach to the archaeological practices of lithic analysis in the Late Neolithic Levant.

Archaeological findings suggest that traditional interpretations of technological "devolution" regarding lithics are inaccurate. Lithics become more specialized to adapt to specific needs, resulting in a reduction in the overall size of assemblage, not in the functionality of the lithics themselves. Therefore, the change in lithics is more likely an adaptation to the changing patterns of those inhabiting the Levant. A potentially beneficial approach would be to analyze how lithic technology adapts to the changing demands of settlements undergoing fluctuations in socioeconomic practices within a specific area. The key shifts in settlement patterns and subsistence strategies, as seen in the Levant, likely contributed to the change in lithic production in the Late Neolithic (Siggers 1997: 190-191).

The body of work created as a result of the survey of the Wadi Ziqlab and the subsequent excavations at Tabaqat al-Buma has emphasized the strong presence of lithic assemblages in the Late Neolithic Levant. The work done by Banning and Siggers does not simply offer a catalogue of measurements and statistics, but provides insightful analysis on the state of human settlement during a shift from nomadism to sedentism in post Pre-Pottery Neolithic periods. Comparative and quantitative information is also used to demonstrate that Tabaqat al-Buma is not an isolated case of stone tool production in a world that was being affected by new technologies.

Each site dating to the Late Neolithic brings its own unique characteristics to this discipline. The size of a settlement is always an important characteristic in the evolution of lithic technology, and should not be ignored. Siggers suggests that the "application and nature of stone tool technology in larger settlements was very different from those employed in smaller farmstead settlements like Tabaqat al-Buma" (Siggers 1997: 191).

3.3.2 Bab edh-Dhra' - Database Site 25

Bab edh-Dhra' is one of five sites along the southern margins of the Dead Sea in southwestern Jordan (see Figure 2, Figure 3). The site is approximately one kilometre below sea level. Bab edh-Dhra' is the northernmost of the sites, located six kilometres south of the modern village of Hadaitha and due east of the Lisan peninsula (McConaughy 1979: i). The report does not specifically mention the effects of erosion at the site, although it is likely that some level of erosion occurred. Due to military restrictions in the 1970s it was not possible to extensively survey the outlying area to determine if any archaeological material had been re-deposited as a result of seasonal rainfall and flooding.

Bab edh-Dhra' was discovered in 1924 by A. Mellon during a survey in the Jordan Valley sponsored by the American Schools of Oriental Research. The initial report by Mellon focused more on the location of sites than their contents. Although a great deal of interest in the site arose when the report was published, it was another 40 years before archaeologists revisited the site, in the mid-1960s.

Major excavations began at Bab edh-Dhra' in 1965, under the direction of Paul Lapp, on behalf of the American Schools of Oriental Research. Three seasons of excavations were completed between 1965-1967. The focus of the excavation was the cemetery and the fortified Early Bronze Age town. Unfortunately, Lapp passed away in 1970 before he was able to publish anything other than brief summaries of the three seasons of excavations (McConaughy 1979: 2). Lapp's work was continued by Walter Rast and Thomas Schaub beginning in 1974. Rast and Schaub also focused their attention on the Early Bronze Age settlement and the cemetery areas of the site

(McConaughy 1979: 2).

Recently, new excavations, under the direction of Ian Kuijt of the University of Notre Dame and William Finlayson, Director of the Council for British Research in the Levant, began in 2002 and is expected to continue through 2005. Kuijt and Finlayson's focus is different than their predecessors, as they are concentrating on the evolutionary transition from foraging to farming in the Bab edh-Dhra' region, in the hope that their work will provide further insight into how this transition affected life at both the village level and the wider regional level. They believe that this research will help anthropologists and archaeologists better understand the trajectory and nature of the transition from a foraging existence to a farming lifestyle (http://www.nd.edu/~kuijt/dhra/research/index.htm).

The Early Bronze Age fortified town of Bab edh-Dhra' has provided archaeologists with a multitude of features and artifacts. Numerous public and private buildings were excavated within the city walls. The most impressive discovery was the more than 20,000 tombs, containing the remains of more than 500,000 burials, and more than 3,000,000 ceramic vessels (Ben-Tor 1975: 149). With such a rich presence of ceramic artifacts and burials to dominate the agenda, it would not be surprising if the excavators had forgotten about lithic artifacts all together. However, this was not the case; the lithic material became the subject of a detailed investigation.

The Early Bronze Age lithic assemblage from Bab edh-Dhra' has been the focus of a number of published reports, in addition to a 1979 Ph.D. dissertation by Mark McConaughy. This study provides analysis of the manufacturing techniques of the Bab edh-Dhra' lithics and the Early Bronze Age functional tool kit, together with a detailed

discussion of comparative assemblages from the Pre-Pottery Neolithic through to the Early Bronze Age. McConaughy examines sites not only from the Levant, but also from Egypt, Asia Minor, Mesopotamia and Iran for comparative purposes (McConaughy 1979: ii-iii). The examination of material from such a variety of areas outside the Levant was prompted by the analysis of human remains from the cemetery, which suggested that the individuals were originally from central Asia. Ben-Tor states:

> The decline of the Chalcolithic culture in Palestine would seem to have been caused by the influx of migrants from the Central Asian steppes, who came by way of Anatolia and Syria [Ben-Tor 1975: 151].

McConaughy was a member of the 1977 excavation team at Bab edh-Dhra', and conducted the site survey in order to locate any outlying Early Bronze Age settlements. McConaughy also examined the lithics that were recovered during the excavations. Since military restrictions limited the scope of the survey, McConaughy spent the majority of his time on preliminary analysis of the lithic implements (McConaughy 1979: 5). A detailed formal typological study was conducted, along with an edge-wear study of the implements. The typological analysis was required because no other Early Bronze Age assemblage in the Near East had been analyzed in its entirety, and none of the few implements mentioned in site reports of this period had ever been properly described or measured (McConaughy 1979: 5). The objective of the edge-wear study was to determine the following: 1) the actual function of individual tool types; 2) the composition of functional tool kits; and 3) the identification of specialized work areas at Bab edh-Dhra' based on the preceding data (McConaughy 1979: 5). McConaughy states:

> This later analysis is important since it represents one of the few attempts at a functional analysis of all lithic types and tools that compose an assemblage instead of just one tool type or selected tools from a site [McConaughy 1979: 5].

These studies enabled McConaughy to elucidate the assemblage as a whole.

The descriptions of the tool types, manufacturing techniques, and forms of retouch used the standard archaeological terminology defined by Crabtree in 1972 (McConaughy 1979: 41). The lithic material uncovered from the 1975-1977 seasons of excavations at Bab edh-Dhra' consisted of 387 chipped stone tools, 269 utilized flakes, and 919 waste flakes/debitage (McConaughy 1979:41). The majority of the form tools were manufactured from tan or light gray to brown or black pebble chert. This chert can be found in the immediate vicinity of Bab edh-Dhra'. The only exception to this is the Ghassulian-form fan scrapers, which were made of tabular brown chert of unknown origin. It appears that the majority of the lithic implements were manufactured locally. Although there is no evidence at this time of trade in lithic raw material, it is likely some trade did occur (McConaughy 1979: 41). There were 29 tool types defined by McConaughy. The highest concentration of tools is in Notches/Spokeshaves and utilized blades, amounting to nearly 25% of the total number of tools (McConaughy 1979: 42, Table 1).

The materials from Bab edh-Dhra' can be classified as a flake industry primarily composed of various forms of notched tools (McConaughy 1979: 235). The majority of the implements were made and retouched by direct percussion, hard hammer methods, and the original flakes had a fairly wide range of platform preparations (McConaughy 1979: 235). Blade tools are present; however, they are in a minority in comparison to the

flake implements. The side and end denticulates were implements that performed a wide range of tasks, since they had a multitude of edge-wear patterns which did not cluster around one particular mode of use. The various tool types from Bab edh-Dhra' were grouped into six functional tool kits based on similarities in edge-wear patterns (McConaughy 1979: 235).

It is interesting to note that few lithics were found in the 20,000 tombs. This suggests that the lithic implements were not held in high regard. The Early Bronze Age society of Bab edh-Dhra' must have felt that these implements would not play an important role in the afterlife (McConaughy 1979: 238). The vast majority of lithics were recovered at or around the fortified town-site and belong to EB III and EB IV phases (McConaughy 1979: 60). Although architecture, human remains and carbon dating provide a great deal of information for the dating of Bab edh-Dhra', lithic material also plays an important role.

The tool types from Bab edh-Dhra' can be directly traced back to Chalcolithic origins, and closely resemble tools recovered at Teleilat Ghassul (McConaughy 1979: 241). The only tool recovered which can be traced to outside influences is the Canaanean blade. The Canaanean blade also occurs in other Early Bronze Age sites in Palestine, indicating that there was some contact with Asia Minor during the Early Bronze Age (McConaughy 1979: 241). There are no other new lithic forms that occur at this time. The Canaanean blade is present as a result of diffusion, not because groups from Asia Minor invaded Palestine (McConaughy 1979: 241). McConaughy states:

> ... the supposed Canaanean lithic industry composed of long Canaanean blades, Canaanean sickle blades, and fan scrapers does not occur as an entity in its own right. The fan scrapers are an indigenous Palestinian

> development and not part of the same industry as the Canaanean blade [McConaughy 1979: 241].

The implications of this comparative study for various theories concerning the origins of many Palestinian cultures and sub-cultures are numerous and far-reaching (McConaughy 1979: 242). Traditional theories often treat each new ceramic type that is found in the Levant as a representation of a new population entering or gaining prominence in the region, or of trade. The implication is that many of the inhabitants in the Pottery Neolithic, Chalcolithic, and Early Bronze Ages must have been new-comers. An entirely different picture emerges when dealing with lithics that reflect a gradual evolution. The long established lithic tradition in the Levant based on triangular cross-section blades indicates that the inhabitants did not change, and were not replaced by other new inhabitants (McConaughy 1979: 242). McConaughy states:

> There is no complete replacement of a Levantine industry by another from the Neolithic until at least the Early Bronze Age which should occur if a new culture and society enters the region [McConaughy 1979: 242].

It should be stressed that the differences between Levantine, Anatolian, Mesopotamian, and Egyptian industries are cultural for the most part, not functional. Whether blades or tools made from a blade have either triangular or trapezoidal cross section is immaterial to their actual function. Either of these cross sections on a tool could adequately perform the same task (McConaughy 1979: 242). The selection of a specific blade form must be viewed as a culturally determined trait, not a functionally derived characteristic (McConaughy 1979: 242). The tradition in the Levant demonstrates that manufacturing triangular, as opposed to trapezoidal, cross-section blades must be viewed in the light of cultural continuity in the region (McConaughy 1979: 242).

McConaughy's comparative analysis demonstrates the necessity of examining lithics from Levantine sites, since lithic technology tends to be a conservative element of culture.

> It lacks the sensitivity of ceramic styles in determining culture changes and in this respect this may be an advantage since it is more likely to demonstrate cultural continuity while various "fads" cause ceramics and other elements of material culture to change much more swiftly [McConaughy 1979: 242-243].

The results of this analysis provide new insights into the lithic technology employed by those living in the Early Bronze Age, and their relationship to cultures outside the Levant. Comparisons with post Pre-Pottery Neolithic lithic industries in the Levant indicate that *in situ* development was present at Bab edh-Dhra'. This assemblage appears to have developed from the preceding Ghassulian Chalcolithic culture, and was part of a larger Palestinian lithic tradition extending through the end of the Early Bronze Age (McCounaughy 1979: i).

The dissertation, *Formal and Function Analyses of the Chipped Stone Tools from Bab edh-Dhra', Jordan* serves as a guide for archaeologists who find themselves uncovering lithic implements in an Early Bronze Age site in the Levant. The dissertation covers all phases of the analysis of the lithics assemblage of Bab edh-Dhra', from the locations of discovery to the tool classification, and eventually to the interpretation of its cultural significance. Comparative and quantitative data is also presented which provides an overview of the lithic assemblage in a larger context. The depth of the research and analysis presented in this study demonstrates that archaeologists should not treat lithics as unimportant, insignificant and generally inconsequential parts of material culture.

3.3.3 Hartuv - Database Site 18

Hartuv is located in the Shephelah region, in south/central Israel close to the Judaean Hills (see Figure 2, Figure 3). This village site is situated in a favourable area, along a wadi with a water source, fertile soil, and in proximity to natural roads. The area was surveyed by Z. Kalai and A. Mazar in 1977, 1978, and 1979 (A. Mazar and P. De Miroschedji 1996: 3). Three short seasons of excavation occurred in the springs of 1985, 1986, and 1988. The Israeli excavators' objectives were to determine the nature of the area, establish the sequence of occupation, and to uncover some domestic architecture. Excavations at Hartuv produced a single-period site dating to Early Bronze I, with a material culture characteristic of southern Israel during this period. The architectural features, ceramics and lithic material recovered contributed to the establishment of the occupational date for Hartuv.

The site of Hartuv does not fit entirely into the category of "comprehensive." The criterion not met is that the amount of published material relating directly to lithics is less than 20 pages. However, this small report provides the reader with more information than many reports twice its size. This is accomplished through a detailed discussion of the physical characteristics of the lithic material, the visual representation of lithic tools in diagrams, the presentation of tables describing the debitage and tool frequencies which include contextual data, numerous comparisons with other contemporary sites and research results that identify the uniqueness of the assemblage. Therefore, it is important to include this report from Hartuv as an example of how reports on post-Neolithic sites in the Levant should address lithics.

The report entitled "The Chipped Stone Assemblage From Hartuv" was published in the *Bulletin of American Schools of Oriental Reasearch* in 1996 by Levantine lithic specialist Steven Rosen. This report is comprehensive, and even though it is only eleven pages in length, its contents provide a clear picture of the Bronze Age lithic assemblage of Hartuv. Rosen states that the chipped stone assemblage comprised three basic components: "1) flake tools and associated waste; 2) blade tools (both locally produced and imported); 3) tabular scrapers" (Rosen 1996a: 41).

The tool assemblage includes scrapers, notches, denticulates, choppers, burins, tabular scrapers, retouched blades, retouched bladelets, awls/borers, retouched flakes, miscellaneous trimmed pieces, varia, and sickle segments (Rosen 1996a: 42-44). Each of the tool descriptions provides the number of each found, contextual information, the material type, and an illustration. Tool and debitage frequencies are enumerated in tables with the total quantity of each tool type, in addition to the relative percentage of each tool within the assemblage (Rosen 1996a: 42, Table 1; 43, Table 2).

The largest tool category is that of sickle segments. There are 35 sickle blade segments recovered from Hartuv. These 35 include two that are considered unclassified fragments, one is an invasively pressure-retouched fragment, possibly linked to the Pottery Neolithic, and one is a large geometric piece consistent with other post-Early Bronze Age assemblages (Rosen 1996a: 44). The remaining sickle fragments are broken into three groups. There are 5 plain sickle blades, 14 Canaanean blades, and 12 backed sickle blades. The three classifications of blades are further discussed in terms of measurements, and reuse, through statistical and comparative analysis (Rosen 1996a: 44). Comparative analysis is an important component in understanding a lithic assemblage

from both an inter-site and an intra-site perspective.

The backed sickle blade is also present, but it differs somewhat from those found in most Early Bronze Age assemblages. There are 12 backed sickle blades present at Hartuv. This tool type is often associated with Chalcolithic assemblages. In the Early Bronze Age the quantity of backed sickle blades produced declined, and was subsequently replaced by the Canaanean blade (Rosen 1996a: 44). The presence of the backed sickle blades produced questions regarding the purity of the excavated levels. The ceramic evidence suggests that the levels are not mixed. There is also a lack of other diagnostic Chalcolithic flint tools, such as axes/adzes, cobble scrapers, micro-drills and micro-endscrapers, implying that the appearance of the backed sickle blades is a result of off-site manufacture (Rosen 1996a: 48).

Aside from the sickle blades, the assemblage is functionally, technologically, and typologically characteristic of the Early Bronze Age (Rosen 1996a: 48). There are three basic components in this assemblage. These components are: 1) a numerically dominant set of expedient *ad hoc* tools, primarily produced on flakes (denticulates, scrapers, awls/borers, notches, miscellaneous trimming pieces, and a single chopper); 2) a blade component (sickle and retouched blades) dominated by the Canaanean blade; and 3) some tabular scrapers (Rosen 1996a: 48). Evidence indicates that on-site *ad hoc* tool production occurred at other Bronze Age sites in the Levant, as reflected in the presence of cores and flake waste (Rosen 1996a: 48). The discussion of the lithics of Hartuv is very technical and concise. The raw materials used at Hartuv are classified by colour and grain, and are separated into five indistinct groups: "1) fine-grained gray and weak reddish gray flint; 2) coarse-grained, white-gray flint; 3) medium to fine-grained, mottled

brown flint with inclusions; 4) medium to fine-grained brown flint; 5) fine-grained, gray translucent flint" (Rosen 1996a: 41).

There were many flakes that were difficult to categorize beyond the material type. This was either because the attributes fall between two groups, such as the material type, or they possessed attributes from multiple groups. The frequency of each material type is not provided due to the number of flakes that did not fit into one of the five categories. Rosen does suggest that a fine-grained brown flint was chosen for the manufacturing of sickle blades. Rosen goes on to discuss traces of burning and patination on some flakes. There are few tools, but a large amount of debitage was derived from mottled flint (Rosen 1996a: 41).

The dominant industry at Hartuv was a flake industry. The total number of flakes recovered was 2021. The ratio of flake : blade + bladelet was almost ten : one. The majority of flakes are less than five centimetres in length and exhibit little technological standardization. Rosen believes that this indicates "an expedient or *ad hoc* flaking technology. The ratio of flakes to flake cores is high, at ninety : one, reflecting the intensive exploitation of raw material" (Rosen 1996a: 42). He compares these results with other sites, including En Shadud (database site 29), with a flake to flake core ratio of eight : one (Rosen 1996a: 42).

There are inconsistencies in the lithic assemblage from Hartuv. The evidence of backed bladelets from the Epipaleolithic prompts the question: what indicates that the Hartuv assemblage is Early Bronze I rather than Epipaleolithic? Rosen states:

> The low number of intrusive microliths and the general scarcity of other pieces of translucent flint suggest that this is not a serious problem in the general comprehension of the Early Bronze I assemblage...The relatively high number of bladelet cores is problematic; but again, since they are not

> associated with the Epipaleolithic tools (possibly except for the few burins) their effect may be discounted [Rosen 1996a: 44].

The published material on the lithic assemblage of Hartuv is not extensive. However, what the report lacks in length it makes up for in content by providing an in-depth examination of the characteristics of the lithic assemblage, not a brief overview as is common with reports of this size. The report on the Hartuv lithics is similar to those of earlier Epipaleolithic and Pre-Pottery Neolithic sites with regard to its detailed analysis and discussion. This similarity is rarely pointed out in reports of post-Neolithic Levantine sites, unless it is Steven Rosen who is responsible for analyzing a site's lithic assemblage.

Rosen's style is clear and to the point, providing the reader with a critical analysis and interpretation of the lithics. Rosen's work meets all of the criteria outlined in the database created for this thesis, and should serve as an example of how lithic assemblages from post-Neolithic periods in the Levant should be studied, analyzed and published. As a leader in the field of Bronze and Iron Age lithics in the Levant, he has produced some of the most complete and comprehensive works in this area.

Reports written by Rosen vary in length and scope depending on the excavation. Rosen's publications on the lithic assemblages of Shiqmim, Tell Qiri, En Shadud, and Gezer demonstrate the same approach to detailed research, analysis and comparative examination as has been shown in his work with the Hartuv assemblage. There is a strong need for work like Steven Rosen's to be published in order to gain a greater understanding of the lithic assemblages dating from the Pottery Neolithic through to Iron Age.

3.4 Satisfactory Sites

The "satisfactory sites" must provide an adequate amount of information regarding a site's lithic assemblage. A minimum of one or more seasons of excavation is required. The lithic material may have been recovered in a contextual level or discovered while excavating the fill. A minimum of 15 pages of published material is required from one or more sources. There must be five to ten analogous sites given, with specific discussion of the comparative lithic material. Statistical or quantitative information must be present in the published material. A minimum of four diagnostic features for the lithic material is required. They include: the tool classification, measurements, material type, material colour, material texture, drawings of lithics, photographs of lithics and use wear analysis. The following sites fit into the "satisfactory" category: Arad, Basta, Burqu/Ruweishid, En Shadud, Gezer, Jawa North, Nahal Oren, Tell ash-Shuna North, Tell el-Hibr, and Tell Jawa. The sites of Tell el-Hibr, Arad, and Tell Jawa are discussed in detail in this section.

3.4.1 Tell el-Hibr - Database Site 16

Tell el-Hibr is situated in semi-arid lands in eastern Jordan (see Figure 2, Figure 4). The site consists of a rock shelter, which was discovered during a survey along the eastern edge of the *harra.* This region exhibits vast amounts of volcanic rock stretching across the "panhandle" of eastern Jordan (Betts 1992:5). The only published report on this site is *"Tell el-Hibr: A Rock Shelter Occupation of the Fourth Millennium B.C.E. in the Jordanian Badiya"*, written by the excavation's director, Alison Betts, of the University of Sydney in 1992. Betts has extensive experience in the excavation of

Levantine sites ranging from the Epipaleolithic through the Bronze Age. She has published reports on lithic assemblages from sites including Tell el-Hibr, Tell Um Hammad and Jebel Naja.

The site lies on the slopes of Tell el-Hibr, a basalt-capped hill about 10 kilometres east of the main volcanic source, near the Saudi Arabian border. According to Betts the site consists of:

> ... a series of peaks with exposed outcrops of limestone and chert on the slopes below... The peak provides both shelter and a convenient lookout station. The most recent use is as a Jordanian Desert Police post, where a small garrison maintains watch over routes south into Saudi Arabia [Betts 1992: 5].

Excavations at Tell el-Hibr revealed numerous levels of human occupation. Basalt boulders located on the hilltops exhibit pre-Islamic inscriptions and rock carvings. Flint scatters and knapping floors were discovered on the lower slopes (Betts 1992: 5). The earliest identifiable artifacts are from the Middle Palaeolithic. The exposed layers of chert beds on the slopes of Tell el-Hibr may have been a popular source of raw material for the manufacturing of lithic tools in prehistoric periods. Within an area of the rock shelter that appeared to be a robber's pit, the remains of a heavily weathered human skull were discovered. On the outside of the rock shelter, was a small scatter of sherds and flint that appeared to be from the fourth millennium B.C.E., dating from the Late Chalcolithic to Early Bronze Ages (Betts 1992: 5).

The rock shelter was originally assumed to be a burial cave, dating to the 4th millennium B.C.E. During that time, bodies were brought to the cave and laid to rest inside. Following the placement of the bodies, the entrance was filled in with rocks (Betts 1992: 5). Betts suggests it appeared that a series of disturbances created an

opening to the burial cave. This opening would explain the distribution of artifacts associated with the burials lower down on the slope. Over time water or wind erosion may have also contributed to the distribution of these artifacts. The cave contained a "significant depth of deposits" (Betts 1992: 5). The site was excavated in hopes that undisturbed levels would be uncovered.

The original assumption of the cave being used as a burial site was partially correct. Of the skeletal remains in the rock shelter, it is believed that the individuals had been buried relatively recently, although no date was provided. The skeletal remains were discovered with a variety of items such as, scraps of fabric, ostrich plumes, gazelle horns, and an iron spearhead (Betts 1992: 6). Occupational deposits were uncovered deep below the burials. Artifacts recovered from a series of stone floors provided an occupation date of the middle of the 4th millennium B.C.E. (Betts 1992: 6). Betts describes the cave as:

> ... a small chamber with access at the southern end to a low tunnel going back into the cliff. The front of the cave was blocked by fallen limestone slabs, reinforced by rough stone walling ... The main chamber of the cave was cleared to bedrock and surface rubble and soils were cleared from the terrace; the fill of the tunnel, however, was not excavated. All earth was sieved through 5-mm mesh [Betts 1992: 6].

The finds recovered dating to the Late Chalcolithic/Early Bronze Age included "pottery, chipped stone, faunal remains, some fragments of ostrich eggshells, and a broken stone ring" (Betts 1992: 7). Pottery consisted of 131 sherds. Only a few diagnostic pieces were found (Betts 1992: 8). The pottery has typological parallels with Chalcolithic assemblages in the southern Levant. The ceramic vessels uncovered maintained the common styles and forms of the Early Bronze Age Levant (Betts 1992: 11).

Betts provides a thorough examination of the more than 700 flint implements that were recovered from this excavation (Betts 1992: 12). The lithic assemblage from this site demonstrates that lithic material was present in this area during the Chalcolithic and Early Bronze Age. The depth of the discussion of Tell el-Hibr was not lost or compromised to focus on the ceramic artifacts or human skeletal remains. Lithics were treated as important artifacts that contributed to the overall understanding of the site.

The majority of the implements were associated with the upper levels of the burials. Betts believes:

> It is unlikely that chipped stone debitage would be associated with recent burials; and given that the material is technologically and typologically similar to the chipped stone from stratified proto-historic levels, it may be assumed that the chipped stone in the upper levels is derived from an earlier context [Betts 1992: 12].

The raw material used for the Tell el-Hibr lithic industry was available in the immediate vicinity. The adjacent hills contain the medium-grain banded chert and fine, smooth tan flint, which was the material most commonly used in the Tell el-Hibr assemblage. Some of the implements were manufactured from reworked Middle Paleolithic debitage. This material was likely from a scatter on the hill slope opposite the rock shelter (Betts 1992: 12). The flint knapping techniques are crude and basic. A limited amount of flakes exhibit wide, faceted platforms, a technique "that is paralleled in Late Chalcolithic and Early Bronze Age industries in the Levant" (Betts 1992: 12). The availability of good raw material gave the Tell el-Hibr industry an individuality that makes comparison with other sites difficult. The tool production may relate more closely to spontaneous need of the individual than to the practice of creating a tool for long term use (Betts 1992: 12). Betts considered the lithics to be unsophisticated. She states:

> The bulk of the tool kit is made up of irregularly retouched blades, flakes and miscellaneous debitage apparently used at random and discarded. In several cases retouch may be the result of use rather than deliberate shaping of the piece [Betts 1992: 12].

Besides a large number of chunky blades with minimal retouch, the Tell el-Hibr tool kit includes crudely formed arrowheads, some irregular burins, scrapers and borers, two bifacial pieces, and a small notch/denticulate piece. The transverse arrowheads are the most finely worked of the tools. The excavators recovered three transverse arrowheads intact. There are two true transverse arrowheads, and one is a piece worked in imitation of the form, but on a triangular chip (Betts 1992: 12). Betts provides tables that list stratified and unstratified tools with specific reference to the "Frequency of Chipped Stone Classes" and the "Frequencies of Retouched Chipped Stone Artifacts (Betts 1992: 15, Table 1 and Table 2).

The assemblage from Tell el-Hibr reveals technological and typological parallels with material recovered from sites near Qasr Burqu. This site lies on the eastern side of the *harra*, approximately 70 kilometers north. Excavations at many of these sites have identified "transverse arrowheads that occur with small, bifacially worked points in Late Neolithic context" (Betts 1992: 12). Transverse arrowheads are common in desert sites of the 4th millennium B.C.E. in the Sinai and the Negev (e.g. Oren and Gilead 1981; Bar-Yosef *et al.* 1977). Transverse arrowheads from Late Neolithic assemblages from the Jordanian stepps have a variety of forms including tanged, triangular, and trapezoidal shapes. The arrowheads from Tell el-Hibr are all trapezoidal (Betts 1992: 15).

Steven Rosen identified a similar pattern of transverse projectile points in the Sinai and Negev. Small, laterally concave, triangular transverse arrowheads were prevalent in fifth and fourth millennium assemblages. During the fourth millennium

large isosceles and equilateral triangles become more common. In the Early Bronze I and II periods various rectangles, trapezoids, and trapezes are most typically seen (Rosen 1989: 205).

> The pattern described by Rosen is mirrored on steppic sites in Transjordan and is consistent with the evidence from Tell el-Hibr. No transverse arrowheads are known from post-Early Bronze Age II contexts in the Levant [Betts 1992: 15].

There were no Canaanean blades found at Tell el-Hibr. This may be because the Canaanean lithic industry is linked with urban exchange networks. "The Canaanean industry is not associated with sites in the steppic areas of the Levant" (Betts 1992: 16). There are some similar cruder looking tools that were manufactured using local chert (Betts 1992: 16). Hanbury-Tenison's 1986 summary of the lithic assemblages from Chalcolithic sites in the Levant, suggests that there is little comparable material between the Tell el-Hibr assemblage and blade-based industries of the Ghassul-Beersheba tradition (Betts 1992: 16). The excavations at Tell el-Hibr produced two tools that can be classified as choppers, although their function is unclear. Tabular tools, such as the Ghassulian fan-scraper, are absent from the Tell el-Hibr tool kit (Betts 1992: 16).

Betts's conclusions on the flint assemblage of Tell el-Hibr are as follows:

> (i) The flint assemblage suggests a date within the Chalcolithic period for the el-Hibr rock shelter occupation. (ii) Typological parallels indicate general cultural connections with village settlements in the southern Levant and also with other mobile groups in the steppic regions of Transjordan. (iii) Parallels with sites beyond Transjordan are sufficiently distant to suggest that the people using the rock shelter at el-Hibr were likely an indigenous North Arabian group without close connections to steppic populations in northern Sinai [Betts 1992: 16].

The rock shelter at Tell el-Hibr was excavated for only one season. The excavator did not clearly specify if any further investigation is required. Although the

site was subject to a single season of excavation, a great deal of information was gathered. Betts clearly acknowledged the importance of lithic implements at this site through her analysis and discussion. The detailed discussion is accompanied by diagrams, tables listing each tool type, description of the material type, colour and texture, and evidence of the source of the raw material. Tables provided quantitative data which provides an overview of the lithic material recovered. The comparative data included provides insight into the cultural group(s) who occupied this rock shelter in the past.

The excavation of En Shadud in the Jezreel Valley of Israel is an interesting parallel for the site of Tell el-Hibr. The site was the focus of a single season of salvage excavation in 1978. A study of the lithic assemblage from En Shadud (database site 29) appears in a brief appendix, "The En Shadud Lithics" by Steven Rosen in *En Shadud: Salvage Excavation at Farming Community in the Jezreel Valley Israel.* Rosen states that 1617 pieces of flint were recovered and identifies 399 as tools. Rosen provides a detailed account of "a good example of a northern Early Bronze I flint tool kit" (Rosen 1985: 153). An appendix provides detailed descriptions of the specific tools found. The archaeological context of lithics material is also provided, which indicates that even though the excavators were under a tight deadline they were still able to record important information. Photographs and drawings of a variety of tools from the En Shadud assemblage assist the reader with the discussion section presented by Rosen (Rosen 1985: 153-166).

The sites of Tell el-Hibr and En Shadud stand as examples of the quantity and quality of information that can be gathered even when excavated under tighter than usual

time restriction. Among the variety of artifacts recovered at the sites are many that have provided information regarding the inhabitants of the site and the time periods in which they lived. Although the lithic assemblages from Tell el-Hibr and En Shadud are not from the same period, they do share an important similarity.

3.4.2 Arad - Database Site 32

During eighteen seasons of excavation from 1962-1966, 1971-1978 and 1980-1984, Ruth Amiran focused on the Bronze Age city which occupies a soft Eocene chalk hill. Amiran, a well known Israeli archaeologist, spent the initial five seasons of excavation uncovering the blueprint of this Bronze Age city, that has a variety of public and private dwellings, temples and city wall (Amiran 1978: 1). The site of Arad is considered essentially a single period Bronze Age site, with limited remains from the Chalcolithic (see Figure 2, Figure 4). The Early Bronze Age site covered an area of 22 acres. The primary focus of the excavations was to formulate a clear image of the town, through close examination of the fortifications of the city, the water supply, the architecture and the local environment (Amiran 1978: 10). The dating techniques primarily depended on information gathered from architectural features and ceramic artifacts, in addition to radiocarbon dating.

The two volumes on the Arad excavations total more than 350 pages. *Early Arad: The Chalcolithic Settlement and Early Bronze City* provides five pages dedicated to flint implements. Part Three "The Early Bronze Age City – Strata VI-I", includes the section "Flint Implements, Strata V-I" written by Tamar Schick. The "Index of Loci and Objects" section provides an additional 10 pages of diagrams. Schick's analysis of the

lithics from Arad essentially consists of a descriptive summary, with minimal comparison to other sites in the Levant. The information provided on flint implements, specifically, that of the Canaanean industry covers only the basic criteria (Schick 1978: 62). It is important to note that the Arad and Bab edh-Dhra' lithic assemblages are similar in terms of date and overall tool classifications, but the discussion of the Arad assemblage lacks an account of the overall investigational practices and analysis. This is a good example of the differences in the examination of post Pre-Pottery lithic assemblages.

There were approximately 250 lithic implements uncovered at Arad. Of these 250, a small percentage was dated to the Chalcolithic period, with the majority dated to the Early Bronze Age. Stratum V is the context of the Chalcolithic flint implements. The 14 lithics uncovered consist of: one fan-scraper, two scrapers, one sickle blade, one-retouched blade, four notched and denticulated flakes, three retouched flakes, and one bifacial tool (Schick 1978: 58-59). The 14 lithic implements were made of flint ranging in colour from light grey to brown. There were 47 items classified as waste material from this stratum. Most of these items were flakes or blades of a medium size and irregular contour (Schick 1978: 59).

It was not possible to draw any definitive conclusions about the nature of the Chalcolithic flint industry at Arad with such a small sample to study. The three tool types from the Chalcolithic strata of Arad could be used for comparison with other sites such as Jericho VIII and Tell Abu-Matar. Schick felt that the three tool types were from the Ghassulian flint industry (Schick 1978: 59).

The flint implements from Stratum IV-I were dated to the Early Bronze Age I-II. The 240 lithics consisted of 64 fan-scrapers, 79 sickle blades, seven scrapers, 33 notched

and denticulates, 41 retouched flakes and blades, and 16 *varia*. It is important to note that a similar number of fan-scrapers were found in the Early Bronze strata at Jericho. This indicates a strong presence of fan-scrapers in Early Bronze Age Levantine assemblages. There are also 85 pieces of flint designated as waste material (Schick 1978: 62).

There are two general categories of tools that make up the majority of the lithics uncovered. The first category comprises tools made on tabular flint. This section describes the raw material from which a number of different types of implements were manufactured. In a discussion of 'unstratified tools' Schick states:

> These unstratified tools do not especially add or detract from the homogeneous character of the flint industry. Among the tools found and worth mentioning are two fan scrapers made in the regular technique but without the cortex on the upper face...The total of complete and broken unstratified tools is as follows: Fan Scrapers 13; Sickle blades 14; Other tools 25; Waste material 85; Total 137 [Schick 1978: 62].

The sickle blade is the second tool type. The blades from Strata IV-I are basically the same shape and size, "with a highly lustrous cutting edge" (Schick 1978: 59). The remaining implements consist primarily of flakes and blades, with some exhibiting retouched or are denticulated. These latter implements are considered to be inferior as a result of poor material and shape, and substandard manufacturing techniques in comparison to the other two groups (Schick 1978: 59).

Schick describes the flint industry in Strata IV-I as homogeneous. The two tool types that are dominant in these stratum are the fan scraper and the "Canaanean" sickle blade. The most common tool at Arad is the "Canaanean" sickle blade with trapezoidal cross section. Since no workshop was uncovered, it is probable that these sickle blades

were not made in the area. It does appear that the sickle blades were used over and over again. The blades would have been hafted, and since the material used for the hafts has not survived, one can only examine the blade itself. Analysis of the Canaanean sickle blade has begun to provide some interesting parallels with other Levantine Bronze Age sites such as Tell Far'ah (north), Lachish, Beth Shan, Megiddo, Affula, Wadi Ghazzeh and Tell el-Judeidah. The blades at Arad are similar in size to those found at Jericho (Schick 1978: 63). In addition to the above-mentioned tools there are various other lithics. However, their shape is not typologically constant (Schick 1978: 62). Schick states:

> The decrease in number of tool types and their standardization in the Early Bronze is related to a change in the way of life: permanent settlements, intensive agriculture and urbanization, one aspect of which is artisans [including those who were responsible for the manufacture of flint implements]. The decrease in the use of flint is also due to the discovery of metal and its increasing use [Schick 1978: 62; emphasis in original].

The two dominant tool types, the fan-scraper and the sickle blade, were created from high quality raw material. The "Canaanean" blade exhibits signs of specialized techniques in flaking. This is in stark contrast to other tools that appear rough and irregular in outline, and are manufactured from weak breccoidal flint (Schick 1978: 62). The majority of the waste material found in these strata comes from the weaker material. But waste material related to lithics manufactured from the stronger material, such as fan-scrapers or sickle blades, also was discovered. There were two blade sections found, but no unworked "Canaanean" blades were found (Schick 1978: 62). Schick drew three conclusions from her analysis.

> First, the fan-scrapers and sickle blades were manufactured by specialized individuals. Secondly, most households contained flint tools, some of which were bought while other were made by an individual of the location

> of the materials. It is likely that an individual would obtain an unworked fan-scraper or blade section and retouch or re-sharpen as the need arose. Thirdly, the excavations at Arad have not uncovered a flint workshop. Tabular flint outcrops have been found in the immediate vicinity [Schick 1978: 62].

Analyses of the local material and the implements found at Arad suggest that the tabular flint might have come from an area further south (Schick 1978: 62).

Schick's final remarks reveal the need for further research and study in the area of Bronze Age lithic analysis. "In the various reports, insufficient attention has been paid to the flint implements of the Canaanean industry" (Schick 1978: 63). It is clear that the author of the section on the Arad flint implements feels that there is a strong need for general analysis and a collection of data on raw material. This process is essential for better understanding of this industry (Schick 1978: 63).

3.4.3 Tell Jawa – Database Site 8

Tell Jawa is situated on the Transjordan plateau, approximately 10 kilometres to the south of the capital of Jordan, Amman. The tell sits on the southern edge of the Balqa Hills overlooking the Madaba Plains to the southwest (Figures 2, Figure 4). The location of the site attracted many early explorers. Surveys were carried out by Alios Musil in 1901 and 1902, Albrecht Alt in 1932 and Nelson Glueck in 1933 (Daviau *et al.* 2002: 2). Glueck collected pottery sherds from the surface of the tell and dated them to Early Bronze II, Early Iron I, Early Iron II and Islamic periods (Glueck 1934: 4). The majority of the excavated area dates to the Iron II period (Daviau *et al.* 2002: 4-5)

The first formal excavation at Tell Jawa began in 1989 under the direction of P.M.M. Daviau and Randell Younker. In 1991 Daviau assumed the role of Field

Director, and subsequently that of Senior Researcher and Director for the remaining seasons. A total of six seasons of excavation transpired from 1989-1995. The owner of the land on which Tell Jawa was situated had made arrangements for development of the land to begin shortly after the conclusion of the 1995 season.

The site of Tell Jawa is approximately two hectares in size (inside the walled area) and forms an oval shape. The primary goals of the excavations were to delineate and expose the fortified wall and determine the occupational sequence. The excavation recovered several thousand artifacts dating to the following periods: modern, Ayyubid-Mamluk, Ummayyad, Byzantine, Roman, Persian, Late Iron II, Middle Iron II, Early Iron I-II, and Late Bronze (Daviau *et al.* 2002: 5). Large numbers of food-processing and textile-related artifacts were found, but surprisingly there was a complete absence of agricultural tools. Numerous pieces of iron weaponry were uncovered, but by contrast no bronze weapons were uncovered. Daviau states: "Bronze appears to have been used exclusively for bow drill bits. Jewellery appears to be of copper rather than bronze, while knives like weapons were of iron" (Daviau *et al.* 2002: 6). Attention was clearly given to metal tools and other objects. The practice of modern agriculture on the tell resulted in the recovery of objects such as small toys, pieces of fabric or even onions within levels dating to the Iron Age. Excavations on tell sites such as Tell Jawa can be challenging due to the possibility of mixed contexts which make it difficult to locate loci that have not been compromised.

P.M.M. Daviau, of the Wilfred Laurier University in Waterloo, Ontario, published a number of annual progress reports on the excavation of Tell Jawa and has recently published two final volumes on the results of the excavations. These publications

primarily examine the site's architecture and the ceramic and metal artifacts. *Excavations at Tell Jawa, Jordan Volume II: The Iron Age Artefacts,* published in 2002, is more than 350 pages in length. Of the 350 pages, only 10 non-consecutive pages discuss the place of lithic material at the site. The text provides a CD-ROM that includes a database listing 2806 objects. Lithic implements make up less than one percentage of those items listed on the "Working Objects" database. One scraper, one bow-drill socket and one obsidian point are identified. There are numerous ground stone tools listed in the database, which include mortars, pounders, grinders and pestles identified as items for domestic food preparation (Daviau *et al.* 2002: Artifact Database).

Apart from the material published by Daviau, there is a paper, "An Analysis and Interpretation of the Lithic Collection from Tell Jawa, an Iron Age Site on the Madaba Plateau, Jordan," presented at the 2001 Annual meeting of the Canadian Archaeological Association by C.M. Foley, Urve Linnamae and Dawn Cropper. They investigate the presence and nature of the chipped stone technology of Iron Age Tell Jawa in the context of general Levantine trajectories (Foley, Linnamae and Cropper 2001: 1). Rosen's assertion that there was an abrupt decline in lithics at the end of the Bronze Age is confirmed by the limited amount of published material with the respect to lithics from Iron Age excavations (Rosen 1996b; Foley, Linnamae and Cropper 2001: 1).

This paper discusses the variety of reasons for the decline of lithics from the Bronze and Iron Ages. Lithic material from Tell Jawa was either not kept, or if it was kept, it was not discussed in earlier reports. Another possibility is that the Iron Age lithics were not considered typologically diagnostic. Finally, lithic material was recovered in mixed or intrusive contexts, in multi-component tells, where the age or

cultural association of the material cannot be determined clearly. Lithic tools continued to be manufactured and utilized long after the advent of metal technologies such as iron. Unfortunately it is difficult to determine the role lithics played in the local economy and everyday life because of the above-mentioned problems of lithic collection, analysis and contextual data (Foley, Linnamae and Cropper 2001: 1).

The Tell Jawa lithic collection consists of 876 items. Only 824 items were available for study, as 52 lithics were listed as missing (Foley, Linnamae and Cropper 2001: 6; Table 1). The lithic assemblage at Tell Jawa was collected over six seasons of excavation. As the majority of the excavated site dates to Iron II, much of the lithic material was contained in sediments related to that period. However, many of the lithics were recovered from disturbed contexts. (Foley, Linnamae and Cropper 2001: 11).

A clear context has been identified for a number of lithics that were uncovered at Tell Jawa, the majority of which were in one area of the site. The inner casemate wall (W3000) in Field E, provided a back wall for a large 9th century building, Building 300, which contained at least 11 rooms situated around a centrally located cistern. Three rooms are believed to have been used for the preparation of food. The cobblestone floor (E53:17) provided the excavators with a wealth of artifacts. The contents uncovered included more than eight hundred ceramic sherds, one polished stone, one grinder, one spindle whorl, five iron points, two upper millstones, and one small mortar. The lithic artifacts that were found *in situ* in this locus include one obsidian point, two blades (one of which was of the Canaanean type), two bladelets, one scraper, and one utilized flake (Daviau 1996: 86; Foley, Linnamae and Cropper 2001: 9). "Nineteen of the lithics were recovered from the beaten earth or plaster living floors of the three rooms in Building

300" (Foley, Linnamae and Cropper 2001:8-9). Thus one can conclude that lithic implements were being used by the Iron Age inhabitants of Jawa. It is unfortunate that this material has yet to be published.

To date the material published and the paper presented at the CAA annual meeting provide clear evidence that Tell Jawa did have lithic material in the Iron Age strata. Potentially a great deal could be learned from the lithics of this Iron Age site. Unfortunately there has not been any significant published report on the lithics assemblage of Tell Jawa. I was very fortunate to gain access to information, due in part to my participation in the 1995 excavations, as well as my attendance as a graduate student at the University of Saskatchewan. Other potentially interested individuals are likely unaware that Tell Jawa produced much more than a small handful of lithics. On the basis of the current publications, they would assume that after six seasons of excavation, lithics did not appear in the archaeological record.

3.5 Limited Sites

The "limited sites" provide only a brief account of the lithic material of a site. The recovery of lithic material should have occurred during either survey or excavation and one or more seasons of survey or excavation are required. The recovery of lithics may be characterized as in context, in the fill, or in an unknown provenance. The published material should range from one to 15 pages from one or more sources. Comparative information on lithic assemblages is not required, but if it is present it should range from one to four sites. The presence of statistical or quantitative information is not required to be included in the publications. The following sites were

included in the "limited" category: 'Ain Abu Nekheileh, 'Ain el-Jammam, Beersheba, Dhiban, Dhuweila, Ein el-Jarba, Hazor, Jebel Abu-Thuwwab, Lachish, Megiddo, Nahal Besor, Nahal Mishmar, Tel Mevorakh, Tell Abu Matar, Tell as-Sai'idiyeh, Tell Deir Alla, Tell Kaisan, Tell Um Hammad, Wadi Fidan (Feinan), Wadi Shueib, and Wadi Yabis. The sites of Megiddo, Tell es-Sa'idiyeh, and Beersheba are discussed in detail in this section.

3.5.1 Megiddo - Database Site 47

Megiddo is regarded as one of the most important biblical sites in Israel, and Megiddo is the only site in Israel to be mentioned by every great power in the ancient Near East. The tell is located in northwestern Israel, not far from the Mediterranean Sea, on a very important trade route (Figures 2, Figure 4). This route, between Africa and southwest Asia, was traversed by merchants passing through the Carmel range, which opens up into the plain of Jezreel (Wright 1964: 226).

Megiddo has been the subject of four major excavations over the past century. The first excavation was conducted by Gottlieb Schumacher from 1903-1905 on behalf of the German Society for Oriental Research. Excavations were renewed in 1925 by the Oriental Institute of the University of Chicago. A number of directors, Clarence Fisher, P.L.O. Guy and Gordon Loud, oversaw excavations until the outbreak of World War II in 1939. In the fifteen seasons of excavation, nearly the entire history of the site was uncovered, with twenty major levels of occupation. The third excavation took the form of a few short seasons in the 1960s and 1970s under the direction Yigael Yadin on behalf of the Hebrew University of Jerusalem. The results of Yadin's work include the

discovery of the monumental Palace 6000, generally associated with King Solomon. The most recent excavations, on behalf of Tel Aviv University under the direction of I. Finklestein, began in 1994 and are expected to continue through 2004. The previous excavations at Megiddo serve as a foundation for the discipline of biblical archaeology, though the results are not without controversy. (www.tau.ac.il/humanities/archaeology/megiddo/excavations1.html).

Thus, over the last century there have been more than 35 seasons of excavation. The variety and sheer volume of artifacts that have been uncovered is staggering. There have been numerous reports published on the Megiddo excavations, covering topics ranging from the fortified city walls, monumental architecture, to pottery, and other small finds. The primary dating techniques used have been architectural features, ceramics, and small finds such as coins or other metal implements, along with biblical sources. Unfortunately, very little has been published about the lithic material uncovered.

A four-page report published in 1948 by Joan Crowfoot, best known for her work on the lithics of Jericho, entitled "Flint Implements and Three Limestone Tools," was included in the monograph, *Megiddo II: Seasons of 1935-39.* This report discusses the lithics from two strata, Stratum -XX and Stratum XX. Stratum -XX, in bedrock, is cave 4067. During the excavations of Megiddo by the Oriental Institute at the University of Chicago, cave 4067 produced the site's earliest remains. The contents of this cave include numerous flint implements, bone, limestone artifacts, unworked animal bones, and a total absence of pottery. Stratum XX, on bedrock, contains Chalcolithic flint implements of a slightly different character that are associated with pottery comparable with layer VIII at Jericho (Crowfoot 1948:141).

The report by Crowfoot provides a descriptive summary of the tool types that were uncovered (Crowfoot 1948:1414-143). Limited contextual information is provided for some of the tools recovered from Stratum XX. Stratum -XX contained 190 pieces of lithic material, while Stratum XX contained 89 pieces (Crowfoot 1948:143). The majority of the implements were manufactured from chert, varying in colour from brown to buff. A few small fragments of obsidian and three limestone artifacts were also recovered, and the subject of further analysis at Cambridge University (Crowfoot 1948: 143). Crowfoot's concluding remarks state:

> ... the flint implements of Strata -XX and XX are very much alike, the only significant difference between them being that in Stratum XX, while the sickle blade with coarse denticulation is still the most common type, there are also a few specimens with fine denticulation; [Crowfoot 1948: 143-144].

Crowfoot believes that there is one flint industry present in the two strata discussed. The pottery in Stratum XX was sparse and did not cover the entire area. The introduction of pottery only slightly changes the flint industry at Megiddo. Therefore, one could assume that the introduction of this new technology occurred during a peaceful time. Statistical data is very limited and can be described as quantitative inventory lists (Crowfoot 1948: 142-143). There are brief comments drawing comparisons of the lithic industry at Megiddo to those at El-'Affulah, El-Khiam, Baisan, Tulailat Ghassul and Wadi el-Ghazzah. These discussions are brief, and generally restricted to one implement, sickle blades (Crowfoot 1948: 144).

The only other report concerned with the lithic material of Megiddo has not yet been published. According to the Tel Aviv University web site on the Excavations at Megiddo, a report entitled "Iron I Flint Implements from Level K-4" by Dado Gersht,

will be included in the 2005 publication of *Megiddo IV: The Seasons of 1998-2002* (www.tau.ac.il). Unfortunately obtaining any other information regarding this publication was unsuccessful. It appears that currently, after a century of investigation at Megiddo, very limited information is available about its lithic industry. However, the above-mentioned report provides hope that there will be more information in the future.

3.5.2 Tell es-Sa'idiyeh - Database Site 46

The site of Tell es-Sa'idiyeh is situated in the central Jordan Valley, approximately two kilometres east of the Jordan River on the south side of the Wadi Kufrinjeh (see Figures 2, Figure 4). The site of Tell es-Sa'idiyeh "has been identified as the biblical city of Zarethan" (http://www.britishmuseum.ac.uk/ane/anereextell.htlm). This once prosperous site consists of an upper and lower tell. It is situated within some of the most fertile agricultural land in Jordan and at the crossroad of two major trade routes. The upper tell faces the east, rising to a height of 40 metres above the present ground level, and covers an area of approximately 10,350 square metres. The lower tell to the west is a bench-like mound 90 metres by 40 metres, and is approximately 20 metres lower than the upper tell. Nelson Glueck first visited the site in 1934 during his survey of Eastern Palestine. Surface collections by Glueck indicated a long occupation at Tell es-Sa'idiyeh. Analysis of material collected provided dates ranging from Early Bronze I and II through to Iron II. There were also traces of Roman and Byzantine occupations (Tubb 1988: 23).

The initial excavations at the site began in 1964 under the direction of J.B. Pritchard of the University of Pennsylvania. A number of test pits and trenches were

opened and excavated until the Israeli war of 1967 forced an end to the project (Tubb 1988: 23). Pritchard was not able to recommence excavations. In 1985, on behalf of the British Museum, J.N. Tubb was granted permission by the Department of Antiquities of Jordan to resume excavations at Tell es-Sa'idiyeh. Pritchard's work had uncovered a number of installations on both the upper and lower tells. With a new excavation beginning nearly 20 years later, it was important to distinguish clearly the stratigraphy and the last stratum reached in 1967 (Tubb 1986: 131).

A great deal has been written about the excavations, as well as the artifacts and architecture at Tell es-Sa'idiyeh. Only one publication refers to lithic artifacts present at the site. In *"Tell es-Sa'idiyeh: Excavations on the Tell, 1964-1966,"* Pritchard discusses the earlier survey of Henri de Contenson in 1953. He states:

> In a sounding, three by two meters, called Trench 1, de Contenson found pottery and flints that he assigned to a late date in the Middle Chalcolithic B, or a Late Chalcolithic with Ghassulian affinities [Pritchard 1985: 2].

The statement would lead one to believe that flint material could have been present at the time excavations began in 1964. If lithics were present, it appears they were not collected, recorded, analyzed, or written about in any of the publications to date. It is possible that lithics were not uncovered after the initial excavations began. If this is the case, it would be helpful if published reports stated clearly whether lithics were present or absent rather than leaving readers uncertain of the status of lithic materials.

It is apparent that those who excavated at Tell es-Sa'idiyeh would have been kept very busy with the vast amounts of pottery and other artifacts uncovered. The contents of the more than 450 graves would have also required a great deal of examination. It appears that if lithics had been discovered, the lithic material was presumably set aside,

perhaps never given a second glance. Needless to say there is an absence of comparative and quantitative data regarding lithics. The description of lithic material is isolated to the Pritchard's comment noted above.

Could there be a Tell es-Sa'idiyeh lithics assemblage in existence similar to the Tell Jawa assemblage? Could there be boxes of lithics from Tell es-Sa'idiyeh sitting on university or museum shelves? Since the author of this thesis did not obtain access to the Tell es-Sa'idiyeh field notes, this question remains unanswered. However, it is a possibility worth considering. It is impossible to state for certain that lithic material, if present, would have altered or contributed to any of the analysis and conclusions about the history of Tell es-Sa'idiyeh. Unfortunately the possibility of analyzing lithic material is lost if those who excavated the site choose not to collect this material. The chronology and history of a site cannot be understood as a whole, unless all of its artifacts are examined.

3.5.3 Beersheba Sites - Database Sites 40 (Beersheba) and 51 (Tell Abu Matar)

Tel Sheva or Tell es-Sab'a, identified as biblical Beersheba, is located in the northern Negev in southern Israel (see Figures 2, Figure 3, Figure 4). The site is approximately 50 kilometres southwest of Hebron, and 100 kilometres southwest of Jerusalem. The site sits in an elongated valley which rises sharply eastward from the Mediterranean coast to the plain of Arad. The ancient town was built on a low hill on the banks of a wadi, which provided the town with a dependable water supply. Ancient Beersheba was situated at the center of a fertile area. The land was excellent for farming and grazing animals. In addition to being an ideal location for farming, Beersheba is at

the crossroads of a busy trade route, and was used as a caravanserai and Bedouin market from the 7th century B.C.E. onward. Today Beersheba sits at the edge of the Negev, and is as far south as a reliable water supply is available (www.ancientroute.com/cities/beersheba.htm).

There have been a number of excavations in and around the town of Beersheba and the surrounding area that will be the focus of this discussion. The area is believed to have been inhabited from at least the Chalcolithic period onward. An extensive amount of copper has been uncovered in excavations, much of which derives from approximately 120 kilometres from Punon, in the Sinai. A variety of artifacts, such as ivory statuettes and painted pebbles, demonstrate the site's important position along the trade routes (www.ancientroute.com/cities/beersheba.htm).

The excavations of the area included a large scale excavation of the main site between 1969-1976 by Y. Aharoni and Z. Herzog on behalf of Tel Aviv University (Herzog 1984: VII). Although there has been a substantial amount of publication on the excavations as a whole, there has been little published on the lithic artifacts of the Beersheba sites. The most complete account of the lithics of Beersheba appears in the monographs on the Beersheba excavations, *Beer-Sheba II: The Early Iron Age Settlement*, which was published in 1984. Of the 150 page text, only three pages were dedicated to lithics (Lamdan 1984: 122-124). There were 26 pieces of flint material recovered over the eight seasons of excavation (Lamdan 1984: 122). The contents of the report include a few diagrams, tool classification and contextual information. Lithics were uncovered in a variety of loci, including five blades dating to the Roman and Hellenistic periods (Lamdan 1984: 123).

Isaac Gilead excavated the nearby site of Grar. In a chapter on the "Flint Assemblage" at Grar in *A Chalcolithic Site in the Northern Negev*, Gilead provides some insight into the state of lithics research for Chalcolithic sites in the area. Gilead states:

> Although the material of the Chalcolithic period is known for more than 50 years, the flint assemblages of this time span have been studied only sporadically. The large samples of flint artifacts recovered in the large scale excavations of Teleilat Ghassul and Beer Sheva sites have been either briefly described or totally ignored [Gilead 1995: 223-224].

The sites of the Beersheba region have produced thousands of flint artifacts, but only preliminary descriptions of small sites such as Horvat Beter are available (Gilead 1995: 223-224). The report, "The Flint Implements from Horvat Beter (Beersheba)" published in 1959 by the journal *Atiqot*, is four pages in length. This report provides a brief description of the lithics uncovered at the site, drawings of some of these lithics, and a concluding paragraph (Yeivin 1959: 47). The conclusion suggests that the flint industry of Horvat Beter acquired its material from nearby streams. Tools such as flakes and blades show fairly rough workmanship. Similar techniques are found in flint industries from Be'er Matar, Nahal 'Azza (Wadi Ghazza), and Teleylat Ghassul (Yeivin 1959: 47). Yeivin states:

> ... there are considerable differences in the proportional distribution between the various groups of tools [the characteristic tools of Ghassul, for instance, is the gouge] and in the types of tools themselves. A more detailed analysis and comparison between these stations, which would enable us to fix the place of Horvat Beter in the development of this lithic industry, is badly needed, but such an analysis lies beyond the scope of this report [Yeivin 1959: 47].

It has been nearly half a century since this report was published, and to date, the analysis Yeivin called for has not been realized.

The site of Tell Abu Matar is a small mound on the right bank of the Beersheba Valley, approximately two kilometres southeast of the ancient city of Beersheba (Perrot 1955: 17). A survey in 1952 by David Alon suggested that Tell Abu Matar had Chalcolithic remains. The site was excavated for three seasons in the early 1950s (Perrot 1955: 17). Preliminary excavations revealed a concentration of pottery sherds and flint toward the top of the slopes dominating the valley (Perrot 1955: 17).

J. Perrot published the report, "The Excavations at Tell Abu Matar, near Beersheba," in the *Israel Exploration Journal* in 1955. Numerous flint tools were uncovered at the site. The evidence suggests that the lithic industry was on the decline. Flint pebbles found in the valley, from which the majority of flint implements were manufactured, provided poor quality material. Rarely were pieces of high quality tabular flint found. The technology of the Tell Abu Matar industry is very similar to that of the Palaeolithic (Perrot 1955: 78). Perrot provides a brief description of the types of tools uncovered, and the material from which they were created. A chart attempts to demonstrate the proportion of each tool type in the total assemblage. This chart is rather vague and the total number of lithics recovered is not provided: instead a system of symbols states whether the lithic is "rare, common or very numerous" (Perrot 1955: 178). This provides limited comparative data for sites within the northern Negev (Perrot 1955: 177). The report is summarized in the following statement on the lithics of Tell Abu Matar:

> Flint Industry: on pebbles; of decadent technique; archaic types. Principle types of implements: chopping tools, scrapers, borers, sickle blades, a few picks, and axes [Perrot 1955: 188].

The sites of the Beersheba region clearly demonstrate that although flint material is present, even in commanding numbers, only brief descriptions outline analysis of the lithics uncovered. Comparative information regarding the three sites is provided in a limited manner; however, quantitative data is absent from the publications.

Ceramic artifacts are the subject of Chapter 3, "The Pottery", by Fredric R. Brandfon in *Beer-Sheba II: The Early Iron Age Settlement.* Brandfon's examination of the ceramic artifacts includes detailed discussions of multiple strata, in addition to the presentation of typological, geographic and chronological conclusions. It is startling that vast amounts of flint implements have been ignored. The provenance of large numbers of pottery sherds has been provided, but no provenance has been provided for flint artifacts, which ignored the distribution of time and space (Gilead 1995: 224). Nearly 50 years ago Yeivin stated that further research and analysis would be required to provide a better understanding of the flint assemblage at Horvat Beter, as well as its relationship with similar sites within the region. Will another 50 years be required to pass by before such a study can be undertaken and completed?

CHAPTER 4

RESULTS OF RESEARCH AND ANALYSIS

Examination of the 46 sites selected has provided ample evidence to suggest the presence of lithic artifacts at all sites examined from the Neolithic onward. However, the quality and the quantity of published material from post-Neolithic sites or strata vary substantially. This chapter presents the overall results of the study, together with a discussion of the apparent decrease in treatment and publication of lithic assemblages from the post-Neolithic periods. Identification of the reasons for this tendency may alert future scholars to the potential problems associated with lithic material from post-Neolithic sites in the Levant.

The database includes 22 (48%) sites from Jordan and 24 (52%) sites from Israel. The **period of site** field (see Appendix A, Table 1) identified the series of occupational levels (Pre-Pottery Neolithic, Pottery Neolithic, Chalcolithic, Bronze Age and Iron Age) at each site. At 39 (85%) of the 46 sites multiple periods have been uncovered. The distribution of discrete periods at the 46 sites is as follows:

TABLE I : DISTRIBUTION OF PERIODS

PERIOD	NUMBER OF SITES	PERCENTAGE
Pre-Pottery Neolithic	12	26
Pottery Neolithic	15	33
Chalcolithic	21	46
Bronze Age	25	53
Iron Age	9	19

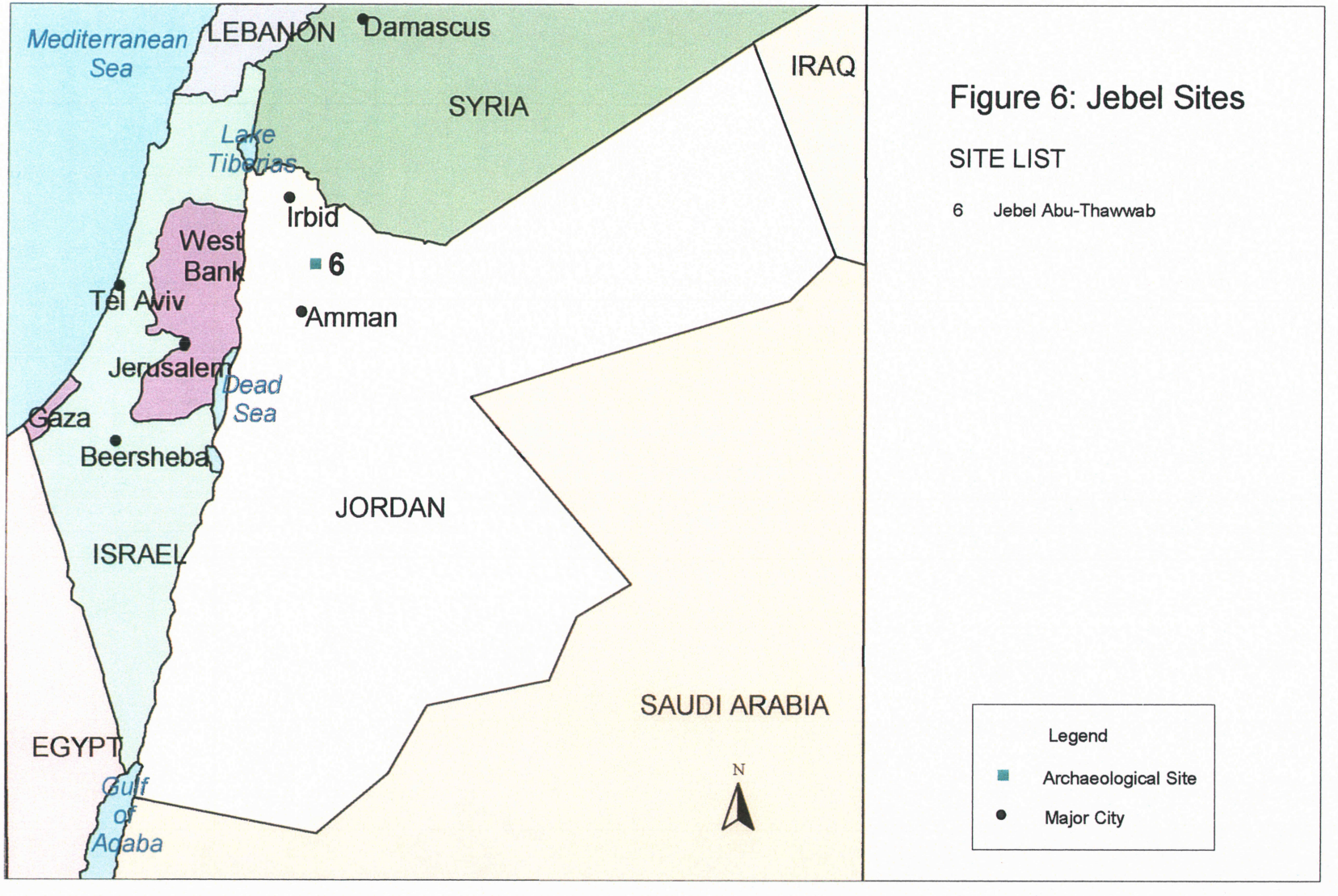
In addition to the above-mentioned periods, which are the primary focus of this thesis, 12 sites (26%) revealed levels dating to the Hellenistic, Roman, Byzantine, Nabataean, Umayyad and Mameluke periods. Eleven of the 15 "comprehensive" sites identified multiple occupational phases. Of the six (13%) single period occupation sites, Grar, Hartuv and Shiqmim are "comprehensive" sites, En Shadud is a "satisfactory" site and Ein el-Jarba and Wadi Yabis are "limited" sites. The presence of published reports providing detailed lithic analysis and discussion indicates that lithics were more likely to be identified and studied when recovered from sites with multiple phases of occupation, as opposed to a site with a single Bronze or Iron Age phase.

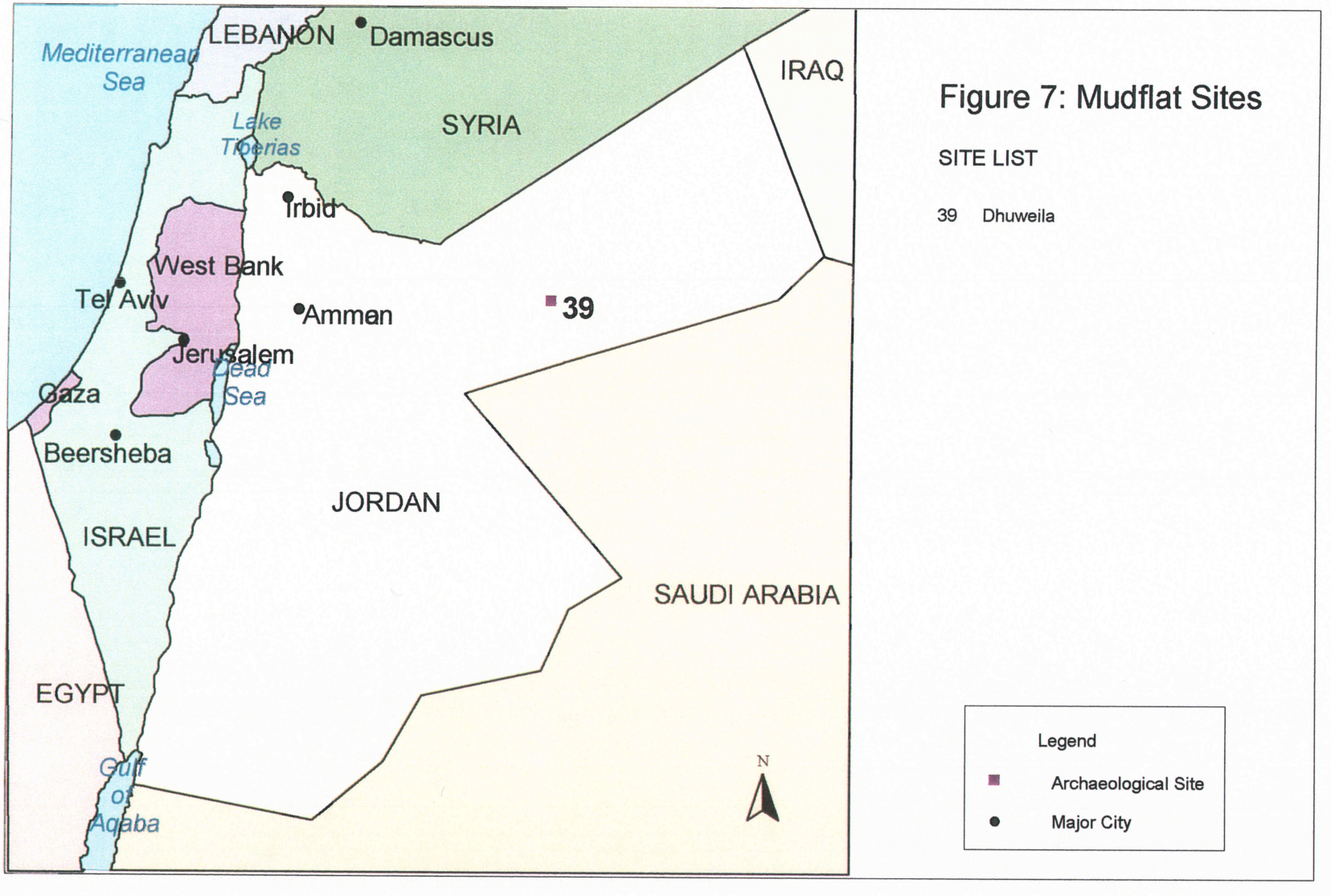
The **topography** field (see Appendix A, Table 2) identified the physical terrain of the 46 sites. Twenty-two (48%) fall under the category of the *tell*; 17 (37%) are a *wadi*; five (11%) are an *'ain*; one (2%) is a *jebel* and one (2%) is regarded as a mudflats. No clear pattern emerged regarding the presence of lithic material at specific "types" of sites in the post-Neolithic Levant. The distribution of site "types" is as follows:

TABLE II: DISTRIBUTION OF SITE "TYPES"

PHYSICAL TERRAIN	POLITCAL LOCATION	NUMBER OF SITES	PERCENTAGE
Tell/Tel/Mound	Jordan	8	17
Wadi/Nahal/River	Jordan	9	20
'Ain/En/Brook	Jordan	3	7
Jebel	Jordan	1	2
Mudflats	Jordan	1	2
Tell/Tel/Mound	Israel	14	30
Wadi/Nahal/River	Israel	8	17
'Ain/En/Brook	Israel	2	4
Jebel	Israel	0	0
Mudflats	Israel	0	0

Through the examination of the database certain trends have been identified relating to topography of a site. Tell sites by their very nature exhibit multiple occupation phases. The 22 tell sites examined in this thesis are identified as multi-period sites. Of the 17 wadi sites, 10 (59%) are defined as multi-period sites, while seven (41%) are considered to be single period sites. There is an even split between the four 'Ain sites examined. Excavations at the two (50%) Jordanian sites of 'Ain Abu Nekheileh and 'Ain el-Jammam has identified both Pre-Pottery Neolithic and Pottery Neolithic occupation levels. The two (50%) Israeli 'Ain sites of Ein el-Jarba and En Shadud are identified as single period sites. Only single sites represent the jebel and mudflats site "types" (see Figure 6, Figure 7). Both sites exhibit multiple occupation


Mediterranean Sea
LEBANON
Damascus
SYRIA
IRAQ
Lake Tiberias
Irbid
West Bank
6
Tel Aviv
Amman
Jerusalem
Dead Sea
Gaza
Beersheba
JORDAN
ISRAEL
SAUDI ARABIA
EGYPT
Gulf of Aqaba
N
Figure 6: Jebel Sites
SITE LIST
6 Jebel Abu-Thawwab
Legend
Archaeological Site
Major City


LEBANON
Damascus
Mediterranean Sea
IRAQ
SYRIA
Lake Tiberias
Irbid
West Bank
Tel Aviv
Amman
39
Jerusalem
Dead Sea
Gaza
Beersheba
JORDAN
ISRAEL
SAUDI ARABIA
EGYPT
Gulf of Aqaba
N
Figure 7: Mudflat Sites
SITE LIST
39 Dhuweila
Legend
Archaeological Site
Major City

levels, but with no comparative data provided for the sites examined, it is difficult to identify specific trends.

The **seasons excavated** field (see Appendix A, Table 2) revealed some interesting insights. Half of the sites (50%) have undergone multiple excavations since the turn of the twentieth century, many of them for more than 20 seasons. Ten sites (22%) experienced 10 or more seasons, while five sites (11%) were excavated for less than five seasons, while six sites (13%) were the focus of a single season of excavation or survey. There does not appear to be a specific number of seasons of survey or excavation required to produce a substantial lithic assemblage. As demonstrated at En Shadud, Ein el-Jarba, and Tell el-Hibr, a single season of excavation can recover significant lithic material. However, eight of the "limited" sites were the focus of five or fewer seasons of survey or excavation, compared to the 10 or more seasons of survey and excavation at 14 (93%) of the 15 "comprehensive" sites. A vast quantity of lithic material was recovered from Tabaqat al-Buma, Bab edh-Dhra', Jericho and 'Ain Ghazal over numerous seasons of excavation.

The **primary focus of excavation** field (see Appendix A, Table 2) included the central objectives or goals of the directors at each site. Locating architectural features was the goal of a clear majority in 32 or 70% of the cases. The discovery of occupational sequences and ceramic artifacts were each listed for nine or 20% sites. Trade, metallurgy, water storage systems and small finds were also listed at a total of 11 (24%) sites. Although lithics were recovered at all 46 sites, only three (7%) sites, 'Ain Abu Nekheileh, Nahal Zahora I and Sha'ar Hagolan, expressly stated that lithics were a primary focus of their excavations. The reasons for this omission from other reports may

stem from the agendas of certain funding agencies or other groups involved in the excavation.

The **excavation/excavator's background** field (see Appendix A, Table 3) examined an individual's background and/or the background of the sponsoring institution of an excavation. The database has demonstrated that Levantine archaeology enjoyed an international presence over the past century. The excavations examined in this thesis have been directed, co-directed, sponsored or co-sponsored by the following: 22 (48%) Israeli, 17 (37%) American, eight (17%) British, five (11%) Canadian, four (9%) Jordanian, three (7%) Australian, three (7%) Scottish, one (2%) Dutch, two (4%) French, and one (2%) German.

This field proved to be very challenging since the author of this thesis was unable to learn the details of every excavation director's educational background. Thus it was difficult to identify patterns or trends in their approaches and methods in the field and in publication practices, although some limited correlations did appear in the overall picture of who excavates Levantine sites. The "comprehensive" sites identify a strong presence of American, Canadian, and Israeli excavators. However, 34 (74%) of the 46 excavations examined were directed by either an Israeli or an American archaeologist. The high number of Americans could suggest that they had access to substantial funding through both public and private institutions. Archaeological excavations are very expensive projects to organize and maintain.

It is evident that government (Israel Antiquities Authority), educational institutions and professional archaeologists are involved in the excavations in Israel. Twenty-two (92%) of the Israeli sites have been primarily excavated by an Israeli

archaeologist or overseen by an Israeli institution. The policy of the Jordanian Department of Antiquities is less nationalistic, allowing foreign scholars to participate in the excavation of the 22 examined here. As a result the Jordanian sites may have benefited from a variety of archaeological approaches in the field.

For a number of Levantine sites archaeologists can turn to biblical sources, for example Beersheba, Hazor, Megiddo, Tell es-Sa'idiyeh, Tell Deir Alla and Gezer. Five of these sites are classified as "limited" in their discussion of lithic materials. The site of Gezer falls into the "satisfactory" category because the lithic analysis was carried out by Steven Rosen. Although the nationalities of the individual excavation directors include American, Dutch and Israeli individuals, four of the sites are under the supervision of Israeli Antiquities Authority. It is likely that biblical sites would attract archaeologists with nationalistic agendas and a somewhat biased focus.

The **use of site** field (see Appendix A, Table 3) provided information on the type or function of each site. The 46 sites revealed a wide range of types, of which the majority (32 sites) were residential in nature: 17 (37%) of the sites had been fortified or walled cities, 15 (33%) had been villages and four (9%) were once farmsteads. A single house, cistern, camp site, rock shelter, hunting site, agricultural site and a cave were also identified.

The function of the sites excavated did not appear to have a clear or direct link to the quantity of lithic material recovered or the quality of analysis performed on the lithics. However, the majority of "comprehensive" sites were villages, namely 'Ain Ghazal, Beidha, Grar, Hartuv, Nizzanim, Shiqmim, and Tell Qiri. The "satisfactory" sites included both villages (Basta, Jawa North, Nahal Oren, and Tell ash-Shuna North)

and fortified or walled cities (Arad, Gezer, and Tell Jawa). Nine of the 22 "limited" sites were also fortified or walled cities, namely Beersheba, Dhiban, Hazor, Lachish, Megiddo, Tel Mevorakh, Tell as-Sa'idiyeh, Tell Kaisan, and Tell Um Hammad. Tell el-Hibr stands out not only as the sole rock shelter site, but also for the recovery and study of numerous lithics in a single season of excavation.

The **potential problems at site** field (see Appendix A, Table 3) field lists the many impediments or inconveniences faced by those excavating Levantine sites. There were 16 sites that did not state any problems in their publications, but this does not mean that problems did not exist. Erosion from the wind or water had occurred at 12 or 26% of the sites. Modern agriculture was documented at eight (17%) of the sites, while various forms of modern construction were seen at 11 (24%) of the sites. The presence of military forces was a problem at Arad, Bab edh-Dhra' and Tabaqat al-Buma. Excavators at Sha'ar Hagolan had the difficult task of working in conjunction with anti-tank trenches created in war time, while those at Beidha identified tourist destruction as a major problem. It should be pointed out that a number of these sites, such as 'Ain Ghazal and En Shadud were partially exposed in the first place by modern construction. As damaging as the problems listed above have been, some sites owe their discoveries to the bulldozer.

The **primary dating techniques** field (see Appendix A, Table 4) identifies the features and artifacts that each site's excavation team relied upon for dating purposes. Nearly all of the sites used multiple techniques to establish chronological phases. Forty-two or 91% of the sites used architectural features for dating purposes. Ceramics were used by 33 (72%), lithic material was employed by 15 (33%), and radiocarbon dating was

performed at 13 (28%) of the sites. Seven of the sites that used lithic material belong to Pre-Pottery Neolithic periods, and eight sites dated between the Pottery Neolithic and the Early Bronze Age.

The presence of lithics was required for sites to become part of this study. The **discussion of lithics** field (see Appendix A, Table 4) notes the quantity and quality of information with specific reference to lithics, published in site reports, annuals, journal articles or texts. Of the 46 sites examined 22 or 48% fit the criteria required for the "extensive" category. An extensive discussion is defined by the amount of published material, providing a detailed examination and analysis of the lithics recovered. The detailed descriptions included the material, tool type, measurements, and contextual information (site reference number, stratum, locus, pottery pail number, and elevation), and detailed drawings and descriptions of the artifacts discovered. Of the sites that fit into the "extensive" category, six identified Pre-Pottery Neolithic levels, eight had pottery Neolithic levels, 10 had Chalcolithic levels, 11 had Bronze Age level and none identified occupations during the Iron Age.

There were seven (15%) sites that were categorized as "moderate." Moderate discussion covered the quantity of published material specifically focusing on lithics, generally ranging between five to 10 pages. Information regarding the raw material and possible lithic types, measurements of the artifacts, and rough drawings of some of the lithics were also present. Occupation levels from the "moderate" sites included two from Pre-Pottery Neolithic sites, two Pottery Neolithic sites, two Chalcolithic sites, one Bronze Age site and two Iron Age sites.

The "limited" category included 17 (37%) of the sites examined. These sites provided only brief accounts of the lithic material recovered, frequently less than five pages. The publications discussed material type, and typology. Rarely were photographs, drawings, measurements, or contextual information included. The "limited" sites included four with Pre-Pottery Neolithic phases, eight Chalcolithic, 11 Bronze Age and nine Iron Age.

The information gained from this field suggests that more "extensive" discussions of lithic assemblages were present at sites with phases dating from the Pre-Pottery Neolithic through the Bronze Age. None of the sites with Iron Age phases provide "extensive" discussions on lithic material. There is an even distribution of "moderately" discussed sites which exhibit phases dating from the Pre-Pottery Neolithic through the Iron Age. "Limited" discussions are identified primarily at sites with phases dating to the Bronze and Iron Age. These results imply that lithic material recovered from Iron Age levels does not receive the same degree of attention as material from earlier periods.

The **location of lithics** field (see Appendix A, Table 4) indicates whether the context of the lithics is known or identified. At 30 (65%) sites lithics were recovered in context. Nine sites provided further details of the context, by providing the loci or strata in which specific lithics occurred. Of these nine sites, four date to a Pre-Pottery Neolithic context. Four (9%) of the total number of sites stated that lithics were recovered from the fill, while three (7%) identified the location of lithic recovery as the surface scatter. Fourteen (30%) sites did not provide any contextual information regarding lithics. In order to compare the location of lithic material within a site or in comparison to other sites, contextual information is required. Such data also reveal trade patterns, the

introduction or abandonment of certain tool types at a certain point in time and can determine the overall significance of lithic material in the Levant throughout the Post-Pottery Neolithic periods.

The **comparative information** field (see Appendix A, Table 5) linked the number of other sites that were examined for comparative lithic analysis. The presence of comparative information is important for understanding the lithic industry of a region, as well as for a specific time period. Archaeologists who use comparative studies are able to draw parallels not only between the lithic artifacts, but also between the sites themselves through possible relationships in shared technology or trade.

All of the 46 thesis sites fit into one of the following categories: "excellent: 10+ sites," "good: 5-9 sites," "poor: 1-4 sites" and "none: 0 sites." There are 20 (44%) "excellent sites," eight (17%) "good sites," 13 (28%) "poor sites" and five (11%) of the sites provided no comparative information. All of the "comprehensive" sites provided 10 or more sites for comparative study. Half of the "satisfactory" sites provided 10 or more sites with comparative data, 3 with 5 to 9 sites and 2 with 1 to 4 sites. Of the "limited" sites five provided 5 to 9 sites, 11 provided one to four sites, five provided no comparative data. The information gathered from this field suggests that there is a link between the amount of comparative data presented and the degree of analysis of post Pre-Pottery Neolithic lithic assemblages. As the treatment of lithic material decreases, so does the overall quality of information that is published.

The **statistical information** field (see Appendix A, Table 5) identified publications that include quantitative data which allow for a greater understanding of the lithic material recovered from each site. A lithic analyst identifies trends or themes in an

individual lithic assemblage. Of the 46 sites examined 25 sites provided statistical information. Of the 25 sites that do, 20 date primarily to the Pre-Pottery Neolithic through Chalcolithic period. Only five of the 46 sites date to the Bronze and Iron Ages. Quantitative data is present at all of the "comprehensive" sites, while it is present at only two "limited sites". When quantitative data has been employed, information regarding high or low ratios of lithic material, tool types, retouched tools and the presence of specific lithic industry within a certain site has been identified which reveals a more complete picture of an assemblage. This data can also be used for comparative purposes to obtain information at a regional level.

The **quantity of published material** field (see Appendix A, Table 5) evaluated the volume of information, not the quality of information that has been published on each site. All of the 46 sites fit into one of the following categories. They are extensive with 21+ pages, very good with 11-20 pages, good with 5-10 pages and poor with 1-4 pages. The total number of pages of published material on each site's lithic assemblage is also included in this field. Seventeen of the sites provided extensive material. These sites are 'Ain Ghazal, Bab ehd-Dhra', Basta, Beidha, En Shadud, Grar, Jericho, Nahal Zahora I, Nizzanim, Sha'ar Hagolan, Shiqmim, Tabaqat al-Buma, Tell ash-Shuna North, Tell el-Hesi, Tell Halif, Tell Qiri and Wadi Ziglab. Seven sites provided an amount considered to be very good. These sites are Arad, Hartuv, Jawa North, Nahal Oren, Tell el-Hibr, Tell Jawa and Wadi Fidan (Feinan). Ten sites fit into the good category and included 'Ain Abu Nekheileh, Burqu/Ruweishid, Ein el-Jarba, Gezer, Hazor, Lachish, Nahal Besor, Tel Mevorakhk, Tell Abu Matar and Wadi Yabis. The twelve sites that were considered poor include 'Ain el-Jammam, Beersheba, Dhiban, Dhuweila, Jebel Abu-Thawwab, Megiddo,

Nahal Mishmar, Tell es-Sa'idiyeh, Tell Deir Alla, Tell Kaisan, Tell Um Hammad, and Wadi Shueib. The sites with large amounts of published material have generally provided the most in-depth analysis on their lithic assemblages, while sites with brief publications have provided only basic information regarding their lithic artifacts.

The final field, **lithic criteria** provided (see Appendix A, Table 5), identified the type of diagnostic information provided in each site's publications. The checklist approach provided a catalogue of the features or characteristics that are listed in each site's publications. This field examined what criteria or attributes archaeologists have provided in the documentation and study of their lithic artifacts. The criteria included measurements of the artifact, the type of material, description of colour and texture of the material, photographs or drawings of lithic, contextual information (stratum, locus, and elevation), and use wear analysis. In addition to these points, it was noted whether or not detailed information about all or only a limited number of artifacts was provided.

Nineteen (43%) of the sites provided all of the above-mentioned criteria or features in their published material, namely 'Ain Ghazal, Bab ehd-Dhra', Basta, Beidha, Burqu/Ruweishid, En Shadud, Gezer, Grar, Hartuv, Jericho, Nahal Zehora I, Nizzanim, Sha'ar Hagolan, Shiqmim, Tabaqat al-Buma, Tell el-Hesi, Tell el-Hibr, Tell Halif, Tell Qiri, and Wadi Ziglab. Half of the sites provided three to six features of the established criteria. Three sites did not provide any diagnostic features listed above. These sites are Dhiban, Tell es-Sa'idiyeh and Tell Deir Alla.

The results of this study have provided a disappointing picture of the study of lithic material from Levantine sites from the Pottery Neolithic period onward. It is clear that lithic material is present at these sites, but the overall treatment of the assemblages

varies greatly. The 46 sites that were investigated for this thesis provided some interesting and disconcerting insights. The sites were broken into three categories in terms of each site's treatment of lithic artifacts. These categories were established through an evaluation of information in the database.

Of the 46 sites, only 15 sites met the requirements of "comprehensive" by providing detailed information about the lithics collected. These sites are 'Ain Ghazal, Bab ehd-Dhra', Beidha, Grar, Hartuv, Jericho, Nahal Zehora I, Nizzanim, Sha'ar Hagolan, Shiqmim, Tabaqat al-Buma, Tell el-Hesi, Tell Halif, Tell Qiri and Wadi Ziglab.

The "satisfactory" category included 10 sites, whose publications paid some attention to lithic artifacts, but did not treat lithics with the same appreciation as is found in the "comprehensive" category. These sites are Arad, Basta, Burqu/Ruweishid, En Shadud, Gezer, Jawa North, Nahal Oren, Tell ash-Shuna North, Tell el-Hibr and Tell Jawa.

Twenty-one of the sites fell into the "limited" category, with insufficient information and analysis. These sites are 'Ain Abu Nekheileh, 'Ain el-Jammam, Beersheba, Dhiban, Dhuweila, Ein el-Jarba, Hazor, Jebel Abu-Thawwab, Lachish, Megiddo, Nahal Besor, Nahal Mishmar, Tell Mevorakh, Tell Abu Matar, Tell es-Sa'idiyeh, Tell Deir Alla, Tell Kaisan, Tell um Hammad, Wadi Fidan (Feinan), Wadi Shueib and Wadi Yabis.

From the fact that almost half of the sites studied fall into the "limited" category, one may conclude that many excavation directors of Levantine sites later than the Pre-Pottery Neolithic have failed to pay appropriate attention to lithic material present in Pottery Neolithic levels and later. They need to apply to lithic research the sorts of

collection and analysis practices as are to be found in the publications on "comprehensive" sites such as Jericho, Beidha, Tabaqat al-Buma or Hartuv. While one of the principle causes for decrease in interest in lithic material post Pre-Pottery Neolithic sites lies in the focus of researchers on ceramic and metal artifacts, lithics did not disappear. Lithic assemblages in the Bronze and Iron Ages do become smaller and more specialized, but, they are not inferior to metal tools and as Rosen has demonstrated, lithic technology and metallurgy overlap for more than 3000 years (Rosen 1997:11). As a result archaeologists investigating sites after the Pre-Pottery Neolithic in the Levant should ensure that they have not overlooked or ignored lithic assemblages.

CHAPTER 5

SUMMARY AND CONCLUSIONS

This thesis had two goals. The first was to demonstrate that there are lithic artifacts in Pottery Neolithic through Iron Age sites in the Levant. The second was to investigate whether lithic materials from these sites had been neglected with respect to collection, analysis and subsequent publication.

Comparison of the treatment of lithic assemblages at Levantine sites from the Pottery Neolithic through the Iron Age has been the focus of this thesis. The database was established to create an efficient reference tool for identifying similarities and differences within 46 selected sites. The 19 fields in the database have provided information identifying occupational sequences, the physical nature and uses of the sites, excavation histories and specific details regarding lithics.

The results of this research have identified problems in the collection, examination and publication of lithic assemblages in Pottery Neolithic through Iron Age sites in the Levant. The detailed analysis of 12 sites has provided evidence for the varying treatment of lithic artifacts. Through the examination of all 46 sites, it is clear that the majority of those who excavate such sites do not place sufficient emphasis on the study of lithic artifacts.

Archaeologists studying Pottery Neolithic through Iron Age periods have tended to concentrate on the increased amount of ceramic and metal artifacts. The actual decline

in lithic production and technology in these periods was certainly a factor contributing to the shift in interest away from lithics, but lithics continued to be present long after the introduction of metallurgy. The examination of 46 sites indicates that lithic material was recovered from at least one of the levels of occupation. Other sites from these periods were also investigated, but their reports did not refer to lithic material. It is therefore possible that there are unreported assemblages sitting on university or museum shelves awaiting analysis and that these lithics may not be examined in the near future, since there seems to be an assumption that lithics do not make as valuable a contribution to the interpretation of post Pre-Pottery Neolithic periods in the same way as other artifacts. However, the work of scholars such as Rosen and Siggers over the past two decades confirms that lithics are valuable artifacts and should be given increased attention. If the next generation of scholars continues to follow their approach to lithics for sites beyond the Pre-Pottery Neolithic, then the present imbalance may be redressed.

This thesis has shown that there is a lack of standardized practices in the collection and examination of Levantine lithics from the periods in question. To rectify this situation, excavation directors must ensure that trained lithic analysts are involved in their projects. If lithic material is recovered during survey or excavation, the material should be treated with the same care and consideration as other artifacts. Should lithic material be completely absent, that too should be noted in published reports. The role of the lithic analyst should be to guide the retrieval of artifacts, devise recording databases, provide comparisons with contemporary sites and fully publish the results.

One pertinent field that the author was unable to explore fully is the educational background of excavation directors. Future investigation of this factor may help to

explain the lack of interest in lithic analysis.

It has been pointed out in this thesis that more complete analyses of lithic material would add an important dimension to our understanding of Pottery Neolithic through Iron Age Levantine cultures. In conclusion, it is the author's hope that the above-mentioned suggestions will be applied to future excavations, since the more information on lithic artifacts that is available, the more Levantine archaeology and archaeology as a whole will benefit.

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Appendix A: Table 1

Site Id	Site Name	Location	Sub-Area	Period of Site
20	'Ain Abu Nekheileh (Wadi Rumm)	Jordan	Southwestern Jordan	Pre-Pottery Neo. B/Pottery Neo. (Transition Stage)
28	'Ain el-Jammam	Jordan	Southwestern Jordan	Pre-Pottery Neolithic / Pottery Neolithic
2	'Ain Ghazal	Jordan	Northeastern Jordan	Multi-Period Site (Primarily Pre-Pottery Neo. B)
32	Arad	Israel	Southern Israel	Chalcolithic / Early Bronze
25	Bab edh Dhra	Jordan	Southwestern Jordan	Late Neolithic / Chalcolithic / Bronze Age
35	Basta	Jordan	Southeastern Jordan	Late Pre-Pottery Neolithic B (Transition Stage)
40	Beersheba	Israel	Southern Israel	Chalcolithic / Iron Age
3	Beidha	Jordan	Southwestern Jordan	Natufian / Pre-Pottery Neolithic
24	Burqu/Ruweishid	Jordan	Northwestern Jordan	PPNB / PN / Chalcolithic / Bronze Age
48	Dhiban	Jordan	Northwestern Jordan	Early Bronze/Iron/Nabatean./Byz./Umayyad/Mameluke
39	Dhuweila	Jordan	Northeastern Jordan	Pre-Pottery Neo. B / Pottery Neolithic
13	Ein el-Jarba	Israel	Northern Israel	Chalcolithic
29	En Shadud	Israel	Northwestern Israel	Early Bronze I
30	Gezer	Israel	Central Israel	Bronze Age / Persian /Hellenistic / Roman / Byz.
19	Grar	Israel	Southwestern Israel	Chalcolithic
18	Hartuv	Israel	South/Central Israel	Early Bronze Age (Single Period Site)
9	Hazor	Israel	Northwestern Israel	Multi-Period Site
37	Jawa North	Jordan	Northeastern Jordan	Chalcolithic / Bronze Age
6	Jebel Abu-Thawwab	Jordan	Northwestern Jordan	Late Neolithic / Early Bronze / Roman / Byzantine
1	Jericho	Israel	Central Israel	Multi-Period Site (3000-700 BCE)
27	Lachish	Israel	South/Central Israel	Early Bronze/Middle Bronze/Late Bronze/Iron Age
47	Megiddo	Israel	Northwestern Israel	Chalcolithic / Bronze Age / Iron Age
38	Nahal Besor	Israel	Southern Israel	Late Neolithic / Chalcolithic / Bronze I
26	Nahal Mishmar	Israel	Southwestern Israel	Chalcolithic
33	Nahal Oren	Israel	Southeastern Israel	Upper Pal. V & VI / Pre-Pottery Neo./ Pottery Neo.
12	Nahal Zehora I (Wadi Raba)	Israel	Northwestern Israel	Pre-Pottery Neolithic B / Pottery Neolithic
34	Nizzanim	Israel	Northwestern Israel	Pottery Neolithic / Early Bronze IA
42	Sha'ar Hagolan	Israel	Northeastern Israel	Pottery Neolithic (Limited Early & Middle Bronze)
22	Shiqmim	Israel	Southern Israel	Chalcolithic
4	Tabaqat al-Buma	Jordan	Northeastern Jordan	Pottery Neolithic / Chalcolithic / Roman
52	Tel Mevorakh	Israel	Southwestern Israel	Bronze Age/Iron Age
51	Tell Abu Matar	Israel	Southern Israel	Chalcolithic / Bronze Age
36	Tell ash-Shuna North	Jordan	Northwestern Jordan	Pottery Neolithic / Chalcolithc / Early Bronze Age
50	Tell Deir 'Alla	Jordan	Northwestern Jordan	Chalcolithic / Late Bronze / Iron-Iron II
11	Tell el-Hesi	Israel	Northwestern Israel	Bronze Age / Persian Period
16	Tell el-Hibr	Jordan	Northeastern Jordan	Late Neolithic/Chalcolithic / Early Bronze IA
46	Tell es-Sa'idiyeh	Jordan	Northwestern Jordan	Late Chalcolithic / Bronze Age / Iron I
10	Tell Halif	Israel	Northeastern Israel	Chalcolithic / Bronze Age /Iron Age / Islamic
8	Tell Jawa	Jordan	Northeastern Jordan	Iron Age I / Byzantine / Islamic
17	Tell Kaisan	Israel	Northwestern Israel	PPN / PN / EB / MB / LB / IronAge / Hellenistic
14	Tell Qiri	Israel	Northeastern Israel	Bronze Age / Iron Age (Uninterruped Occupation)
15	Tell Um Hammad	Jordan	Northwestern Jordan	Chalcolithic / Early Bronze
23	Wadi Fidan (Feinan)	Jordan	Southwestern Jordan	Pottery Neolithic / Chalcolithic / EBA/Roman-Byz.
7	Wadi Shueib	Jordan	Northwestern Jordan	PPN / PN / Chalcolithic / Roman / Byzantine
21	Wadi Yabis	Jordan	Northwestern Jordan	Pottery Neolithic
5	Wadi Ziqlab	Jordan	Northwestern Jordan	PPNA / PPNB / Pottery Neolithic / Chalcolithic

Appendix A: Table 2

Site Id	Site Name	Topography	Seasons Excavated	Primary Focus of Excavation
20	'Ain Abu Nekheileh (Wadi Rumm)	Ain/En/Spring	Multiple Excavations 1976-77; 1999-2001	Architecture/Trade (Lithic Material)
28	'Ain el-Jammam	Ain/En/Spring	Mult. Excavations 1965; 1983-85; 1995-96 (Salvage)	Architecture/Salvage (1995-96)
2	'Ain Ghazal	Ain/En/Spring	Multiple Excavations 1980-Present	Salvage/Multiple Aspects
32	Arad	Tell/Tel/Mound	18 Seasons (1962-1966; 19711978; 1980-1984)	Bronze Age City
25	Bab edh Dhra	Wadi/Nahal/Brook-River	Multiple Excav.1965-67;1975-79; 1994; 2001-Present	Architecture (20000 Chamber Tombs), Ceramics
35	Basta	Wadi/Nahal/Brook-River	2 Seasons 1986-87	Architecture
40	Beersheba	Tell/Tel/Mound	8 Seasons 1969-1976 (Reconstruction Began 1990)	Architecture
3	Beidha	Wadi/Nahal/Brook-River	8 Seasons (First 1958, Final 1983)	Multiple Aspects / Architecture
24	Burqu/Ruweishid	Tell/Tel/Mound	Multiple Excavations 1927-1928;1958;1988-1990	Architecture / Modern Enthnoarchaeology
48	Dhiban	Tell/Tel/Mound	Multiple Excavations 1925-39; 1960	Solomonic Period Buildings found in 1960
39	Dhuweila	Mudflats on Basalt Ridge	Survey 1983; 1 Season Excavation 1986	Hunting Camp
13	Ein el-Jarba	Ain/En/Spring	1 Season 1966 (Salvage)	Salvage Excavation / Architecture / Trade
29	En Shadud	Ain/En/Spring	1 Season Excavation 1978 (Salvage)	Salvage (Maximum Information in Short Time Period)
30	Gezer	Tell/Tel/Mound	Mult. Excavations 1902-05; 1907-09; 1964-66; 1990	Architecture
19	Grar	Wadi/Nahal/Brook-River	7 Seasons (1981-1987)	Understanding the Site as Whole(Inter/Intra Site)
18	Hartuv	Wadi/Nahal/Brook-River	Survey 1977-79; Excavation 3 Seasons 1985-86, 1988	Architecture / Occupation (Urban Transition)
9	Hazor	Tell/Tel/Mound	Discovered 1875;Excav 1955-58/1968-69/1990-Present	Architecture / Ceramics / Small Find
37	Jawa North	Wadi/Nahal/Brook-River	Discovered 1930; Excav. 1975-1990's	Architecture / Water Storage System
6	Jebel Abu-Thawwab	Jebel/Har/Mountain	2 Seasons 1984-1985	Salvage Excavation / Architecture / Ceramics
1	Jericho	Tell/Tel/Mound	Multiple Excavations 1907-9, 1911,1930-36, 1952-58	Architecture/ Ceramics / Occup.Sequences / Trade
27	Lachish	Tell/Tel/Mound	Multiple Excavations: 1932-38; 1973-75; 1980+	Architecture (Burial Chamber) / Occup. Sequences
47	Megiddo	Tell/Tel/Mound	Multiple Excavations (Beginning In Early 1900's)	Architecture
38	Nahal Besor	Wadi/Nahal/Brook-River	Survey/Exacavation Beginning in 1929	Survey
26	Nahal Mishmar	Wadi/Nahal/Brook-River	Multiple Excavations 1961-2000+	Metallurgy
33	Nahal Oren	Wadi/Nahal/Brook-River	6 Seasons (1951-1960)	Architecture (Houses)
12	Nahal Zehora I (Wadi Raba)	Wadi/Nahal/Brook-River	Mult. Excava. 1987&90-97;Nahal Zahora II Presently	Architecture / Lithics
34	Nizzanim	Tell/Tel/Mound	Multiple Excavations 1979-1982; 1989-1991	Architecture/ Site Transition
42	Sha'ar Hagolan	Wadi/Nahal/Brook-River	Multiple Excavations 1949-1952; 1972; 1990-1992 +	Settlement Pattern/Stratigraphy/Ceramics/Lithics
22	Shiqmim	Wadi/Nahal/Brook-River	Discovered 1951; Mult. Excav.1982-1993, 1999+	Multiple Aspects
4	Tabaqat al-Buma	Wadi/Nahal/Brook-River	Survey 1981; Excavation 1986-Present	Architecture / Occupational Sequences
52	Tel Mevorakh	Tell/Tel/Mound	4 Seasons 1973-1976	Architecture
51	Tell Abu Matar	Tell/Tel/Mound	3 Seasons 1952-1954	Architecture/Ceramics/ Small Finds
36	Tell ash-Shuna North	Tell/Tel/Mound	Multiple Excavations 1984-1985; 1991-1992	Architecture / Occup.Sequences / Ceramics
50	Tell Deir 'Alla	Tell/Tel/Mound	Multiple Excavations 1960-67; 1976-79; 1982; 1984	Ceramics (Stratified Late Bronze/Iron Age)
11	Tell el-Hesi	Tell/Tel/Mound	Mulitple Excavations 1892 through Present	Architecture / Occupational Sequence / Trade
16	Tell el-Hibr	Tell/Tel/Mound(Rock Shelter)	1 Season 1991	Architecture
46	Tell es-Sa'idiyeh	Tell/Tel/Mound	Mult. Excavations 1939-47;1953; 1964-67; 1985-89	Architecture / Ceramics
10	Tell Halif	Tell/Tel/Mound	8 Seasons 1976-1980, 1983-1987	Architecture / Occupational Sequences / Trade
8	Tell Jawa	Tell/Tel/Mound	6 Seasons 1989-90; 1992-1995	Architecture
17	Tell Kaisan	Tell/Tel/Mound	Multiple Excavations 1935-36; 1971-76; 1980+	Architecture/Small Finds/Ceramics/C14/Paleo.Bot.
14	Tell Qiri	Tell/Tel/Mound	3 Seasons 1975-77	Architecture / Material Culture Develop. Occup.Seq
15	Tell Um Hammad	Tell/Tel/Mound	Multiple Excavations	Architecture/Dating of Ceramic btw. Chalco & EBII
23	Wadi Fidan (Feinan)	Wadi/Nahal/Brook-River	Multiple Excavations	Multiple Aspects(Architecture/Metallurgy/Historic)
7	Wadi Shueib	Wadi/Nahal/Brook-River	1988 (Survey)	Settlement & Trade Patterns
21	Wadi Yabis	Wadi/Nahal/Brook-River	Salvage Survey (1 Season Published)	Salvage Excavation
5	Wadi Ziqlab	Wadi/Nahal/Brook-River	Survey 1981; Excavation 1986-Present	Architecture / Occupational Sequences

Appendix A: Table 3

Site Id	Site Name	Excavators/Excavations Background and History	Use of Site	Potential Problems at Site
20	'Ain Abu Nekheileh (Wadi Rumm)	American/British	Village	Erosion (Wind)
28	'Ain el-Jammam	American/Jordanian	Farming Village	Mod. Road Constr./Steep Slpoe to Excav. Site
2	'Ain Ghazal	American (G. Rollefson)	Village	Modern Road Cut
32	Arad	Israeli (R. Amiran)	Fortified / Walled City	None Stated
25	Bab edh Dhra	American (Lapp, Rast, Schaub, Kuijt)	Fortified City	Military Restrictions
35	Basta	Jordanian	Growing Village	Erosion (Water)
40	Beersheba	Israeli	Fortified City	None Stated
3	Beidha	American / British (Diana Kirkbride)	Village / Town	Erosion (top layer s) / Tourist Destruction
24	Burqu/Ruweishid	Australian / British / Scottish (A. Betts)	Multiple Sites (27+ Sites)	Erosion/Modern Road & Modern Pipeline
48	Dhiban	American / Israeli	Fortified City	None Stated
39	Dhuweila	Australian / British / Scottish	Small Hunting Camp	None Stated
13	Ein el-Jarba	Israeli	Village	Construction / Drainage Ditch
29	En Shadud	Israeli	Agriculture	Bulldozing / Construction (for a Cotton Gin)
30	Gezer	American	Fortified City	Erosion
19	Grar	American / French / Israeli (I. Gilead)	Village / Farm	Modern Agriculture
18	Hartuv	Israeli	Village (Pre-Urban Centre)	Modern Agriculture
9	Hazor	Israeli (Present Excavations Israeli / Spanish)	Fortified City / Walled City	None Stated
37	Jawa North	American / British	Village / City (Tranitional)	None Stated
6	Jebel Abu-Thawwab	Jordanian	Agriculture / Farm	Modern Road Cut/Construction / Agriculture
1	Jericho	British/Israeli / Multi-National (Kenyon & Amiran)	Fortified City	Muliple Problems / Erosion
27	Lachish	Israeli	Fortified City	None Stated
47	Megiddo	American / Israeli	Fortified / Walled City	Multiple Problems (Bedrock)
38	Nahal Besor	American / Israeli	Unspecified	None Stated
26	Nahal Mishmar	Israeli (published by Pessah Bar-Adon)	Cave / Winter Home	Overall Environment / Steep and Dangerous Cliffs
33	Nahal Oren	Israeli	Village / Houses (15+)	Erosion (Wind & Water)
12	Nahal Zehora I (Wadi Raba)	Israeli	Unspecified	None Stated
34	Nizzanim	Israeli	Village	Construction / Quarrying / Flooding in Area
42	Sha'ar Hagolan	Israeli	Hunting/Camp Site	Construction / War (Ref. Anti-Tank Trench)
22	Shiqmim	American / Israeli (Levy)	Village	None Stated
4	Tabaqat al-Buma	Canadian (E. Banning & J. Siggers)	Farmstead	Erosion (Water & Wind) / Military Restrictions
52	Tel Mevorakh	Israeli	Fortified City / Temple	None Stated
51	Tell Abu Matar	French / Israeli	Village	None Stated
36	Tell ash-Shuna North	Multi-National	Village	None Stated
50	Tell Deir 'Alla	Dutch (H.J. Franken)	Multiple Urban Settlements	None Stated
11	Tell el-Hesi	American / Canadian	Fortified City	Erosion
16	Tell el-Hibr	Austrailian / British / Scottish	Rock Shelter	Modern Construction (Roads & Bulidings) Police
46	Tell es-Sa'idiyeh	American	Fortified City	Modern Agriculture
10	Tell Halif	American	Fortified City / Transitional Site	None Stated
8	Tell Jawa	Canadian (P.M.M. Daviau)	Walled Ammonite City	Multiple Modern Problems / Agriculture
17	Tell Kaisan	British / Israeli	Fortified City	Modern Agriculture / Areas of Marshy Land
14	Tell Qiri	Israeli	Village	None Stated
15	Tell Um Hammad	British (majority of excavations by S.W. Helms)	Fortified City / Transitional	Modern Agriculture
23	Wadi Fidan (Feinan)	British / Canadian / German / Jordanian	Multi-Use Site / Transitional	Erosion (Flooding) / Robbing Activities
7	Wadi Shueib	American (K. Wright & R. Schick)	House	Modern Road Cut
21	Wadi Yabis	American	Cistern	Erosion/Construction (Agric. Reasearch Station)
5	Wadi Ziqlab	Canadian (E. Banning)	Multiple Uses / Farmstead	Erosion (Water & Wind)

Appendix A: Table 4

Site Id	Site Name	Primary Dating Technique	Lithics Present	Discussion of Lithics	Location of Lithics
20	'Ain Abu Nekheileh (Wadi Rumm)	Architecture / Lithics	Present	Moderately Discussed	Unknown
28	'Ain el-Jammam	Architecture / C14	Present	Limited Discussion	Unknown
2	'Ain Ghazal	Architecture / Ceramics / C14	Present	Extensively Discussed	In Context
32	Arad	Architecture / Ceramics / C14	Present	Moderately Discussed	In Context (Stratum Provided)
25	Bab edh Dhra	Architecture / Cemetary Remain (Bones) / C14	Present	Extensively Discussed (Ph.D. Dissertation)	In Context
35	Basta	Architecture / Human Remains(Burial) / Lithics	Present	Extensively Discussed	In Context
40	Beersheba	Architecture / Ceramics / Literary (Biblical Ref.)	Present	Limited Discussion	In Context
3	Beidha	Architecture / C14 / Small Finds / Lithics	Present	Extensively Discussed	In Context (PPNA & B)
24	Burqu/Ruweishid	Architecture / Ceramics / Lithics / C14	Present	Extensively Discussed	In Context / Fill / Surface Scatter
48	Dhiban	Architecture	Present	Limited Discussion	Unknown
39	Dhuweila	C14 / Paleobotanical Samples	Present	Limited Discussion	Unknown
13	Ein el-Jarba	Architecture / Ceramics / C14	Present	Moderately Discussed	Unknown
29	En Shadud	Architecture / Ceramics /Lithics	Present	Extensively Discussed	In Context
30	Gezer	Arch. (Walls)/Ceramics / Literary (Biblical Ref.)	Present	Extensively Discussed	In Context (The Loci & Strata Provided)
19	Grar	Architecture / Ceramics / Lithics / Bone	Present	Extensively Discussed	In Context (Stratum Provided)
18	Hartuv	Architecture / Ceramics / Lithics	Present	Extensively Discussed	In Context
9	Hazor	Arch./Ceramics/Literary/SFinds (Cuneiform Tablets)	Present	Limited Discussion	In Context
37	Jawa North	Architecture(Citadel) / Ceramics	Present	Extensively Discussed	In Context (Provenance Included)
6	Jebel Abu-Thawwab	Architecture / Ceramics	Present	Limited Discussion	In Context (Neolithic & EBI Storage Pits)
1	Jericho	Architecture / Ceramics / C14	Present	Extensively Discussed	In Context (PPNA & B)
27	Lachish	Architecture / Ceramics / Small Finds	Present	Limited Discussion	In Context
47	Megiddo	Architecture/ Ceramics / Small Finds / Literary	Present	Limited Discussion	Unknown / Javelin's In Context
38	Nahal Besor	Architecture / Ceramics /Lithics	Present	Limited Discussion	Survey Surface Scatter
26	Nahal Mishmar	Ceramics / C14 / Metal Implements	Present	Limited Discussion	Unknown
33	Nahal Oren	Architecture / Lithics	Present	Moderately Discussed	Unknown
12	Nahal Zehora I (Wadi Raba)	Architecture / Lithics	Present	Extensively Discussed	In Context
34	Nizzanim	Architecture / Ceramics / C14	Present	Extensively Discussed	In Context (Stratum Provided)
42	Sha'ar Hagolan	Multiple Techniques	Present	Extensively Discussed	In Context/Fill
22	Shiqmim	Architecture / Ceramics / Lithics	Present	Extensively Discussed	In Context
4	Tabaqat al-Buma	Architecture / Ceramics / Lithics	Present	Extensively Discussed (Ph.D Dissertation)	In Context
52	Tel Mevorakh	Architecture(Temple) / Ceramics	Present	Limited Discussion	Unknown
51	Tell Abu Matar	Architecture / Ceramics	Present	Limited Discussion	Survey Surface Scatter
36	Tell ash-Shuna North	Architecture(Mud Brick) / Ceramics	Present	Extensively Discussed	In Context
50	Tell Deir 'Alla	Architecture / Ceramics / Literary (Biblical Ref.)	Present	Limited Discussion	Unknown
11	Tell el-Hesi	Architecture / Ceramics	Present	Extensively Discussed (Ph.D Dissertation)	In Context
16	Tell el-Hibr	Ceramic / Lithics / Small Finds	Present	Extensively Discussed	In Context
46	Tell es-Sa'idiyeh	Architecture/Ceramics/Literary (Biblical Ref.)/C14	Present	Limited Discussion	Unknown
10	Tell Halif	Architecture/Ceramics/Paleobotanical/Small Finds	Present	Extensive Discussed (MA Thesis)	In Context (Mostly in EBI Strata)
8	Tell Jawa	Architecture / Ceramics / Small Finds	Present	Moderately Discussed	In Context / In Fill
17	Tell Kaisan	Architecture / Ceramic / Small Finds	Present	Limited Discussion	Unknown
14	Tell Qiri	Architecture / Ceramics / Small Finds	Present	Moderately Discussed	Unknown
15	Tell Um Hammad	Architecture / Ceramics	Present	Limited Discussion	In Context (In Loci Near Walls or Surf.Scatter)
23	Wadi Fidan (Feinan)	Architecture / C14	Present	Extensively Discussed	Unknown
7	Wadi Shueib	Architecture	Present	Limited Discussion	Discovered in Fill from Road Cut (PPNA)
21	Wadi Yabis	Ground Stone Tools / Lithics	Present	Limited Discussion	In Context
5	Wadi Ziqlab	Architecture / Ceramics / Lithics	Present	Extensively Discussed	In Context

Site Id	Site Name	Comparative Information	Statistical Information	Quantity of Published Material	Lithic Criteria
20	'Ain Abu Nekheileh (Wadi Rumm)	Good 5-9 Sites	Not Present	Good 5-10 Pages (6 pages)	Multiple Aspects: All Criteria
28	'Ain el-Jammam	Poor 1-4 Sites	Not Present	Poor 1-4 Pages (3 pages)	Mult. Aspects: Including Tool Creation/Technology
2	'Ain Ghazal	Excellent 10+Sites	Present	Extensive 21+ Pages (300+ pages)	Drawings/Measurements/Material Type/Tool Class.
32	Arad	Good 5-9 Sites	Present	Very Good 11-20 Pages (20 pages)	Drawings/Photo./Material Type/Tool Classification
25	Bab edh Dhra	Excellent 10+Sites	Present	Extensive 21+ Pages (400+ pages)	Drawings/Material Type,Texture, Colour/Tool Class.
35	Basta	Excellent 10+Sites	Present	Extensive 21+ Pages (35 pages)	None Provided
40	Beersheba	Poor 1-4 Sites	Not Present	Poor 1-4 Pages (4 pages)	Drawings/Photo/Meas./Material Type,Texture,Colour
3	Beidha	Excellent 10+Sites	Present	Extensive 21+ Pages (200+ pages)	Multiple Aspects: All Criteria
24	Burqu/Ruweishid	Good 5-9 Sites	Present	Good 5-10 Pages (8 pages)	Drawings of Lithics/Tool Classification
48	Dhiban	None Provided	Not Present	Poor 1-4 Pages (3 pages)	Multiple Aspects:Drawings/Photo/Measure/Tool Class
39	Dhuweila	Poor 1-4 Sites	Not Present	Poor 1-4 Pages (3 pages)	Mult.Aspects:Inc.Replication/Morphol/Wear Analysis
13	Ein el-Jarba	Good 5-9 Sites	Not Present	Good 5-10 Pages (8 pages)	Multiple Aspects: No Use Wear Analysis
29	En Shadud	Excellent 10+Sites	Present	Extensive 21+ Pages (22 pages)	Multiple Aspects: All Criteria
30	Gezer	Good 5-9 Sites	Present	Good 5-10 Pages (7 pages)	Multiple Aspects: All Criteria
19	Grar	Excellent 10+Sites	Present	Extensive 21+ Pages (90 pages)	Drawings/Measurements/Material
18	Hartuv	Excellent 10+Sites	Present	Very Good 11-20 Pages (11 pages)	Drawings of Lithics/Measurements/Tool Class
9	Hazor	Poor 1-4 Sites	Not Present	Good 5-10 Pages (6 pages)	Multiple Aspects: All Criteria
37	Jawa North	Excellent 10+Sites	Not Present	Very Good 11-20 Pages (15 pages)	Mult.Aspects: All Criteria
6	Jebel Abu-Thawwab	Poor 1-4 Sites (1 Sha'ar Ha Golan)	Not Present	Poor 1-4 Pages (3 pages)	Multiple Aspects: All Criteria
1	Jericho	Excellent 10+Sites	Present	Extensive 20+ Pages (150+ pages)	Drawings./Meas./Mat.Type, Text., Col../Tool Class.
27	Lachish	Poor 1-4 Sites	Not Present	Good 5-10 Pages (6 pages)	Multiple Aspects:All Criteria (No Photo)
47	Megiddo	Good 5-10 Sites	Present (Limited)	Poor 1-4 Pages (4 page)	Drawings/Measurements/Material Type/Tool Class.
38	Nahal Besor	Poor 1-4 Sites	Present	Good 5-10 Pages (5 pages)	Multiple Aspects: All Criteria
26	Nahal Mishmar	None Provided	Not Present	Poor 1-4 Pages (2 pages)	Multiple Aspects: All Criteria
33	Nahal Oren	Poor 1-4 Sites	Present	Very Good 11-20 Pages (12 pages)	Tool Classification
12	Nahal Zehora I (Wadi Raba)	Excellent 10+Sites	Present	Extensive 21+ Pages (24 pages)	Drawings/Photo/Meas./Mat.Type/Tool Class
34	Nizzanim	Excellent 10+Sites	Present	Extensive 21+ Pages (34 pages)	Drawings/Measurements/Material Texture&Colour
42	Sha'ar Hagolan	Excellent 10+Sites	Present	Extensive 21+ Pages (60 pages)	Drawings of Lithics
22	Shiqmim	Excellent 10+Sites	Present	Extensive 21+ Pages (60+ pages)	Measurement/Material Type/Tool Classification
4	Tabaqat al-Buma	Excellent 10+Sites	Present	Extensive 21+ Pages (350+ pages)	Drawings/Meas./Mat.Type,Texture, Col../Tool Class.
52	Tel Mevorakh	Poor 1-4 Sites	Not Present	Good 5-10 Pages (5 pages)	Multiple Aspects: All Criteria
51	Tell Abu Matar	Poor 1-4 Sites	Not Present	Good 5-10 Pages (5 pages)	Drawings/Measurements/Mat.Type/Tool Class.
36	Tell ash-Shuna North	Excellent 10+Sites	Present	Extensive 21+ Pages (25 pages)	Drawings/Measurements/Mat.Type,Tex,Col/Tool Class.
50	Tell Deir 'Alla	None Provided	Not Present	Poor 1-4 Pages (1 page)	Drawings/ Measurements/Material Type
11	Tell el-Hesi	Excellent 10+Sites	Present	Extensive 21+ Pages (200 + pages)	Drawings/Measurements/Mataterial/Tool Class.
16	Tell el-Hibr	Excellent 10+Sites	Present	Very Good 11-20 pages (28 pages)	Multiple Aspects: All Criteria
46	Tell es-Sa'idiyeh	None Provided	Not Present	Poor 1-4 Pages (1page)	None Provided
10	Tell Halif	Excellent 10+Sites	Present	Extensive 21+ Pages (100+ pages)	Multipe Aspects: Replication/Morph/Wear Anal.ysis
8	Tell Jawa	Poor 1-4 Sites	Not Present	Very Good 11-20 Pages (25; 15 Unpublished)	Multiple Aspects: All Criteria
17	Tell Kaisan	None Provided	Not Present	Poor 1-4 Pages (1 page)	Measurements/Photograph/Tool Classification
14	Tell Qiri	Excellent 10+Sites	Present	Extensive 21+ Pages (45 pages)	Multiple Aspects: All Criteria
15	Tell Um Hammad	Poor 1-4 Sites	Not Present	Poor 1-4 Pages (3 pages)	Multiple Aspects: All Criteria
23	Wadi Fidan (Feinan)	Good 5-10 Sites	Not Present	Very Good 11-21 Pages (15 pages)	Tool Classification
7	Wadi Shueib	Poor 1-4 Sites	Not Present	Poor 1-4 Pages (2 pages)	Drawings/Measurements/Tool Classification
21	Wadi Yabis	Good 5-9 Sites	Not Present	Good 5-10 Pages (5 pages)	Dr./Meas./Material Type,Texture,Colour/Tool Class.
5	Wadi Ziqlab	Excellent 10+Sites	Present	Extensive 21+ Pages (40 pages)	Mult. Aspects: Incl. Replication/Microscope Exper.

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Appendix B: Chronological Phases of the Levant

Period	Date B.C.E.	Locations of Major Occupations	Cultural Developments
Pre-Pottery Neolithic	8500 - 6000 B.C.E.	'Ain Ghazal, Beidha, Jericho,	-emergence of agriculture - trade with Anatolia
Pottery Neolithic	6000 - 4300 B.C.E.	Sha'ar Ha Golan, Tabaqat el-Buma Tell el-Hibr	- village farming - introduction of ceramics - Wadi Raba culture
Chalcolithic	4300 - 3300 B.C.E.	Shiqmim, Ein el-Jarba, Bab ehd-Dhra'	- pastoral society, copper smelting - olive trees grown for the first time - potter's wheel developed
Early Bronze	3300 - 2300 B.C.E.	Hartuv, Megiddo, En Shadud, Arad	- growing villages - Egyptian influences - urbanism, city states
Middle Bronze	2000 - 1550 B.C.E.	Beersheba, Tell Abu Matar, Tell es-Sa'idiyeh	- bronze commonly used - urban resurgence
Late Bronze	1550 - 1200 B.C.E.	Tell Deir Alla, Hazor, Lachish	- conflict and destruction - urban decline - arrival of 'Sea People' in Levant
Iron Age	1200 - 586 B.C.E.	Tell Jawa, Tell Halif, Tell Qiri	- iron widely used - Philistines, Israelite Settlement - destruction of Judah

APPENDIX C – Personal Experience

In the author's personal experience working on an Iron Age site in Jordan, digging through dense soil the author encountered hundreds of rocks, ranging in size from tiny pebbles to small boulders on a daily basis. With the presence of a wide variety of ceramic and metal artifacts, lithics were not considered a priority. If those excavating are not made aware of the importance of lithic artifacts through proper instruction and demonstration, he or she will not stop to take a second look at any of hundreds of rocks that the excavator comes across in her/his trench.

The following paragraph is intended to demonstrate how easily lithics can be overlooked in historic period sites in the Levant. Picture yourself out in the field, excavating for long periods of time in dusty conditions, bright sunlight and often in high temperatures. As one excavates through often thick soil, generally containing rocks of all sizes and shapes, one can be distracted by an object that is bright green, about the size of a nickel. Could this be an ancient coin? Would one notice a small brownish rock with a flat edge, if it were lying a foot away from a diagnostic piece of ceramic, such as a handle from a highly decorated juglet? What if one discovered an entire plaster floor? While being caught up in the excitement of this new discovery, one sweeps up the remaining dirt and rocks, and notifies the photographer that the surface is clean and ready for a photograph. Would the individual excavating have stopped for just a moment to see if any of those rocks might be more than just rocks, possibly lithics? These examples are more than just "what if's?". They are actual events that happened in the author's first season at an Iron Age site in Jordan. The author feels that it is important to share these

events, to demonstrate how easy it is to be distracted and unaware of important artifacts, when one does not know what one should be looking for.