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Pigs, Philistines, and the Ancient Animal Economy of Ekron from the Late Bronze Age to the Iron Age II

Justin Samuel Elan Lev-Tov
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To the Graduate Council:

I am submitting herewith a dissertation written by Justin Samuel Elan Lev-Tov entitled "Pigs, Philistines, and the Ancient Animal Economy of Ekron from the Late Bronze Age to the Iron Age II." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Anthropology.

Walter E. Klippel, Major Professor

We have read this dissertation and recommend its acceptance:

David W. Tandy, Charles W. Faulkner, Jan Simek

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Pigs, Philistines, and the Ancient Animal Economy of Ekron from the Late Bronze Age to the Iron Age II

A Dissertation Presented for the

Doctor of Philosophy Degree

The University of Tennessee, Knoxville

Justin Samuel Elan Lev-Tov

May 2000

Dedication

This dissertation is dedicated to a person who has been a great friend and a great help to me,

Said Freij

The only person I've ever known to come close to being a man of steel.

If only he were.

Acknowledgments

I owe many thanks to many different people and institutions in several different parts of the world. Without the encouragement and graciousness of Professors Trude Dothan, Professor Emeritus of Archaeology at the Hebrew University of Jerusalem, Seymour Gitin, Dorot Professor and Director of the Albright Institute of Archaeological Research in Jerusalem, and Brian Hesse, Professor of Anthropology at the University of Alabama-Birmingham, this research would not have been possible at all. It was at their invitation that my participation in the Tel Miqne-Ekron Excavation and Publication Project commenced. For financial support received during the three years I spent studying the faunal remains from Tel Miqne-Ekron at the Albright Institute, I would like to thank the United States Information Agency and the Tel Miqne-Ekron Publication Project.

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Abstract

The assemblage of animal bones recovered from the excavation area of Field I at the site of Tel Miqne-Ekron, located in Israel, is the subject of this dissertation. This site has been identified as the ancient city of Ekron, one of the Philistine cities. The faunal remains from Ekron can be divided into three main parts, bones recovered from the Late Bronze Age, Iron Age I, or Iron Age II strata of the site. Research questions relevant to these three time periods were formulated for each corpus of animal bones. The theme which ties these subdivisions together is world systems theory, such that the animal economy of Ekron is framed in terms of the development and evolution of a Mediterranean world economy.

The Late Bronze Age in the southern Levant is notable for the presence there of an Egyptian administration. Faunal remains from Tel Miqne-Ekron's Late Bronze Age levels were analyzed to examine the extent of Egyptian influence on the economy of Canaan. That is to say, was the Egyptian administration of Canaan pervasive enough to affect the staple goods economy of the region during this period? Examination of the faunal data produced no evidence that the town's economy was anything but provincial, an agricultural strategy aimed at providing for only local needs, and not external demands for trade and tribute.

The Iron Age I was the historical period in which the Philistines emerged as a powerful military and political entity in Canaan. Animal bones derived from Iron Age I deposits were identified and analyzed for the degree to which the Philistine diet reflected an ethnically distinct foodway related to Aegean dietary preferences. In addition, the data was examined in terms of how the animal economy fit into the larger picture of trans-Mediterranean trade. Although there are unique components to the faunal assemblage of Iron Age I Ekron, most notably an abundance of pig bones, the diet was not definitively Aegean in character. These results do not negate the possibility of a Philistine migration from the Aegean or elsewhere, but do argue that abundant pig bones should not be used as ethnic markers. Swine agriculture in the Ancient Near East may have been affected by a variety of circumstances, among them the degree to which local Levantine city economies were governed by foreign imperial polities. In eras of

foreign rule over the Levant, pig use was generally low, while the opposite is true for times of independence, as was characteristic of the Iron Age I.

The Iron Age II was a time of expanding territorial states, and Ekron in that period came under the political control of a series of foreign powers, most notably the Neo-Assyrian Empire. As with the Late Bronze Age, the primary research agenda for this portion of the faunal assemblage was to determine the extent to which these imperial states penetrated and developed a Mediterranean world economy. In contrast to the Egyptian administration in the Late Bronze Age, the succession of states and especially the Neo-Assyrian Empire did penetrate the staple economy of Ekron such that animal production strategies were changed. Among other economic changes correlated with the advent of the Neo-Assyrian Empire's expansion into Philistia, sheep were favored over goats, cattle were heavily employed in traction activities, and pigs nearly disappeared from the diets of Ekron's population.

Using the diachronic changes visible in the faunal assemblage excavated at Tel Miqne-Ekron as an example, it is possible to trace the non-linear development of a Mediterranean world system from the Late Bronze Age to the Iron Age II. Although Egypt was already a territorial state and an empire by the Late Bronze Age, the faunal remains from Ekron demonstrate that the Egyptians were either incapable or uninterested in altering the Levantine subsistence economy. The Iron Age I animal economy of Ekron demonstrates a prosperous but insular city economy, seemingly untied to regional exchange in staple goods. Finally, the Iron Age II faunal displays in a variety of ways an astonishing degree of regional interconnectedness which affected not only the production of prestige goods, but also the orientation of animal production.

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Chapter 1: Introduction

The subject of this dissertation is a very large assemblage of animal bones from the site of Tel Miqne-Ekron, Israel. Tel Miqne has been identified with the ancient Philistine city of Ekron, mentioned in the Old Testament as well as Assyrian and Babylonian sources. That original identification claim, first made in the early part of this century, was for a long time rejected by archaeologists because they thought the site too small for a city so well known in ancient times. The identification was generally accepted in the middle of the century, when it turned out the site was many times bigger than had originally been thought. Still, it was not until the site was excavated, some 30 years later, and began to produce the sorts of artifacts expected for that culture, that many skeptics were convinced of the identification. This designation was universally accepted after the last season of excavation, when archaeologists uncovered an inscription bearing the name of the city, 'Ekron'. The time periods explored by this excavation project have concentrated on the time just before, at the height of, and in the twilight of Philistine settlement and occupation of the site. Thus the project focused on the Late Bronze (ca. 1550-1200 BC), Iron I (ca. 1200-1000 BC), and Iron II (ca. 1000- 586 BC) periods (chronology from Mazar 1990). The Iron Age II[1] is generally said to end, as a date of convenience, with the destruction and deportations that came with the conquest in the year 586 of Israel and Judah by Neo-Babylonian king Nebuchadnezzar. The terminal date for this period at Tel Miqne-Ekron is somewhat earlier, at 603/604, the date of the city's destruction by the same Babylonian king in an earlier campaign to subdue Philistia (the allied city-states and surrounding territory of the Philistines). This destruction, along with the ensuing deportations, was evidently so complete that Ekron was thereafter abandoned and never reestablished as a city[2].

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[1] The rather long Iron Age II is usually divided into three subperiods, the Iron Age IIA (ca. 1000-900 BC), Iron Age IIB (ca. 900-700 BC), and Iron Age IIC (ca. 700-586 BC).

[2] Evidence of post Iron Age II occupation or use of the site is very limited. The city was abandoned from ca. 604 to the Roman period. Evidence of Roman, Byzantine, and Islamic period settlements were discovered only at the northern edge of the tel (T. Dothan and Gitin 1997:34).

Research Agenda

Several research problems will be addressed in this zooarchaeological study of the faunal remains from Tel Miqne-Ekron. These include the study of ethnic groups from the perspective of dietary remains. The case for the Philistines being a distinct ethnic group in Iron Age Canaan, with cultural roots in the Aegean area, will be evaluated from a zooarchaeological perspective. Discussions of Philistine ethnicity have previously used faunal remains as evidence, pro and con, for a Philistine-Aegean connection but this debate so far has singularly focused on swine agriculture. Not only will other species be considered as a part of the whole agricultural system in this analysis, but also butchery patterning will be examined to determine whether other forms of zooarchaeological information shed light on the subject. Outside of research questions involving ethnicity, the excavation strategies employed at the site provide the opportunity to, at least on a gross level, examine spatial patterning in animal remains. That analysis may be able to demonstrate the development of specialized city quadrants or buildings for activities involving, perhaps, animal processing – meat storage, distribution, or slaughtering areas.

The economic and political role of Ekron in the Late Bronze Age and during the Iron Age II will be examined in the context of empire economics. That is, the agricultural economy of Ekron will be placed into ongoing discussions concerning the origins, development, and effects of world systems in the ancient Near East. The data collected from the faunal assemblage will also be used to assess what are to some extent competing explanations for the Philistine material culture phenomenon. In other words, are ethnic migrations or Mediterranean area economic transformations primarily responsible for the dissolution of empires and subsequent formation of territorial states between ca. 1300 and 1000 BC? Finally, the development of increasingly complex and bureaucratic empires will be traced diachronically, by examining the faunal data from Tel Miqne-Ekron as a reflection of regional agricultural economic policies.

One of the questions outlined above is that of ethnicity. The material manifestations of Philistine ethnicity have been one of the cornerstones of archaeological investigation of their cities. That problem, as detailed later, has important implications for both the humanistic/Bible historicity research paradigm which archaeology in Israel generally operates under, as well as broader importance for anthropological archaeology and its social science paradigm – a case study of group identity visibility in the archaeological record. While there have been countless attempts to correlate historically-known ethnic groups with various observed artifact patterns, only rarely has it been tried with the archaeological remnants of ancient foodways – in this case, animal bones.

Questions about the visibility and meaning of ethnic expression, or the lack of it, in the archaeological record are for the most part relevant only to Late Bronze Age - Iron Age I transition, the Iron Age I itself, and the Iron Age I - Iron Age II transition period. The Late Bronze - Iron Age I period marks the immigration of the Philistines to the Levant, while the Iron Age I represents the zenith of Philistine power and (perhaps) unique cultural expression. Finally, during the Iron II, it seems they lost some of their power and glory, and, along with it, may have undergone acculturation. During this period their material culture more closely resembled that of their Semitic neighbors. After this time, the Philistines disappeared entirely from the historical and archaeological records (T. Dothan and M. Dothan 1992; Gitin 1995; Stone 1995). Just before the Philistines settled at Ekron, the city had been only a small Canaanite town. The Philistines turned it into a comparatively sprawling metropolis, although it later suffered a decline and the settlement contracted to its former small size. During the latter part of the Iron Age II period, Ekron was subservient to a sequence of neighboring states and powerful empires, including the Neo-Assyrian juggernaut which assumed control over Philistia in the mid-eighth century BC. Nevertheless, or more likely, because of that, the city flourished as an important industrial center under the pan-Mediterranean 'business-as-usual' atmosphere created by the *pax Assyriaca* (T. Dothan 1995; Gitin 1995).

What was the impact of urbanization and economic expansion on the pastoral economy of the city? Such processes may have impacted the way in which meat was distributed to city residents by bureaucratic institutions (Zeder 1988) and may have caused an economic shift from an emphasis on meat to encouraging production of secondary products, especially wool (Gitin 1995). At the same time tribute and taxes were levied on Ekron by the rising powers of other West Asian states, later economic reforms inspired or instituted by the Neo-Assyrian empire breathed new life into a city in decline. The effects of such imperial demands on the city's animal economy have been demonstrated at other Philistine sites (Wapnish 1993, 1996) and may be visible in the faunal assemblage from Tel Miqne-Ekron as well.

After the Iron Age I, Ekron and its fellow cities of Philistia were to varying degrees incorporated into larger territorial states, either as an independent state subservient to the political and economic goals of more powerful neighboring ones, or as a formal vassal province of large empires (Ehrlich 1996:34, 56). This change in political status likely affected the economy of Ekron. Philistia and its cities, as one part of relatively large territorial states, would have been incorporated into systems of trade and tribute involving potentially distant markets and strongly centralized redistributive economic institutions. The fine points of Philistia's, and especially Ekron's, historical and political situation during the Iron Age II have been analyzed and discussed in great detail elsewhere (e.g., Ehrlich 1996; Tadmor 1966), and will not be reiterated here. Historical texts – the Old Testament and Neo-Assyrian records – discuss the Philistines' interactions with neighboring groups during this period and therefore have provided Biblical historians and Assyriologists with significant amounts of textual material to work with.

What has been generally lacking in discussions of Philistia's political economy during the period of *circa* 1000-600 BC, as well as in discussions of most Near Eastern state societies after the end of the second millenium BC, is an anthropological, explanatory approach. Perhaps the most appropriate paradigm with which to address and understand the economic changes, which Philistia underwent in this period, is World-Systems Theory. This concept was first developed by Wallerstein (1974) to explain the origins of Europe's economic systems during the Renaissance, and has since been applied widely in archaeological analyses of complex states in both the Old World (e.g., Edens 1994) and the New World (e.g., D'Altroy 1992).

In the pages which follow, two broad themes – ethnicity and World-Systems theory – will be explored in terms of how the faunal data fit these explanatory paradigms. These two bodies of theory are not often used in conjunction with one another, but instead sometimes form competing explanations for the same phenomenon: either an ethnic migration or an economic transformation is posited to explain observed changes in the archaeological record (e.g., Bauer 1998). There is no part of World-Systems analysis which formally encompasses the delineation of archaeological ethnic groups, but neither does it exclude such studies. Proponents of World-Systems Theory have perhaps avoided ethnic arguments due to the emphasis in their research on economic relationships between centers and peripheries, where the focus is placed on relations between states (e.g., Rowlands 1987), rather than relations within them.

The traditional emphasis in Near Eastern archaeology has been one of correlating the historic record with the archaeological record. Because of this textual orientation, Near Eastern archaeologists have sought the geographic origins of various ancient populations (Kamp and Yoffee 1980:85-86, 97). Snodgrass (1991:63-65), writing from the perspective of Classical archaeology and the *Annales* school of history, has pointed to the failure of prehistory in its former attempts to discover the boundaries of archaeological cultures. Prehistorians, as well as archaeologists working in the proto-historic periods (e.g., the Bronze and Early Iron Ages of the Near East), have been mimicking the "tribes, states and empires of the historian" (Snodgrass 1991:64). There is good reason to be cautious when proposing ethnic explanations for proto-historic archaeological patterning, but both Classical archaeologists like Snodgrass (1991:65) and anthropologically-trained archaeologists like Anthony (1990) suggest model testing and refinement rather than giving up entirely on the study of ancient ethnicity.

Regardless of the fit between the two bodies of theory it is crucial to address the faunal assemblage patterning in light of ethnic argumentation. This has been the dominant argument to date for explaining the appearance of early Philistine material culture (e.g. T. Dothan 1982), a trend which has even extended to discussions of faunal remains (e.g., Stager 1995). The two paradigms may not directly mesh, but neither are they incompatible orientations. Political and economic changes of the type caused by the expansion and contraction of ancient empires inevitably affected the prominence and placement of ethnic groups across the affected areas. As Kamp and Yoffee (1980:98) observed with respect to the collapse of the Ur III state at the hands of what they perceived to be a foreign invasion, there are "political implications of ethnic behavior....". Ethnic groups in history have been credited for polity expansions as well as collapse, such that discussions of archaeological ethnicity within states are not entirely separable from analyses of economic and political relationships between states.

Summary

This study proceeds by taking advantage of the huge corpus of bones excavated from portions of Tel Miqne-Ekron, drawing interpretations and conclusions based on observed patterning. Three historically distinct periods were uncovered in the excavations, including the early one (Late Bronze Age) which included the period before Philistine settlement, and the era of Philistine settlement and regional superiority (Iron Age I). The excavations also encompass the period from the tenth through seventh centuries BC (Iron Age II), when the Philistines lost their military edge as they became enmeshed in games of regional politics with new and stronger players. The city of Ekron appears to have had a different character to it during each of these periods, which leads to different zooarchaeological research questions. These disparate questions are bridged using a diachronic perspective on agricultural economic developments over the millennium of time which encapsulates the earliest and latest excavated deposits.

Chapter 2: Theoretical Approaches

Ethnicity, Animal Bones, and Near Eastern Archaeology

The 1960's paradigm shifts in anthropological archaeology's theoretical emphases caused animal bone studies, as well as other ecologically-oriented subdisciplines, to move to the forefront of archaeological research in American archaeology (Thomas 1996:1; Willey and Sabloff 1980:190). This ecological approach actually had its start with Braidwood's pioneering work at Jarmo (Trigger 1989:280), and that influence continued in the region, at least with prehistoric and very early Historic sites in the region. Following the goals of that project, the majority of zooarchaeological research in the late prehistoric and early Historic periods in the Near East concentrated on two subjects: (1) domestication and (2) the relationship between herding economies and state formation processes. Yet those questions are largely irrelevant in later times; by 2,000 BC dogs, sheep, goats, pigs, cattle, horses, and a variety of birds had all been domesticated (Clutton-Brock 1989) and state-level civilizations had existed for more than a millennium. Perhaps the lack of such obviously relevant research questions to address was the reason that archaeologists working on later sites (from the Middle Bronze Age to more recent times) only slowly and belatedly recognized the importance of zooarchaeology in adding to the reconstruction of ancient lifeways (Firmage 1992:1117).

Zooarchaeologists as well were slow to respond to the different research questions relevant to the later periods. They were accustomed to formulating strictly ecological and anatomical models explaining the 'why' and 'how' of domestication as well as rigid economic theories linking domestic animal economies to state formation. Since these research orientations were not of immediate interest to archaeologists dealing with the Mediterranean world economy of the later Bronze and Iron ages, animal bones were considered largely irrelevant, one of the reasons, perhaps, that they were not systematically saved. In more recent years it seems that zooarchaeologists have recognized the need to formulate more 'social-historical' questions in order to make their research more relevant and in that way encourage excavators to save excavated bones (MacDonald 1991). Zooarchaeological topics relevant to the Historic periods might discuss city economic orientations: the degree to which the state regulated husbandry and meat distribution (Zeder 1988), as well as how animals and animal products fitted into the large, transregional, trading networks which characterized much of the ancient Near East at least from the third millennium on. The role of hunting in urban life or how animals and animal sacrifices fitted into ancient religion also form valuable research topics (Crabtree 1990a). Finally, there is the topic of ethnicity, whether patterns of meat preference/avoidance can be linked to a group's origins or 'ethnicity' (Crabtree 1990b), a subject particularly relevant to ancient Palestine.

Ethnicity has been explicitly used to explain the patterning of faunal assemblages from sites excavated in modern Israel (e.g., Hesse and Wapnish 1997, 1998). Ethnicity and zooarchaeology have become perhaps inextricably linked. Historical and archaeological interest in animal bones comes principally from the implications for the faunal record which the Biblical dietary laws spell out, most notably ritualized slaughter, sacrifice, and the prohibition of various animals, including (but not limited to) pigs (e.g., Douglas 1996). To understand the place of zooarchaeology in studies of ethnicity, it is necessary to engage in a brief review of how the concept of group identity expressed in material culture has been employed in archaeology, both recently and in the past.

In general, studies of cultural identity in archaeological research have been undergoing something of a renaissance in recent years. Formerly pervasive in nearly all archaeological discussions covering subjects from artifact typologies to explanations for culture change, that emphasis fell out of favor for a time with the critique of the culture-history paradigm led by Binford over thirty years ago. Binford (1962:218-220) advocated an approach to archaeology that viewed formal variation in artifacts as the result of environmental adaptation, rather than a historical explanation for material culture change grounded in theories of innovation, diffusion, and migration. At the same time he discounted the study of cultural origins, Binford proposed a functional approach to ethnicity, containing an active quality that "...provide[s] a symbolically diverse yet pervasive artifactual environment promoting group solidarity and serving as a basis for group awareness and identity" (1962:220). This active view of ethnicity's role in culture was taken up more recently by Wobst (1977), who strongly influenced the current generation of archaeologists interested in ethnicity. In that paper, Wobst (1977) delineated an approach to stylistic behavior that sanctioned the view, echoing Binford's earlier work, that material culture actively conveys social information like a sense of group belonging.

The main trouble with Binford's (1962) approach to style was its methodology for isolating such attributes in material culture. The proposal he advanced for determining which formal attributes were stylistic was one that Conkey (1990:10) has termed 'residual'. For Binford, only those "...formal qualities...not directly explicable in terms of the nature of raw materials, technology of production, or variability in the...technological and social sub-systems of the total cultural system" could be, almost by default, considered stylistic (Binford 1962:220). Challenges to that view have been frequent over the years since that article was published, first from Wobst (1977), even though he defined style as 'formal variation', basically retaining Binford's approach (Conkey 1990:10). Sackett's (1982, 1990) conception of style, and where it lies, differs radically from Binford's: he argues that stylistic behavior is inherent in all attributes, as everything is made or modified in an ethnic context.

Beyond merely trying to identify the 'locus' of style and how such information conveys group identity information, other researchers have tried to derive an approach to ethnicity that examines the conditions under which it arises, persists, changes, and diminishes. As the latter concerns illustrate, archaeologists have increasingly drawn away from older notions of ethnic groups categorized as distinct and integrated social units with hard, clear boundaries (Stevenson 1989:272). Wolf (1982:6) has likened that approach to "a global pool hall in which [cultures] spin off each other like so many hard and round billiard balls." In place of the 'pool table' model archaeologists now more often espouse definitions of ethnicity that recognize it as a cognitive concept that is fluid rather than solid. For instance, McGuire (1982:160) believes that groups form along ethnic lines due to competition and ethnocentrism, whereas the "differential distribution of power determines the nature of the relationship." So in this widely cited definition there is clearly a concern with origin and process, as well as a recognition that ethnic boundaries can change over time, depending on factors like power distribution and competition. Small (1997:272) offers a broadly similar definition of group identity:

1. Ethnicity is a relationally born definition, coming from a primordial we/they distinction.
2. Ethnicity has two identifying faces: how groups define themselves and how others define them.
3. Many of the definitional labels used in ethnic marking are descent-conscious, indicating an identity that was inherited.
4. Unlike totemism, which refers to identity born from symmetrical relations between groups, ethnicity is the historical product of asymmetrical relations, opening up investigation to issues of resource competition, and social evolution from simple to complex societies.

With these newer 'ethnicity as social process' definitions as well as explicit theoretical and methodological approaches to the elucidation of stylistic attributes from formal variation, the archaeology of ethnicity was resurrected in a manner acceptable to both processually-oriented researchers, and those laboring in the so-called "post-processual enlightenment" milieu (Stevenson 1989:273). Of late, even formerly much-maligned studies of prehistoric migrations have been getting a boost in the world of anthropological archaeology. Some archaeologists have proposed a revival of migration studies, arguing that in culture-historical archaeology the 'wrong questions' concerning migration were asked. The problem with the traditional approach to migration was that it lacked an understanding of the structure of migrations and the conditions under which it occured (Anthony 1990:897-899). That failing led "systems-oriented archaeologists, in rejecting migration, [to throw] the baby out with the bathwater" (Anthony 1990:895, abstract). He instead outlines a model for understanding different types of migration and antecedent conditions (Anthony 1990:899-905).

The paradigm of Near Eastern archaeology is one where questions concerning ethnicity and migration assume a primary place, given the availability of texts discussing the distinct habits of so many nations. Interestingly, archaeologists in this region, up until the last few years, were able to totally ignore the debate over the material correlates of group identity that had raged in Anglo-American anthropological archaeology probably since the publication of Binford's (1962) article challenging the status quo ‘normative’ approach to the subject. In fact the ethnicity/migration archaeological research paradigm, even since anthropological archaeology scholarship in that field has gained notice among archaeologists working in the Near East, has never undergone the same sharp critique, subsequent abandonment, and later resurrection that happened to their western cousins. This is especially true for Biblical archaeology, where unreconstructed migration theories and ‘pots and peoples’ analyses have since its beginning assumed and controlled center stage. This is probably because the very core text, the Hebrew Bible, details the habits and origins of the Israelites and neighboring peoples, encouraging researchers – out of theological interest – to search for the archaeological (‘scientific’) proof of the Bible. It is rather telling that, in the numerous papers written about the Philistines in the last decade, few cite recent theoretical expositions on migration (e.g. Anthony 1990), and that authors seldom consider the conditions favoring and structuring the proposed migration (e.g., T. Dothan and M. Dothan 1992; Stager 1995; Stone 1995). That Biblical Archaeologists had until recently not noticed the self-flagellation occurring in anthropological archaeology is not surprising; it, like its sibling discipline – Classical Archaeology – has remained stubbornly isolated from outside archaeological traditions (Renfrew 1980).

Leaving aside the texts for the moment, the archaeological evidence from the Near East in general and Israel in particular certainly demonstrates that the region was a constant crossroads of traders and armies. Yet much of the earlier research and assumptions about national origins have been called into question by newer researchers influenced by this recent wave of anthropologically-oriented ethnicity studies (Bunimovitz and Yasur-Landau 1996:88-89). Excavation of the Philistine and Israelite cities has in particular focused on the question of whether group identity is recognizable in material remains. For the most part archaeologists working on such sites have relied on pottery studies – the old ‘pots and people’ question – but have not gone much beyond this (Bunimovitz and Yasur-Landau 1996:93). Hesse and Wapnish (1997) extensively reviewed concepts of ethnicity in Biblical archaeology, and labeled the concept of group identity in this field ‘primordial’, in that it assumes, *a priori*, that distinct ethnic groups with sharp boundaries always existed and maintained identities distinct from all neighboring peoples. In fact, most of this field has completely ignored the last three decades of ethnicity research in the social sciences, which criticizes such conceptions and instead offers much more flowing, 'dynamic' models of identity-signaling group formation and boundary maintenance (Stevenson 1989).

Theologians, historians, and Near Eastern archaeologists long ago cobbled together the idea that the Philistines were Early Iron Age immigrant-refugees to the Levant, no doubt coming from the Aegean as a result of Late Bronze Age disturbances there (Dothan 1989:3, 1997:100-104; Stager 1995). The concept of Philistine group identity which emerged from this research was originally, and remains today, a static one, defining the Philistines according to material culture correlates between Philistine cities and the Aegean world, whose advocates constantly search for clear evidence of migration. In this way every similarity between Aegean and Philistine artifact assemblage, mainly pottery and architecture, and every difference between these and assemblages from sites outside the theorized boundaries of Philistia, forms another brick in the rigid boundary wall of Philistine versus Israelite and Canaanite culture.

Despite the prevailingly simple approach to ethnicity used by many archaeologists in the region, others interested in the Philistine origins question have attempted more complex formulations of Philistine culture and concomitant settlement patterns. Bunimovitz and Yasser-Landau (1996), and Finkelstein (1996, 1997) have used settlement data and pottery assemblages to show that there is in fact something distinct in the material culture from those sites labeled Philistine. By incorporating current anthropological concepts of fluid ethnicity, those authors make significant headway in modernizing archaeological studies of ethnicity in the region. These authors, especially the article by Bunimovitz and Yasser-Landau, proposed historical situations where group identity would be at a temporary state of high differentiation, a sort of red flag, and be recognizable in combinations of disparate types of artifact assemblages (1996:89-91, 96).

One such historical case studied from this perspective is the Hyksos, apparently a group of Semitic people (based on linguistic analyses of personal names) who invaded and conquered Egypt during the Middle Bronze Age. The Hyksos ruled over Egypt for about a century before native Egyptians rose up, defeated the foreigners, and expelled them from the country (Redmount 1995:63-64). A careful study of the pottery corpus from a Hyksos site in the Eastern Nile Delta led Redmount to conclude that the point in time at which they settled the delta was far enough removed from the time of the migration for their ethnic markers to have changed. Affinities between Hyksos pottery and the ceramics of Syria-Palestine were identified, but exact correlates in either ware or form were not. This hypothesized shift in pottery styles was perhaps in reaction to changes in "intra-group perceptions or definitions of that ethnicity, as the Hyksos adapted to life in the Egyptian Delta" acculturating (but not assimilating) to Egyptian civilization (Redmount 1995:77-82).

At the same time some archaeologists, like Redmount, have adopted a more anthropological approach to ethnicity while still using the traditional medium, pottery, there is also a recognizable trend among other authors to back away somewhat from the all-encompassing role that ceramics have taken on over the years. Pottery has long reigned as the workhorse of prehistory, to the detriment of other artifact studies. Arguments about chronology, trade, migration, ethnicity, gender, technology, kinship, and cultural evolution have all relied on aspects of ceramic studies. Yet as Kamp and Yoffee (1980) point out, anthropological definitions of ethnicity, like Barth's (1969) classic 'interactional' formulation, do not specify any particular trait, or list of traits, that are more reflective of ethnic identity than others. Thus, there is no reason to single out ceramics, as Dever (1994:30) does, as being especially sensitive to group expressions of identity. The traditional approach to Philistine ethnicity falls into the 'trait-list' trap (e.g. Dothan 1989), ignoring Kamp and Yoffee's argument that "...all trait-list approaches entail prior assumptions by the analyst about the behavior of an ethnic group..." (1980:88). Gitin reiterates the trait-list argument for defining Philistine culture, though he at the same time points out the limits of the approach for the Iron II Period, when their 'culture markers' based on Iron Age I material, "all but disappeared" (1998:163). Despite the fact that the distinct material culture later assimilated, the group retained a distinct identity since contemporary texts still speak of the Philistines and Philistine lands (Gitin 1999). Only very recently have archaeologists in this region and elsewhere recognized that artifacts besides pottery might have something to contribute to ethnicity studies. Rather than rely solely on a 'pots and people' argument, both Finkelstein (1997) and Bunimovitz and Yasser-Landau (1996) are willing to incorporate other types of archaeological data, especially faunal remains and utilitarian types of ceramic vessels.

Archaeologists, anthropologists, and theologians interested in the delineation of ancient ethnic groups in the Iron Age Near East inevitably have been drawn to distinctions based on the dietary laws of Leviticus and Deuteronomy. The relevance of the laws stem from the fact that, while the Israelites were forbidden from eating certain animals and combinations of animal products, neighboring peoples such as the Philistines were presumably not subject to such restrictions. A number of authors have speculated on the reasoning behind the dietary laws, especially the prohibition against raising pigs and eating their meat. Harris (1985) took an ecological perspective on the subject, and argued that pigs were physiologically ill-suited for raising in desert climates. Zeder (1996), in her study of the role of pigs at Tel Halif in southern Israel effectively disproved the latter hypothesis. It seems that Near East-adapted pigs get along well in high temperatures so long as there is shade and wallow (Zeder 1996:301). On the other hand, both Douglas (1997) and Soler (1997) offer structuralist explanations for both the need for the laws, and the patterning within them.

Turning to a discussion of the textual rather than archaeological evidence, some authors have examined the pig prohibition in context, that is, with reference to the other dietary laws set forth in the Hebrew Bible. Douglas (1997:45-46, 51) has pointed out the tendency in the Biblical dietary laws to in general forbid those animals which somehow cross perceived boundaries within the animal kingdom, or those food combinations, as in the mixing of milk and meat, which defile because they traverse the separation between a mother and its young. Pigs do not qualify as animals permissible to eat because they have cloven hooves yet do not chew their cud. Further, as Soler (1997:60) points out, pigs are not strictly herbivores; they sometimes eat meat. Animals which eat meat or carrion were forbidden to the Israelites, apparently because such animals violated other parts of the Mosaic code: only herbivorous animals were part of the Creation (Gen. 1:29-30; Soler 1997:60). In addition, animals which eat meat violate the principle that meat must be drained of blood before it is eaten; carnivorous animals presumably are unclean because they have eaten meat with the blood together (Douglas 1997:51).

Whatever the exact reasoning behind the pig and other dietary prohibitions, it is of course tempting to test this against the archaeological record. Is there spatial patterning in faunal remains which helps to delineate the boundaries of the neighboring state societies that inhabited portions of the Levant during the Iron Ages? Several authors (Finkelstein 1997; Hesse 1990; Hesse and Wapnish 1997) have studied the issue but interpret the archaeological record somewhat differently. Finkelstein asserts that an abundance versus a scarcity of pig bones at Iron Age I sites in the Southern Levant is evidence enough for ethnic determination: the pattern seems to be that, within the Philistine-controlled southern coastal plain, pig bones are relatively abundant. On the other hand, in the central hill country to the east which formed the heartland of the Israelite territory, pig bones are rather scarce. Hesse (1990:215-218) reports similar results, finding no evidence of extensive swine-raising in the Iron Age I hill country, and the opposite on the coastal plain. Furthermore, the latter study noted that pigs only appeared in significant numbers at the beginning of the Iron Age, a sudden increase from their near absence in the Late Bronze Age. Thus the increase in pigs coincides with the supposed arrival of the Philistines in Canaan.

Hesse and Wapnish (1997) are more cautious in their interpretation of Iron Age I pig bone data. They delineate a number of 'pig principles' which govern whether or not a given community decides to raise swine. These principles include the geographic locale of the community, whether it is urban or rural, a cultic versus a domestic context, new settlements versus established ones, and so on. All of these factors, or combinations of them, can affect what animals are raised. The rationale for pig avoidance or the lack thereof need not be a religious prohibition against, nor an ethnic disposition towards the animals. Finkelstein therefore presents a much-simplified conclusion to explain the data at hand, making the claim that "pig taboos...are emerging as the main, if not only, avenue that can shed light on ethnic boundaries in the Iron I" (Finkelstein 1997:230).

These attempts fall into a sort of trap, perceiving the faunal data as a scientific and therefore stronger line of argument than the evidence provided by more traditional carriers of ethnic identity like ceramics. This approach is a sort of 'pigs and people' delineation of Philistine or Israelite ethnicity. Instead of fine ceramic wares being used to trace the boundaries and arrival date of these two groups, the abundance or scarcity of pig bones on the appropriate sites forms the central argument. Pig bones then become 'index fossils' (Hesse and Wapnish 1997) of ethnicity, in much the same way the distribution of various pottery styles equals the settlement expanses of ancient tribes in culture-historical archaeological studies (Willey and Sabloff 1980).

As a number of authors from various fields have noted, foodways in general are a conservative facet of culture and are probably among the last components of group identity to change because of assimilation pressures. Given this principle, one might ask whether there are in fact culinary practices native to the Aegean (assuming that this was the Philistine homeland) – for instance, this seeming emphasis on pork consumption – that could be traced back as antecedents to dietary patterning identified at Philistine sites in Israel. The idea, common among archaeologists working with Philistine materials, that pork consumption is in fact an Aegean dietary hallmark, seems to stem from a rather offhand remark by Hesse (1990), who remarked that "if the Philistines migrated from lands surrounding the Aegean as many theorize, then their pig husbandry *may* have roots in what had been successful adaptations to their old homeland" [emphasis mine]. This seems to be a speculation, rather than a hypothesis, based on pig percentages observed at sites in Israel, since no comparison was done with Aegean sites. Hesse's apparently offhand remark has since taken on a life of its own, so often has it been referred to by Philistine/Israelite ethnicity sleuths: Dothan (1997:100) and T. Dothan and M. Dothan (1992:248) credit Hesse as their source when they state that "the Philistines brought culinary changes with them, introducing pork and beef in place of goat meat and mutton." Stager (1995:344) says unequivocally that "Mycenaeans and later Greeks had a positive attitude towards swine and a preference for pork...the Philistines brought that preference with them to Canaan...." Finkelstein (1997:230) also promotes the idea that the Philistines had a dietary preference for pork, brought from their homeland as part of an ethnically distinct husbandry tradition.

The former discussion of pigs in the Aegean begs the question of their popularity and distribution on Bronze and Iron Age sites in Israel. Hesse (1990) published an extensive survey of pig percentages from sites there, and since that time other archaeologists have cited that work as proof that Philistines liked pigs and Israelites didn't. This ancient swine survey did in fact find an intriguing pattern: in the region where the Israelites were supposed to have settled there was very low consumption of pigs. By contrast, in the area where the Philistines settled, pig consumption was generally higher (Hesse 1990:211-216). Playing somewhat with the numbers Hesse presented, it seems that in fact the average contribution of pigs to the Philistine diet was a mere six percent, with a low of zero and a high of 18 percent. On the other hand, the pig sample from Israelite sites averaged about three percent, having a percentile range from zero to 13.

What is necessary to address the issue of ethnicity and diet is, first of all, a much larger animal bone sample from a Philistine site – which Tel Miqne-Ekron provides – and secondly a broader scope than the direct pig-Philistine-Aegean line that has been explored until now. It is apparent that attempts to define Philistine ethnicity from a dietary perspective have been very narrow – the pig consumption problem has been the sole approach thus far – and simplistic (Hesse and Wapnish 1997). The diet and ethnicity research with respect to the Philistine identity problem seems to have been approached, in a sense, by trying to reconstruct an image from its negative. The entire pig problem is not, *per se*, one of direct relevance to the character of the Philistine nation, but rather one of central importance to their neighbors and bitter rivals, the Israelites. The Israelites in part defined themselves through the dietary taboos detailed in Leviticus. Attempts to link the Philistines to an Aegean homeland where pig consumption was at least *de regueur,* if not a mandated part of cult practice, are tenuous assertions at best.

By researching pig consumption among the Philistines, archaeologists have in a sense been forming a possible outline of who they were *not*, rather than who they *were.* In fact, to scrutinize pig percentages from Philistine sites and use these to help argue for a link between them and an Aegean homeland, is to turn the argument on its head. The Aegean was not particularly pork-loving, but rather the Near East was peculiarly pork-hating. Hesse (1997) has pointed out that linking the Israelites to an archaeological correlate of pig avoidance does not shed much light on ancient ethnicity: vast regions of the Iron Age Near Eastern world avoided that animal, probably for a variety of reasons. Likewise, linking the Philistines to a particular homeland by their supposed love of pork potentially connects them to a huge geographic range of pig-eating lands: pork consumption was certainly common over a large expanse of territory to the west including all of Europe.

Instead of focusing solely on pigs in the Iron Age I, I wish to take a broader view and consider the bone assemblage as a whole. We now know that the Philistines were not an ethnic phenomenon for only the duration of the Iron Age I's two centuries. Rather the Philistines, despite increased evidence of foreign influence in their material culture, retained a distinct cultural and political identity until the Babylonian destruction and deportations some 400 years later (Gitin 1999:274-276); Stone 1995). Therefore it is important that the Philistine diet, as represented by the Tel Miqne-Ekron faunal assemblage, be examined diachronically, over the entire 1000 years of city history exposed by excavations. Fluctuations over time in the diet must be reconciled with the pork consumption/Philistine identity hypothesis.

What other information can we get from piles of broken bones that might shed light on a distinctive, perhaps ethnic, Philistine foodway? The overall dietary spectrum has to be analyzed: what species were consumed in what ratios? At what age were animals slaughtered and what does this indicate about the 'orientation of animal production' (Wapnish and Hesse 1988)? There may well be an unusually high amount of pig remains in the assemblage, possibly but not necessarily related to an older Aegean practice. But to consider relative abundance of pig bones *the* sole factor in a study of ethnicity would greatly simplify what is in fact a rather complex dietary phenomenon. Pigs may be avoided or favored due to a number of reasons unrelated to ethnic preferences, possibilities that have been discussed and debated in great detail elsewhere. Among these reasons are water availability, pig fecundity, and the ease with which they can be raised on urban houselots – sans state bureaucratic control (e.g., Crabtree 1989; Diener and Robkin 1978; Hesse and Wapnish 1997; Magness-Gardiner and Falconer 1994; Redding 1991; Zeder 1996).

It is clear from Hesse's (1986) preliminary study of the Ekron faunal assemblage that the popularity of pork there fluctuated greatly over time. Pig bones were common only in that part of the assemblage excavated from Iron Age I levels. In other words, pig husbandry was economically important to the Philistines for a period of about two hundred years. Both before and after this period however, it seems that swine were relatively scarce. During the Late Bronze Age, pigs accounted for only eight percent of the identified bones, but more than doubled in proportion during the succeeding Iron Age I, to 18 percent. Yet, this pig focus was not to last: during the Iron Age II, pig consumption again declined to approximately what had been a few centuries before, to ten percent (Hesse 1986:23).

Still, Hesse's (1986) article on this animal bone assemblage was meant only as a preliminary study, and must be tested against, and integrated with, the further study presented here. But what the above sentences are meant to demonstrate, in a preliminary way, is that simply concluding that the Philistines, for reasons of ethnic identity, favored pork consumption while the neighboring Israelites did not, does not address the issue in a useful way. Even the latter hypotheses fail to solve the problem of why the Philistines in later times ceased to raise and consume swine as they had in the period of 1200-1000 B.C., given that the Iron Age II city eventually grew into an even larger metropolis than it had been previously. The issue of Philistine diet and pig consumption must be considered with reference to all other species found, making use of not only percentage fluctuations, but also mortality profiles, metric evidence, and how all of these patterns varied over time and in relation to the political and social *milieu* of each of the three occupational periods.

Toward a 'Style' of Butchery

An additional avenue of inquiry to be explored here is butchery patterning: Is it possible that, just as different cultural groups often have distinctive corpuses of ceramic forms, they butchered their animals in distinctive ways to suit their cooking styles? Perhaps carcass division was related to pottery vessel shapes and sizes – animals chopped up to fit common cooking pots (Bunn *et al* 1988:448), in turn a function of cuisine and meal concepts. Over the past ten to fifteen years there has been a great deal of interest among zooarchaeologists in butchery patterning. Nearly all of that literature, however, deals with butchery from hunter-gatherer (or pastoralist) and/or taphonomic perspectives. On the one hand, there have been many ethnoarchaeological studies of traditional pastoralist and hunter-gatherer societies, analyses of carcass dismemberment, food-sharing, bone breakage, and food refuse discard to build analogical models for interpreting patterning observed at Paleolithic Period sites (e.g., Binford 1978). On the other hand other studies have tried to solve the same palimpsest through experimental work, trying to distinguish butchering marks and breakage made by stone tools versus tooth marks and other damage caused by carnivorous mammals, raptors, trampling, and weathering (Lyman 1987). In other words, there have been few detailed studies of butchery patterning from bone assemblages excavated at villages and cities of sedentary agriculturalists. This is especially true of the Middle East, though the generally good preservation of the frequently large faunal assemblages lends itself well to such investigations.

Some zooarchaeologists working on Near Eastern sites have linked butchering marks and their patterning with various cultural processes, though none have taken a cuisine-oriented approach and linked such observations to culturally particular meat cut preferences. Zeder (1988) attempted to link carcass part distribution and general placement of butchering marks with the development of specialized animal economies and highly organized political authority in Bronze Age Iran. This pioneering study did show the potential of butchery analysis, though cut mark recording and butchering sequences do not seem to have been as detailed as that proposed above. Nevertheless the study did demonstrate residents' differential access to carcass parts, apparently according to status, as well as having given some insight into building function and bureaucratic involvement in meat distribution. Luff (1994), working with animal bones from Tel el-Amarna in Egypt, did look at butchery scar patterning and concluded that different species of domestic animals were butchered distinct ways, and ultimately decided that villagers probably butchered sheep, goats, and pigs themselves, but relied on professional butchers for cattle. The latter study did not address butchery scar locations as imprints from culturally proscribed formulas for producing meat cuts, but rather assumed much of it to be 'noise,' the result of sloppy butchers, the idea being that skillful butchers would leave few or no scars on the bones. Yet Klenck's (1995) study of Bedouin animal sacrifices demonstrates that even in ritual situations, presumably where great care would be taken in meat handling, lamb carcasses were divided by chopping through bones rather than carefully severing the soft tissues holding joints together. One study from Iron Age [Geometric] Crete (Klippel and

Snyder 1991) did at least briefly consider that the characteristic pattering of bone modification – namely the high proportion of bones showing spiral fractures – was the result of the peoples' dietary preference (or perhaps nutritional need) for fat-rich marrow.

Patterns of carcass division, implied by placement and orientation of butchering marks, are ultimately reflections of cuisine; meat cuts are produced at least partly according to both pot shapes and sizes used to cook it in (Otto 1977). Ultimately the question is whether butchering patterns can be discussed as an issue of 'style' in much the same way as ceramics (e.g. Plog 1990), lithics (Sackett 1982), and projectile points (Wiessner 1983) have been discussed. The problem of whether butchering patterns can form something archaeologists recognize as style begs the question, just what is style? Some concept of style has been central to archaeology since its beginnings, and especially during the culture history paradigm that characterized pre-1960's American archaeology and, to a large extent, still characterizes Near Eastern archaeology today. In that paradigm, style was most often discussed with respect to, naturally, artifact typologies which defined the space and time limits of normatively-defined culture areas (Binford 1965). Change in artifact styles – usually some sort of pottery attribute or projectile point shape – was viewed in an overarching biological analogy, where they embodied prehistoric cultures – evolving, degenerating, dying out, invading one another, and blending with each other at culture area borders (e.g. Wauchope 1950). Challenges to that conception of style emerged with processual archaeology, most notably Binford (1965:208), who argued that artifact styles are relatable to the "social context of their manufacture and use", implying that stylistic patterning reflects or actively signals certain cultural phenomena like ethnic groups or other social divisions. In fact, the term style in archaeological use generally refers to some type of material culture patterning related to group identity (Conkey 1990:9-11).

Over the last twenty years archaeologists have debated the exact role of material culture style in society, and what types of artifacts and attributes might contain stylistic attributes useful for tracing ancient ethnic groups. The principal positions in the debate are those of Binford, Sackett, and Wiessner. Wiessner (1983:257) offered an approach she labeled 'emblemic style', formal variation in material culture that represents a social group and its norms. Certain types of material culture are more likely than others to be good referents for conveying such information because they are "naturally important to social identity...or [are] efficient in transmitting such a message" (Wiessner 1983:259). Stylistic attributes that are useful for analyzing expressions of identity are those that "transmit a clear message to a defined target population" and that are not related to materials, function, technology – they must be selectively neutral (Wiessner 1983:261). For Sackett's 'isochrestic' variation however, selective neutrality is not a good criterion for choosing attributes to analyze: it is usually impossible to separate function from something that is purely decoration, and in any case a decorative attribute that conveys information of group identity *does* have a "function writ small" (Sackett 1990:34).

Sackett's view is that any attribute on any type of material culture can be a locus of style, the idea being that in the design or modification of any item, there always exist a number of equally viable options for attaining a given end in the manufacturing process. Therefore, not only decoration on items, but the items themselves are "great reservoir[s] of style" since choices must be made in not only decoration, but functional design as well. So in this view function is not something separable, or even conceptually separate, from style (Sackett 1990:33-34). The isohrestic view also differs from the emblemic one in that in the former case style is usually passive. Isochrestic variation's ethnic referent lies in the fact that it was created by a specific group member through a series of design choices, so that most items do not intentionally signal identity. It is not necessary for an item to be intentionally imbued with symbols of identity since people can react to symbolism without "being prodded". Emblemic style seeks only those material culture attributes that actively transmit belonging. The isochrestic model does not deny the existence of active signaling, but rather contends that because all material culture – no matter how 'functional' – contains style, most formal variation will be passive (Sackett 1990:36-37). Wiessner (1990:107) and Sackett have basically come to agree on style and where it resides, although the former makes a good point in noting that whether formal variation is contained in decoration or functional attributes, it should have no bearing on whether style is passive or active; even functional attributes can actively transmit identity.

Binford, however, has been quite critical of Sackett's isochrestic approach. The problems he sees with it is that Sackett does not offer any methodology for how to select attributes of formal variation that likely signify identity groups. Lacking that, one is left with the impression that any attribute patterning is attributable to ethnic identity, as opposed to "activity" – that is to say, function (Sackett 1990:38). Accordingly, all artifact variability combines into an "ethnic-history model of the past", rather close to the normative assumptions of culture-historical archaeology that Binford has made a career of challenging (Binford 1989:54-55). Conkey (1990:10) however points out that such an assumption is not necessarily bad since "if we recognize that style *is* a way doing things... [then] there is a normative component to anyone's concept of style" [emphasis in original]. Sackett (1990:38) answers Binford's critique by declaring it his belief that function as well as style resides in all artifact forms. Rather than contradict each other, they crosscut; either is visible at different levels of resolution, depending on how the assemblage was defined. Wiessner outlines a three-step approach to interpreting formal variation, asking whether "...an attribute bearing style appear[s] to play an active or passive role in communication? Is it more likely to have had a distinct or vague referent? does [sic] it appear to express individual identity, group identity, or both?" This is part of her approach that views style as "a means of non-verbal communication to negotiate identity" (1990:108).

Using the isochrestic approach to style, it is indeed conceivable that butchering marks left on bones may represent formal variation that refers to an ethnic group, in this case, the Philistines. Sackett suggests that the imprints left by tools on other materials could be analyzed as identity-signaling. He goes on to remark that "...a specific butchering technique may well convey as much ethnically significant information as the typology of the tools with which it was carried out" (1990:35). Lyman (1992) presented an interesting study of seal and sea lion butchering techniques as represented by such bones recovered from two sites on the coast of Oregon. Through an analysis of butchering mark frequency and placement, he concluded that there was a consistent butchery pattern. This pattern was largely consistent across species but different across animals of disparate sizes, which Lyman attributed to a functional cause – similar transport histories from kill to camp sites for similarly-sized animals (1992:254-258).

Lyman also points out that "...frequencies of skeletal elements displaying butchery marks, the frequencies of skeletal elements that were in fact butchered, and the frequencies of skeletal elements recovered are all positively correlated," (1992:258-259) indicating that an overarching, consistent method of butchery ties all these things together. As Sackett (1990) pointed out, the same artifact attributes may at once display both functional and stylistic attributes. Thus Lyman's (1992) discussion of a consistent pattern of seal and sea lion butchery could also be interpreted as formal variation in carcass processing, attributable at once to both transport and meat removal logistics as well as perhaps to a specific 'ethnic' way these people had of butchering those animals. Gould and Watson (1982:366) in fact came to such a conclusion when they observed that "[c]learly some kind of normative principle was at work..." among the Western Desert Aborigines in Australia. The Aborigines "...invariably divided macropods...into the same initial nine pieces..." (Gould and Watson 1982:366) regardless of factors that might affect meat apportionment -- how many people were involved in the hunt, were back in camp, etc.

What we may end up with is a sort of style of animal bones, or at least animal butchery. Butchery marks are a sort of negative impression, or mirror image, of culture-specific 'maps' of carcass division. These scars mark the impact of a tool on the bone where it has penetrated the soft tissue at the points where desired carcass sections or pieces of meat were removed. Bones simply get in the way during meat selection and removal – the butchering scars are not conscious symbols of cultural actions, but rather accidental ones. Nevertheless, where carcasses are taken apart in specific, repeated ways, the result will always be a similar series of butchering marks in similar places and orientations on the bones. Still, we have to be careful to differentiate between "mere spatial variation" and "self-conscious identification", the former, according to Shennan (1989:16) is the danger inherent in using Sackett's isochrestic approach, while the latter is what we must seek when we look for ethnicity in material culture. Shennan (1989:16) favors the 'active' approach to style and ethnicity sometimes advocated by Wiessner (1983 and elsewhere). But in the case of the Iron Age in the Southern Levant, there may be reasons to think that people actively used foodways to signal their identity. Unfortunately, the Philistines left almost no historical record of their own – we have to go by what others, the Egyptians, Assyrians, and Israelites had to say about them. The historical sources do not mention the food habits of the Philistines, but of course the Bible does go into detail about the Israelites' dietary laws. The Philistines' neighbors in part based their identity on dietary laws, not only forbidding certain species, but also prescribing a particular method of slaughtering and butchering animals. Therefore it may be that such food-related activities were important for all the peoples of the area in that time – it is at least worth a look.

Butchering patterns identified in this assemblage of bones is, if nothing else, an experimental attempt to go beyond the time-honored, though important, zooarchaeological tradition of examining species abundance (especially pigs). Through the proposed analysis it may be possible to apply the much-debated concept of stylistic analysis to butchering and examine cuisine from a culinary perspective. Were there 'mental templates' particular to the residents of Ekron for cutting apart carcasses of the various species of animals they raised for consumption? Taken together, these information strands – species abundance and butchering patterns – may take us into a more sophisticated analysis of ethnicity than has to date been attempted with animal bones.

Market Activity, Tribute Demands, and the Ancient World-System

The analytical issues discussed above, in this case pig consumption and stylistic research, primarily relate to the study of material expressions of ethnicity during the Iron Age I. By the Iron Age I, a new group of people, apparently with a distinct cultural tradition, had established themselves at the site and, together with allied city-states, created a unique political system which was somehow more than a simple alliance of cities, and yet more loosely organized than a true territorial state. Although data from the Late Bronze Age faunal assemblage is useful as a contrast to the succeeding Iron Age I, the issue of ethnicity is otherwise irrelevant for the period. Ethnicity, while an important area of investigation, by itself overlooks overarching issues of economic and political change. The latter research areas relate well to the Late Bronze Age town at Tel Miqne, since it was somehow incorporated as a dependent in a Canaanite petty kingdom, which may in turn have been under Egypt's at least nominal control.

One of the goals of this study is to apply core and periphery characterizations of ancient polity interactions to Philistia during its entire existence, from its Late Bronze Age existence in the era of Egyptian influence or rule in Canaan, to its time in the Iron Age I as an independent but allied city in a Philistine alliance, until its reduction to vassal status and political pawn during the Iron Age II. The political shifts, briefly outlined above and discussed in detail in the chapters to follow, which involved Ekron undoubtedly affected the city's economy to varying degrees. Their impact can potentially be traced by framing the faunal record into a discussion of economic development and connections using the body of theory known as World-Systems Theory (Wallerstein 1974).

Posing the problem this way, that is, integrating analysis and discussion of Ekron's animal bone assemblage into a broad theory of how empires work, elevates discourse about the Ancient Near East in the first millenium in two ways. First, the World-Systems model provides a framework for discussing not only patterning in faunal remains, but at the same time integrating the analysis with patterning in other forms of material culture (e.g., pottery) more commonly linked to trade and political relationships. Secondly, by linking what are essentially dietary remains to agricultural policies, the level of zooarchaeological discussion and relevance is raised beyond a relatively narrow discussion of foodways. Instead, the discourse on animal bones links the city's livestock system to macro-economic policies of archaic empires. Such an orientation as well places the agricultural economy into the discussion of local and long distance trade patterns, a debate which currently focuses on craft goods and contains little discussion of exchange in staples (Dever 1995:112).

This theme also provides an opportunity to unite all three periods (the Late Bronze Age, Iron Age I, and Iron Age II) into a synthetic discussion of changes, shifts, and cyclical economic patterning over time. Especially for the Iron Age II, but also for the earlier two periods, the question of how political arrangements of the period affected the economy of the city becomes primary. As agriculture no doubt accounted for a large share of peoples' livelihood as well as a significant segment of the city's economy, the degree to which the faunal assemblage reflects these politico-economic situations is certainly worthy of investigation. Ekron, over the millennium of occupation which excavations there revealed, vacillated between being a dependent town or city of a greater kingdom or empire, and an independent city-state sometimes incorporated into a Philistine military alliance.

The appropriate bodies of theory in which to envelop the thousand year time span of the excavations should emphasize economic development and interconnections, as well as offer perspectives on both short-term, local change, and long-term processes as the *Annales* historians have advocated (Braudel 1972; Knapp 1992a:2). World-Systems Theory, originated by historian Immanuel Wallerstein (1974) to explain the origins of modern capitalism as an outgrowth of the pan-Mediterranean Renaissance trading network, has been advocated by a variety of archaeologists as a way of understanding the development of Mediterranean trade and civilization as far back as the Neolithic (Hall 1999:7), though most would settle for the Bronze Age (e.g. Frank 1993). This body of theory has been used by archaeologists to integrate historical texts and artifacts to develop coherent frameworks which go beyond both strictly historical reconstructions and typically unhistorical anthropological theories to create a synthetic understanding of past societies (Knapp 1992a:3; Kohl 1987a:4).

Wallerstein's original formulation of the world-systems theory concept attempted to explain the economic and political changes which began in the late fifteenth/early sixteenth centuries AD (1974:15). The features he was interested in explaining were those having to do with the emergence of an economy that was greater than any one state or empire, and yet acted in a unifying manner such that trade connections enriched the centers but pilloried the peripheries. To Wallerstein, it was the development of this 'world-economy' which laid the foundations for modern capitalism and global trade. Key to his idea was that, though there had been 'world-economies' among the powerful ancient states of the past, they had always transformed themselves into empires. By contrast, the modern world-system was (and is) supranational, such that the economic emphasis shifted from being the actual center of the world-economy, as in empires, to a role where it expended political capital to assure the continuance of trade in general, though all the while seeking to monopolize it (Wallerstein 1974:16-17).

Since the publication of various archaeologists' cooption of Wallerstein's approach, a controversy has emerged between those who regard world-systems theory inapplicable for any period preceding the

Renaissance, as well as those who accept the theory's general applicability, but seek to modify its perceived shortcomings in various ways (e.g., Frank 1999; Kohl 1987a). The most prominent member of the former category is Wallerstein himself, who has consistently objected to archaeological adaptations of his work in several solicited commentaries on prehistoric applications of the theory (e.g. Wallerstein 1993). The crux of Wallerstein's objection to such applications of world-systems theory is that he does believe that capitalism, meaning the development of credit transactions and massive accumulations of wealth gained by the axial division of labor between an exploited periphery which produced the materials consumed by the exploiting core, existed prior to the fifteenth century AD. Wallerstein as well points to an important difference he perceives between long-distance trade in luxury goods, and long-distance exchange in bulk goods, the necessities of life (Wallerstein 1993:294). Indeed, in his original book, Wallerstein repeatedly emphasizes the importance of trade in such goods – as he puts it "staples account for more of men's economic thrusts than luxuries" (1974:42).

Archaeologists too have doubted the ability of ancient bureaucracies and forms of transportation to regularly trade in high bulk/low value staple goods. Adams (1979:397) for instance casts doubt on the abilities of the Assyrians to have done so, claiming that such activities "would have been a heavy drain on the Assyrian military economy...[and though] herds could be driven...except in rare instances of emergency long distance transfers of food staples...[trade in bulk goods was] at all times limited to those for which water transport was practical." Schneider (1977, cited in Hall 1999:3) has criticized world-systems theory on several grounds, among them insisting, in contrast to Wallerstein, that luxury goods are just as important, if not more so, an indicator of economic links as staples. It seems that a combination of factors, including doubts about the existence of ancient trade in staples, critiques of Wallerstein's staple emphasis, as well as the long-standing bias of (especially Mediterranean) archaeology toward what could be termed the few, the pretty, and the valuable (e.g. exotic pottery, metal objects, and figurines) as opposed to the many, the ugly, and the worthless (e.g. animal bones and seeds), have led archaeologists interested in world-systems theory to emphasize trade in luxury goods.

Long-distance exchange of luxury goods has formed the lion's share of the discussion concerning the existence of world-economies (in Wallerstein's terms) or world-systems (in Frank's [1993] terms) before the Renaissance. For instance, Larsen (1987:50-52) lists mostly precious metals and agricultural luxury products (fine oils, spices, and aromatics), though he also admits that utilitarian goods were exchanged. Frankenstein (1979:272), though not explicitly concerned with tracing the origins or outlines of an Iron Age world-system, extolls the Phoenician role in obtaining precious metals and carved ivories for distribution throughout the Neo-Assyrian Empire, and doubts whether Assyria "would have been interested in acquiring Phoenician bulk commodities...which could more easily have been obtained from their own manufacturing centres..." The importance of luxury goods to archaeologists working within an ancient world-systems paradigm is not simply that their explanatory value was perhaps underestimated by Wallerstein. Rather, the evidence of exotic luxury goods having circulated across ancient states and regions is tied to anthropological concerns over how such items were used by ancient elites to foster their political and economic ambitions, through what Baines and Yoffee (1998) have termed maintaining 'order, legitimacy, and wealth'. Essentially, traffic in and control over the production and distribution of luxury goods, hereafter discussed as 'wealth finance' (D'Altroy and Earle 1985), allowed elites of core states to hoard or give out objects of high value and status to their vassals, as a way to forge bonds of loyalty. The vassals of peripheral states needed such luxury objects to maintain their own positions of power over local people, and therefore became dependent on the paramount elite for their own legitimacy. As Mauss (1990:59) put it "the gift is therefore at one and the same time what should be done, what should be received, and yet what is dangerous to take...because the thing that is given forges a bilateral, irrevocable bond..."

Without casting doubt on the importance of luxury goods in creating and maintaining the social and economic links which strung together disparate states and regions, it should also be pointed out that bulk goods were an important part of the ancient Near Eastern world-system as well. Although archaeological evidence of the phenomenon may be harder to trace than spotting exotic imported objects, there is no shortage of textual evidence which confirms, over and above the doubts of Adams (1979) and others, that exchange in staples did exist in the ancient world. Texts from the urban centers of Neo-Assyrian state, Khorsabad and Nineveh, dating to the seventh century BC, as well as tablets from the wealthy Late Bronze Age kingdom of Ugarit on the Syrian coast nearly a millennium earlier detail the receipt and shipment of livestock, grain, and wool from and to distant cities and regions (Linder 1981:36; Postgate 1974:122-123). Clearly, then, ancient trade in bulk goods did exist.

The economy of the ancient Near East was a dual one, comprising the wealth finance which involved high value/low bulk goods given out as tokens of power or in exchange for other high value items, as well as staple finance, involving trade in grain, textiles, and livestock (D'Altroy and Earle 1985; D'Altroy 1992:147). If wealth finance was primarily motivated by political concerns of power and legitimacy, then staple finance in the ancient Near East may have been motivated mainly – though perhaps not wholly – by practical concerns of feeding populations. Mesopotamia, the core of a succession of world-empires from the third millennium on, was both staple and wealth resource-poor. However, the Tigris-Euphrates area had the fortuitous geographic advantage of lying in between the wealth resource rich areas of Anatolia, Iran, and Afghanistan, and the agriculturally rich Levant. This geographical role as middle man was probably one of the factors which both necessitated and enabled those states' cyclical expansions westward (Kohl 1987b:15; Marfoe 1987:25).

Given the amount of archaeological work which makes use of exchange concepts first outlined by Wallerstein, it is clear that many archaeologists reject his view that a modern world-economy originated only in the Renaissance, regarding the division arbitrary (Kohl 1987a:5-7). Aside from that objection, other archaeologists, like Renfrew (1986), have tried to modify world-systems theory to suit their own particular region or time frame, as with the bronze age Aegean being a system of core-core interaction rather than one of core-periphery in the standard Wallersteinian formulation (Frank 1999). Many archaeologists are, however, largely content with the core-periphery interaction sphere, and have used it to explain social and economic change in the late prehistoric southwestern U.S. (McGuire 1989), Early Bronze Age Mesopotamia (Marfoe 1987), as well as (at least implicitly) seventh century Philistia as the periphery of the Neo-Assyrian Empire (Gitin 1997). Whether these ancient economic systems are termed 'world-economies' as is Wallerstein's (1974) preference, or true world-systems as Frank (1993) favors, matters little, so long as emphasis is placed on understanding archaeological data patterning as being the result of specific political and historical cycles involving economic interactions inspired by political and ideological means of domination.

The question then is whether it is possible to trace, through examining patterns of livestock production at Ekron, the extent to which the city was absorbed into the ancient Near Eastern world economy at various times in the city's history. Such evidence could turn up in terms of what species were emphasized – or de-emphasized – within each period, what mortality profiles and metric data suggest about the importance of secondary products, and these patterns changed with the onset of new historical and political conditions in the region. What may emerge is not only some measure of the degree to which staple goods were involved in the economies of the city and the region, thus integrating bones into discussions of trade, but also tying fluctuations in zooarchaeological data to the historical and political conditions of the ancient Near East. Trade in staples is not simply about the periphery of a world-economy supplying low valued edible goods to the core, as food as well as luxury items can have political implications. Mauss observed that connections forged by gifts are bilateral and irrevocable "...above all when it involves food...Thus one must not eat in the home of one's enemy" (1990:59). World-Systems Theory is particularly appropriate for understanding these time periods individually and diachronically, as it can link local economic phenomena to larger political processes, and demonstrate trends in economic incorporation over long periods of time.

Activity Areas and Animal Bones

The different functions of discrete areas in ancient Near Eastern cities is a subject often addressed in archaeology, but very seldom are faunal remains incorporated into such analyses. On a macro scale, Tel Miqne-Ekron has been divided up into 'elite', 'industrial', 'fortification', and 'domestic' zones across the tel based on the types of architecture and general array of finds discovered (Gitin 1997:88). In a very general way, then, we know that the city was made up of areas where certain clusters of similar activities were concentrated, at least in the last century or so of its existence. Still, it would be very desirable to study the phenomenon in more detail, from the level of architectural units or at least based on finds in the respective five-by-five meter excavation squares. Archaeological research on patterning of activities at a detailed scale of study is often labeled 'spatial analysis'. As commonly understood in Anglo-American archaeology, spatial analysis refers to mapping out of activity areas through the use of 'dimensional analysis', plotting artifacts *in situ* in two or three dimensions (Whallon 1973). However, there is no reason why spatial analysis cannot be done on a larger scales of measurement. That is to say, interpreting artifact patterning using the locus as the unit of measurement, as well as taking advantage of architectural remains like buildings and rooms within them (Magness-Gardiner 1996:183).

Spatial analysis of artifacts at the locus and architectural scale has been done on Historic period Near Eastern sites with quite interesting results (e.g. Stager 1985). Limiting the present discussion, for the most part, to the spatial analysis of animal bones on tel sites, two interesting studies come to mind. Magness-Gardiner (1996) studied the differential distribution of different species and butchering units between domestic and temple precincts at a Middle Bronze Age site in Jordan. This patterning, combined with a spatial analysis of cooking, serving, and storage vessels led to interesting conclusions about the activities performed in each of these areas. Of the two classes of artifacts, the faunal remains showed much greater differences in discard and use between the two areas; there existed only minimal differences with the ceramics. Patterning observed in the animal bone sample evidently relates to rules for ritual offerings within the temple itself, as opposed to the variety of activities occurring in the temple courtyard and surrounding domestic area (Magness-Gardiner 1996:190). The most interesting observation of this study is that pig remains were much less prevalent within the temple area than outside in the domestic zone, which suggests that pigs may have been approved for domestic consumption but not ritual offering (Magness-Gardiner 1996:188; Magness-Gardiner and Falconer 1994:144). In another study of animal bone patterning, Zeder (1988) examined the distribution of skeletal elements on a largely architectural scale at Early Bronze Age Tal-E Malyan in Iran. In that analysis she was able to detect differences in the frequency of various bones, which she attributed partly to economic stratification across different areas of the city. Based on skeletal element patterning, she concluded that a large structure excavated was probably a public building whose function was at least partly to redistribute food.

The excavation strategy employed at Tel Miqne did not include dimensional analysis of artifacts *in situ.* Therefore the spatial patterning of animal bones will have to be examined at the locus or architectural unit level. Neither of the above studies had benefit of dimensional scale analysis either, yet intriguing and interpretable results emerged nonetheless. With respect to Ekron, some spatial patterning of ceramics has already been of observed by Gitin (1993), in his analysis of ceramic scoops. These were evidently used for taking out grain from large storage vessels, and their spatial distribution here and at other sites demonstrates that they are correlated with cultic structures: most were discovered within temples. Rather than proclaim the vessels to have had a ritual use, more likely they are related to the well-known secondary function of Near Eastern temples as administrative centers, whose functions included the redistribution of food. Most of the scoops from Ekron come from the Iron II period temple located in Field IV, outside the area being used for this analysis. However, a large building -- part of the Iron Age II fortifications -- excavated in Field I consisted of storage magazines, based on the architecture and types of pottery found (Gitin 1993). It is possible then that, among other things, meat was somehow stored there, a phenomenon known from Mesopotamia (Jones and Snyder 1961:213; Zeder 1988).

Excavations at Tel Miqne-Ekron exposed more limited expanses of Late Bronze Age remains than they did Iron Age II, the latter levels being the easiest to expose since they lay just beneath the plowzone. Nevertheless, Field I investigations did uncover areas which, even though limited in exposure, could be considered separate architectural units or living spaces from the earlier two areas of the ancient city. Late Bronze Age remains from Field I most famously revealed domestic structures, pottery kilns, and a human burial (Killebrew 1998a; Meehl and Goren 1996), but also, in the upper part of the field, uncovered a large storage building, including a jar full of carbonized figs, and others holding lentils (Dothan 1998:150-151). The contrasts between these two architectural units could be quite intriguing; perhaps meat was stored and distributed from the large building, in addition to plant foods. Therefore, there may be a great deal of consistency in the species and elements found there, possibly indicating animal processing or meat storage. The domestic/industrial areas might have produced a much more mixed assemblage, coming from a possible mixture of household garbage as well as butchering waste, if animals were slaughtered and the carcasses initially divided in this outlying industrial area on the slope of the tel.

Exposure of Iron Age I architectural remains in Field I was extensive, especially in the lower part of the field, along the tel's slope. There, several squares reached Early Iron I levels, in strata V-VII, where the architecture was in some places industrial, as pottery kilns and bronze-working installations were discovered, and in other places rather domestic, since installations like fire pits for food preparation were uncovered (Killebrew 1998; Meehl and Goren 1996). This characterization holds true for strata VII and VI, while stratum V was entirely domestic – indicating a change in use of this area, from a mixed industrial/domestic purpose, to a wholly domestic one (Meehl and Goren 1996). The stratum VII and VI architectural remains can be divided, according to the general character of various excavation units, as either industrial or domestic. As with the Late Bronze Age industrial areas, these manufacturing installations might also contain an assemblage containing mostly butchering refuse and commensal animals. At the top of the mound, other excavation squares exposed architecture of this period which was a mixture between houses and associated features, as well as an open area containing a number of hearths. The domestic character of the upper portion of Field I remained so over the entire course of the Iron Age I, strata VII-IV (MacKay and Arbino 1996:2). Field I in the Iron Age I, as with the preceding Late Bronze Age, also offers the opportunity for activity area comparison, as a reflection of domestic versus industrial uses, in differentiation to the preceding period, where storage/redistribution versus industrial activities form the contrast.

In the lower portion of Field I, however, where extensive Iron Age I strata were uncovered, two distinct activity areas were delineated. An industrial area with several pottery kilns was excavated in six squares, while two other excavation units produced remains of domestic structures. Additionally, those portions of Field I Upper which reached Iron Age I levels also defined that architecture as domestic in nature. A comparison between the bones recovered from the industrial area, versus those produced by the domestic quarter may reveal patterning relating to class or other social differences.

The distribution of faunal remains could also yield information about city organization in the Iron II Period, the period with by far the largest horizontal area excavated at Miqne. Two lines of information may emerge from the analysis: The first is, how did the Assyrian-influenced or controlled city bureaucracy distribute the products of livestock herds, most visibly meat, to residents? It has become apparent from other aspects of the Ekron excavations, namely the evidence of large-scale olive oil and textile industries, that under the Assyria hegemony the city's economy expanded exponentially, suggesting a highly organized administrative system. Secondly, it may be possible to detect economic stratification through an examination of the spatial distribution of skeletal elements as they represent (presumably) differently valued cuts of meat.

Economic stratification was endemic to ancient civilizations and is widely thought to be either cause or consequence of state-level societies. The Neo-Assyrian domination of Ekron, through both its expansion of commercial – wealth-based – activity and simply by the very nature of foreign rule (exploiting conquered peoples) must have exaggerated the population's existing material distinctions. It is not at all sure whether such stratification would have affected peoples' access to meat cuts, since the society during this period was still quite agrarian and therefore peoples' access to food much more direct than the recent historic past for which such scenarios have been proposed. Nevertheless, this is an avenue worth investigating, if only to confirm that Iron Age populations did not live under such highly developed market economies as to affect their access to animal products.

Chapter 3: The Tel Miqne-Ekron Excavation Project – Summary of Field Investigations

The Tel Miqne-Ekron excavation and publication project is an ongoing joint venture between Drs. Seymour Gitin of the Albright Institute of Archaeological Research in Jerusalem, and Trude Dothan of the Hebrew University in Jerusalem. The site of Tel Miqne, an artificial mound on the southern coastal plain of Israel along the southern bank of the Nahal[3] Timnah at Kibbutz Revadim, has been known by archaeologists since William F. Albright himself surveyed it in 1924 (T. Dothan and Gitin 1982:150). Albright, however, believed the site to be only ten acres in size and therefore not a likely candidate for a major excavation. It was not until 1957 that a kibbutz member alerted the Israel Antiquities Authority that the site encompassed an additional, lower, forty acres, making it among the largest ancient city sites in Israel (T. Dothan and M. Dothan 1992:235). At that time the site was surveyed and extensive Iron Age fortifications noted, as well as Iron Age artifacts.

It was not until the early 1980's, with the start of the Albright Institute-Hebrew University project, that excavation commenced. The site was eventually chosen as the latest ancient city in Israel to undergo extensive excavation because of its probable identification with the Philistine city, and due to favorable digging conditions there. The mound of Tel Miqne is somewhat unusual compared to other such sites, because the city was never extensively resettled in periods later than the mid-first millenium BC. Surveys of the mound and preliminary excavations soon revealed that, aside from a Roman period villa near the center, an Ottoman period Bedouin cemetery near its northeast corner, an entire city dating to 603 BC and earlier lay relatively undisturbed just beneath some centimeters of modern plowzone. This stratigraphic situation of course gave tremendous advantage to the excavation project; years of work excavating post-Philistine occupation layers could be avoided, and the late Iron Age could be revealed in the first season of work.

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[3] A term used to mean a seasonal stream and its canyon, in Hebrew. This is equivalent to the frequently used Arabic term, 'wadi', used for the same type of creek.

In all, there were thirteen excavation seasons at Tel Miqne, beginning in 1981 and ending in 1996. After excavations at other Philistine sites such as Ashdod, Tel Qasile, and Tel es-Safi, a generally accepted definition of Philistine material culture and historical outline of their place of origin and process of adaptation had been formulated by the time the Tel Miqne excavations began (Finkelstein 1996:225). This project therefore concentrated on the investigation of a very well-preserved site, to find out whether the archaeological record bore out the tel's geographical identification with Ekron, and explore further Philistine material culture. The nature of the Philistines' material culture at the site of Ekron, in its heyday a major city at the Philistine-Israelite border and overlooking ancient highways, was particularly interesting given the site's well preserved strata and its position on a sometimes hostile frontier (Dothan and Gitin 1982:150, 152-153). The site's strategic locale makes it ideal for studying expressions of ethnicity since, as we know from ethnographic situations, people often express their group identities most strongly at border areas (Pyszczyk 1989:244-245).

The many years of excavation and survey of Tel Miqne revealed the site's settlement history. The earliest ceramic material discovered dated to the Chalcolithic (ca. 4300-3300 BC) and Early Bronze Age I-II (ca. 3300-2700 BC). Most of the artifacts dating to the latter periods were found only out of context, incorporated into later fills and mudbricks, and not in stratified deposits (T. Dothan and Gitin 1993:1052). Sherds from these periods, as well as from the subsequent Middle Bronze IIA period (ca. 2000-1800-1750 BC) were discovered in all areas of the mound (chronology from Mazar 1990). The nearly square 50 acre site derives its shape, like many tels in the region, from the massive Middle Bronze Age II fortifications and urban development within them (T. Dothan and Gitin 1993:1051, 1997:30; Mazar 1990:180-182). Middle Bronze Age material was encountered everywhere in the excavations, in the form of earlier material incorporated into later fills and mudbricks. Strata from that period were not excavated due to their position below the water table, as well as the project's orientation toward later periods. Two strata (IX-VIII) dating to the Late Bronze Age (1550-1200 BC) were excavated at Tel Miqne-Ekron. These strata were assigned to the Late Bronze Age IIA-B, the fourteenth-thirteenth centuries BC, making them the earliest stratified deposits excavated.

Tel Miqne in the Late Bronze Age was a much smaller city than its Middle Bronze Age predecessor had been: though the fortified city had covered the entire 50 acre mound during the Middle Bronze Age, by the Late Bronze Age only the 10 acre, now unfortified, acropolis was occupied.. Excavations on the slope of the northeast acropolis, Field I, exposed the three Late Bronze Age strata. In the center of the lower city, in Field IV, excavators probed but did not excavate Middle Bronze Age deposits directly below Early Iron Age buildings, indicating an occupation gap of some 250 years in that area (T. Dothan and Gitin 1993:1052). Tel Miqne's contracted size during the Late Bronze Age fits the pattern of urban decline noted for many contemporary sites in Palestine. Urban decline in this period of Palestine's history is a feature often attributed by archaeologists to the rejuvenated status of Egypt after the Second Intermediate Period, when a new dynasty was able to drive out a group of foreign, perhaps Canaanite, rulers known as the Hyksos. Battles between the Eighteenth Dynasty Pharaohs and the fleeing Hyksos may have taken place in Palestine, disturbing trade patterns and adversely affecting cities. In the Late Bronze Age, the Nineteenth Dynasty Pharaohs reasserted Egypt's influence in their former province of Canaan, and some urban revival appears to have occurred (Mazar 1990:238-240; 279).

The lack of fortifications at Tel Miqne's Late Bronze Age city is also a typical characteristic of Canaanite cities of this period. Most scholars agree that the Nineteenth Dynasty pharaohs forbade their vassal city-states from building enclosure walls (Mazar 1990:243). Alternatively, a general shortage of cheap labor may have forced the Canaanite kings to either repair Middle Bronze Age fortifications, or do without them entirely. There is some evidence that either depleted populations -- implied by the smaller LB cities -- or Egyptian demands for Canaanite corvée laborers resulted in a shortage of labor for such monumental building projects (Bunimovitz 1991:8-9).

Research at Tel Miqne-Ekron has simultaneously focused on two periods, the Late Bronze Age/Iron Age I, and the long Iron Age II. The settlement and expansion of the city by the Philistines marked the earlier periods of the city's history. Research on that period has therefore focused on mapping out the distinctive early Philistine material culture assemblage and assessing its relationship to Aegean and Cypriot cultures of the same period. Studies of Ekron during its later phases, namely the Iron Age II, start from a material culture corpus which changed quite a bit from the preceding periods, and resemble much more those goods produced by neighboring cultures. Philistia's, along with Ekron's, political status was quite different in each of these broad periods. The two periods in the city's history reflect very different local and regional political arrangements, a divergence which is reflected in each period's material culture corpus. The political situation, in short, was that early in the Iron Age the Philistines were a powerful, independent state (or confederation of city-states) which held the upper hand in military and economic competition with bordering countries. Later, from the start of the Iron Age II, Philistia declined as it became a prize in a regional power game being played out by small but powerful Levantine states. Still later, in the seventh century, Philistia and Ekron experienced something of a rebirth, after being incorporated into the imperial economics of the Neo-Assyrian empire.

Before excavations commenced, the large tel was divided into many excavation fields (Figure 1). Over the course of the thirteen seasons spent at the site, a total of five of these fields was excavated, namely fields I, II, III, IV, and X, with limited probes in other areas. Each of the excavation fields revealed a functionally distinct area and several periods of the city's occupation, leading to the overall impression that the twelfth century Philistine takeover and expansion of the pre-existing smaller city had resulted in a large and well-planned urban center (T. Dothan and M. Dothan 1992:239-248).

Field I was the first of the excavation areas to be tested archaeologically. Over the first several seasons at the site a step trench was excavated down the northeastern slope of the mound in order to quickly uncover the stratigraphic sequence, and to examine the remains of the city's surrounding fortification wall. The resulting section, as well as pottery sherds found out of context in later fills, revealed that there were major intact strata from the Iron II and Iron I periods. In addition, excavators in this area reached Late Bronze levels in two strata, of which evidence of the earlier level, stratum IX, was excavated only in this trench. In addition to the stratified deposits, scattered sherds dating to the Middle Bronze and Chalcolithic appeared in the later fills, suggesting that the settlement contained several unexplored, earlier, strata. Along with the important stratigraphic sequence, the trench revealed Iron I period pottery kilns, a series of superimposed shrines, and fortifications (T. Dothan 1995:45-48). In the

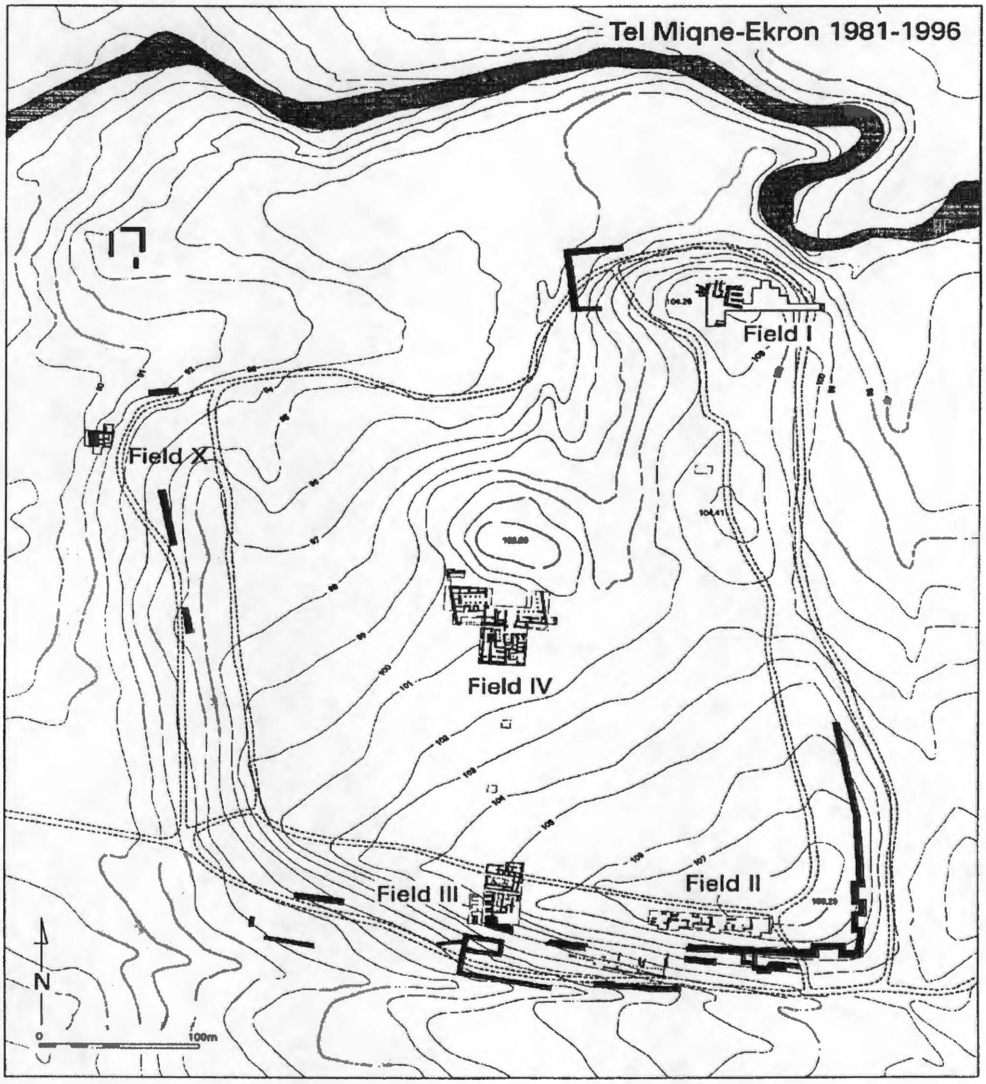

Figure 1: Top plan of Tel Miqne-Ekron, stratum I (seventh century BC). Visible here is the tel's topography, excavation fields, and major architectural remains. (Plan modified after Gitin 1998)

later excavation seasons, a broader area next to the sounding was excavated to further expose settlement architecture. Above the northeastern slope, in the trenches at the acropolis of the tel, a broad exposure of Iron II levels revealed a variety of buildings, including a city wall and drainage system.

Several destruction levels were observed in the excavations of Field I. The first destruction level, in stratum IX, has so far not been attributed by archaeologists to any specific military campaign by neighboring kingdoms or regional states[4], but may have brought the fourteenth century settlement to an end. The subsequent stratum (VIII) also ended with a destruction, this one showing evidence of massive fires and great destruction of buildings. This event has been attributed by the excavators to the influx of a new population -- the Philistines -- who, after destroying the Late Bronze Age town, utilized the debris of the destroyed city in massive fills laid to support the new, larger, Iron Age I city.

Fields II and III, where many olive oil manufacturing facilities were discovered, constituted the industrial zone of the lower area of the tel during the late Iron II (stratum IC/IB). Both of these fields were located on the southern edge and slopes of the mound, which indicates that a specific industrial zone was planned and built during the late phases of the city's existence (Gitin 1998). Olive oil installations were built adjacent to the interior of the defensive wall and to one of the city's gates (Gitin 1997:87), indicating, in addition to the orientation of doorways in the olive press buildings, that the city was laid out in a rectangle with perpendicularly intersecting streets (Gitin 1989:35-36). Field II was excavated only sparingly, in a short spring campaign whose goal was to expose a series of stone foundations visible from the surface. Excavations in that field therefore did not penetrate very deeply, and so produced relatively few artifacts. Essentially the excavation strategy in Field II involved only the removal of the plowzone and removal of soil accumulations within the foundations. These foundations were later determined to be olive oil pressing rooms, complete with press weights and collection bins. By way of contrast, Field III

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[4]The usual practice in Biblical Archaeology is to seek historically known military campaigns by foreign rulers as the parties responsible for destruction layers in the city mounds of the region. Thus excavated levels with clear signs of destruction by fire are most often not considered the accidental and tragic result of a fatal mixture between open fires, flammable construction materials, and a dry climate. Conquest-related fires necessitated major rebuilding phases and therefore ensuing architectural changes make convenient demarcations for separating phases and strata.

was extensively excavated over many seasons. The deep soundings dug into that area eventually exposed a city gate and fortifications, in addition to more olive presses. The large number of oil installations discovered, in addition to many loomweights, suggests that the large amount of industrial production here in the 7th century BC stratum must be related to the city's status as a vassal of the Neo-Assyrian empire and its Mediterranean-wide trade interests (Gitin 1997:77-80, 84, 87).

In the central area of the lower tel, known as the 'elite zone' of Field IV, two monumental buildings were discovered, one dating to the Iron Age I and the other to the Iron Age II. The earlier of the two buildings was first constructed in the 12th century (stratum VII) but stayed in use, with architectural modifications, for about two hundred years (through strata VI, V, and IV). This structure has been described by T. Dothan (1995:42-44) as a large public building planned with a central hearth, a feature rare in Canaan but well known from the palaces of the Bronze Age Aegean world. The latter building was covered over by fills laid for a succeeding monumental structure built in a style similar to but more massive than the design of the preceding one, indicating cultural continuity and attainment of economic stability for the city (T. Dothan 1995:44-45). The Iron Age I city of stratum IV, along with the latest phase of the hearth building, was destroyed around 1,000 BC, probably as a result of a military campaign by either Pharoah Sheshonq or King David of Israel.

This destruction marks the end of the Iron Age I city, separating it from the succeeding strata and different city layouts of the Iron Age II. For the first half of the Iron Age II (strata III and II, tenth through eighth centuries BC) the city of Ekron was much smaller than its Iron Age I predecessor. As with the settlement's transition between the Middle Bronze and Late Bronze Ages, in the early centuries of the Iron Age II the city's limits covered only the northeast corner (Field I) of the large mound.

The uppermost, seventh century BC, stratum (IC/IB) of Field IV revealed, just beneath the topsoil, a wide area of destruction debris showing signs of burning. Gitin (1999:276, footnote 2) believes the destruction to have been the work of Neo-Babylonian king Nebuchadnezzar's Levantine campaign in 604 BC. Excavations produced dozens of both intact and smashed but complete vessels scattered on living floors, as though they had fallen from storage places in the ruined buildings. Massive architectural remains of what turned out to be a very large monumental building similar in layout to Neo-Assyrian royal palaces, homes, and temples were also revealed (Gitin *et al* 1997:3).

Decipherment of an inscribed stone block found *in situ* inside the building's sanctuary room revealed that the structure was a temple dedicated by the king of Ekron to his goddess. The inscription reads that king Ikausu of Ekron, son of Padi (and then mentioning several forefathers in the royal lineage), dedicated the temple to the goddess *Ptygh*. This deity was heretofore unknown, but was perhaps another name for local Semitic goddess Asherah (Gitin *et al* 1997:11-12)[5]. The inscription seems to be written in a local script and the wording and spelling are reminiscent of the Semitic Phoenician dialect of the region. The first two names inscribed are known rulers of Ekron, mentioned by Sennacharib in Neo-Assyrian annals. Other people, mentioned as forefathers of Ikausu and Padi (the names previously known) are not known specifically as rulers, but these are familiar Semitic names known from other documents (Gitin *et al* 1997:9,10-12). Finally, the name *Ikausu* offers a tantalizing piece of information in itself; it is evidently not a Semitic name but possibly a West-Semitic transcription of what was originally the name *Anchises*, mentioned in the Iliad. Through a number of linguistic twists and turns the latter name can in turn be transcribed as 'Achaean,' meaning 'Greek'. Naming a Philistine ruler 'Greek' of course forms more evidence to add to the argument for a Philistine Aegean origin (Gitin *et al* 1997:11). Not all scholars agree with the reading and interpretation of the inscription which Gitin *et al* (1997) offered: for instance the proper restoration and interpretation of the word indicating the temple's patron goddess is disputed, as are the implications of the inscription's linguistic affinities. A recent article on the inscription posited that the Phoenician affinities of the words and letter shapes indicated that the ruler was in fact the child of a Philistine father and Phoenician mother, and thus the product of the sort of political marriage well known from other ancient Near Eastern texts (Sasson 1997).

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[5] Other interpretations of the goddess' name in the Ekron inscription have been offered. Demsky (1998) suggests that the name should be read as *Ptnyh*, the difference hinging on an unclearly engraved letter in the middle of the word – either the letter *gimel* in the original interpretation, or the letter *nun* in the revised reading.

Finally, a small probe was opened up along the northwestern slope of the tel in an area designated as Field X, adjacent to where the Nahal Timnah cuts into the mound (Bierling 1997). Seven squares were exposed here over the most recent two excavation seasons, the objective being to check the extent of the Iron Age I city and, if it existed here, whether all or only some Historic periods were present. Results of excavation revealed only three strata, all dating to the Iron Age I. Other strata had eroded away due to wadi action and the area's position on the slope. The most significant features uncovered in this area included a massive mudbrick defensive wall and associated glacis, built on top of the original Middle Bronze II rampart and tower. No Late Bronze Age strata were encountered, supporting earlier conclusions from elsewhere on the tel that in this period city occupation had been limited to the 10 acre 'upper city'. Excavators also identified an intriguing building complex, one of its rooms having plastered walls, floor, threshold, and *bamah* ('altar' in Hebrew) – probably a small shrine (Bierling 1997).

Taken as a whole, the thirteen year excavation project of Tel Miqne-Ekron uncovered a large and important corpus of material culture as well as architecture with which to further research the process and nature of Philistine settlement. Because of Ekron's geographical setting, the project has proved immensely important for clues about Philistine-Israelite interactions.

There exist extensive faunal samples from strata dating to all three of the periods revealed by excavations at Ekron. Therefore this dissertation incorporates animal bones from three Historic periods, early (Late Bronze II), middle (Iron I), and late (Iron II), in order to add a dietary perspective to the reconstruction of this ancient city's ebb and flow over time. Since the city's history can be rather neatly divided into three distinct political phases and thus discrete sets of general research questions, the study of the faunal remains can also be so divided . Despite these divisions, overarching themes must also be sought, in order to add a long-term anthropological perspective to already existing particularistic histories of the city which have heretofore been (re)constructed from other archaeological and textual evidence. The city's function in the complex political and economic landscape of the Late Bronze Age southern Levant can be analyzed and contrasted with its radically different setting during the Iron Age I. In the Iron Age I, the rise of territorial states and the withdrawal of externally-based empires created a significantly different setting in which the Philistines rose to prominence. The ethnic or national political boundaries which to some degree separated these states must have affected the orientation of Ekron's animal economy. What is required here, therefore, is to examine to what degree ethnic preferences and politico-economic strategies are reflected by the faunal remains. For the late period, the Iron Age II, the questions shift to those concerning changes between the two Iron Ages, due to new political circumstances. Most prominent is the waning of Philistines' political, military, and economic powers, the high point of this former strength having been reached during the preceding Iron Age I. Ekron's incorporation during the Iron Age II into successive empires, altered the city's political affiliations and economic orientation, historical processes which again may be visible in the patterning of faunal remains from the site.

Chapter 4: The Bone Sample from Field I: Sampling Strategy and Sample Taphonomy

The sample of bones, which this dissertation describes, consists of two discrete parts. The first part is that portion of the sample I identified at the Albright Institute of Archaeological Research in Jerusalem. This sample was complemented by animal bone data from a portion of the Field I assemblage originally identified by Dr. Brian Hesse at the University of Alabama-Birmingham, who decided it should be included in this dissertation, rather than publish it himself. The combined sample comprises slightly more than 12,000 identifiable bones, in addition to some 20,000 unidentifiable bones. The latter totals should not be taken to mean that more than 50 percent of all bones in the sample were identifiable. That impression arises from the fact that the data provided by Hesse comprise information almost entirely about identifiable bones, whereas the other sample consists of approximately 6,500 identifiable bones and the 20,000 unidentifiable ones. Data derived from the combination of Hesse's and my samples forms the basis for the discussions and conclusions in the chapters which follow this one.

The entire faunal assemblage examined here was recovered from the excavations in Field I. Other excavation fields produced animal bones as well, but Field I was chosen for the first intensive study of faunal material from Tel Miqne-Ekron for several reasons. First, Hesse (1986) earlier began work on faunal remains from Field I, so that further work in the same area would build on his pilot study. Hesse's donation to this study of a large unpublished data set also made this the obvious choice for analysis. Further, Field I was the only excavation area to have an uninterrupted sequence of deposits, spanning the Late Bronze Age through to the 603 BC destruction stratum, thus offering the opportunity to observe a complete sequence of diachronic dietary change through ten strata of the city's existence.

The amount of faunal material excavated, sorted, and saved over the 13 year duration of the Tel Miqne-Ekron project is immense. From the outset, project directors Trude Dothan and Seymour Gitin, along with project zooarchaeologists Brian Hesse and Paula Wapnish, decided on total retrieval of animal bones, saving all faunal remains excavated. Field collection of animal bones was mostly done by hand, although (at least in theory) one in every ten baskets of earth was sieved (using approximately 5 millimeter mesh), except in cases of distinct pits or other special features, where all or a higher proportion of earth was screened. Unfortunately, it seems now that the sifting program was in the end a totally wasted effort: forms for recording excavated locus and basket information did not contain a place to mark the sample as sieved or unsieved, nor was that information ever written on the bone bags themselves. These oversights eliminated any chance to have a screened control sample to contrast with the remainder. An unscreened sample of animal bones often creates a bias in the faunal sample because small species, small skeletal elements, and juveniles of larger species have a lesser chance of being recovered in hand-sorting (Payne 1975). Although that biasing factor may not be serious in this case since non-domesticated species – birds, fish, and small mammals – have played no significant dietary role in the diets of Near Eastern peoples from the Chalcolithic onward (Davis 1987:140), it is impossible to know for certain. Generally speaking, excavations of post-Chalcolithic sites tend to be large and conduct minimal sieving at best, such that Davis' previously cited observation may be a product of excavation techniques.

It is practically impossible, without a screened control sample, to assess the degree to which recovery bias lessened the number of small skeletal elements and very young juveniles' bones in the sample. What may be interpretable as an interest in secondary products, indicated by a relative disinterest in slaughtering young animals, could in fact be a failure by archaeologists to recover such individuals, and vice-versa. Similarly, bias against the recovery of small elements is also difficult to assess. It is possible to come up with an expected number for each of the various carpals, tarsals, and sesamoids based on MNI's derived from other elements, and compare that to the observed number. Yet, a discrepancy in that measure could also be the result of cultural practices such as differentially discarded carcass parts.

The issue of sampling the overall excavated assemblage begs the question of how to do so, how to sort out which contexts are better than others. This complex taphonomic and geoarchaeological problem has to do with the formation processes that create tel sites. Tels are artificial city mounds built up above the surrounding topography over hundreds of years and even millennia. Tels (an Arabic word meaning 'hill') are physically shaped by their "geographical setting, socioeconomic organization, political structure, defense requirements, technology, and...ideology in the broadest sense..." The tel is therefore "a microcosm of cultural development" and, in and of itself, an artifact. As such, their 'insides' are an accumulation of every imaginable sort of material culture – building foundations, rubble, and construction fills piled atop one another and filled with the debris of human activity – ceramics, bones, stone tools, and other household belongings (Dever 1996:38-40). Tels are sort of 'layer cakes,' mudbrick cities built atop ruined mudbrick cities, with the result that the piled-up debris eventually takes the form of a hill (A. Rosen 1986). The methodology used to excavate tel sites was developed in the first third of this century by British archaeologists Sir Mortimer Wheeler (1954) and Dame Kathleen Kenyon (1952). Kenyon went to excavate with Wheeler in Britain and later took his excavation system, with modifications, to Palestine, where it developed into the 'baulk/debris-layer method' still used, with varying amounts of modification, today by excavators here, whether British, American, German, French, or Israeli (Dever 1973:3). That system was developed before studies of animal bones and other 'ecofacts' were commonly done. Therefore, this excavation system's approach to stratigraphy and archaeological units does not always mesh well with what we now know about how bones, as opposed to ceramics, are deposited.

The chronological sequences for Syro-Palestine were formed by a ceramic chronology developed over the last century of excavation. When archaeologists examine pottery assemblages from the various strata of a tel, they not only can recognize whatever distinct features of the ceramics that interest them, but just by looking at the sherd, establish the period of its manufacture and thus its proper chronological context. Along with dating ceramics, the sequences of building construction and subsequent modification and destruction are mapped out vertically, forming an additional dating system based on architectural phasing. Unfortunately bones, unlike ceramics, are not inherently datable; a sheep radius from a level dated to the twelfth century BC looks just the same as one from a Late Roman stratum. Also, because bones found in tels represent trash, their architectural context does not help much to date them. Bones found in the foundation fill of a building presumably date to sometime before it was constructed, having been removed from their last place of interment as a part of the soil need for construction preparations. These would not be large problems in single period occupation sites, or if all datable pottery in each of a tel's strata or loci were purely from one period. That ideal is seldom a reality here. As O'Connor

(1996:7) puts it, "[a] Bronze Age deposit which contains a few sherds of Neolithic pottery will be regarded as containing residual material. The residuality of the bone assemblage will be assumed to mirror that of the pottery, and the bone assemblage will be treated accordingly."

The very process that creates tels – constant building, collapse, leveling off, and rebuilding actions – moves artifacts about a great deal vertically and probably horizontally as well. Construction there makes artifacts "well up" (Hesse 1986:20), in the sense that new structures' foundations or various sorts of pits are sunk into pre-existing layers. This in turn of course displaces the dirt and artifacts contained therein, often depositing them in a later level, whether as trash or as construction fill. As well, preparations for new construction often employ large fill episodes, dumping soil from one part of the tel into another. In sum, these actions result in most loci having a rather mixed corpus of pottery from various periods. Finkelstein (1998:211) points out that "[a]t Megiddo, for instance, a large number of earlier sherds…are found in almost every Iron II deposit. They found their way through bricks, fills, make-up of floors and roofs, etc." Yet, since the ceramics can be dated, we can assign most loci to one phase and stratum or another, by the *terminus post quem* method. In addition, architectural phasing delineates shorter periods of occupation within each stratum. Thus, we know generally when particular surfaces were laid down and used, or when fills were deposited, walls put up or taken down, regardless of how mixed the pottery is in date. Still, bones are not necessarily moved about in the same manner as ceramics. They are seldom the by- or end-products of artifact manufacture, unlike other types of material culture. Further, it may seldom be the case that discarded bones are allowed to drop and stay in the household area; instead they are moved to specific dump locations, making them secondary deposits (Meadow 1978:15).

Bones may have a different depositional history than the ceramic sherds that are found in the same locus. This creates the problem of how to assess the relationship between faunal material and pottery from the same context. In other words, if one dates a fill to, for example, the Middle Bronze Age by *terminus post quem,* most prevalent ceramic type, or architectural phasing method, should one as well assume that all or most of the bones in that locus are of the same date? And, given that they are often transported to dumps rather than left in the consumption area, should bones found in association with a floor deposit be considered a primary deposit dating to the occupation of that house? Or should they post-date it, having been dumped atop the floor sometime after the structure was abandoned?

Hesse (1986) examined some of these problems in a pilot study of faunal remains from Tel Miqne-Ekron. As he saw it, two chronological systems are available which can produce dates for the studied bone samples. The first was based on the bones' position within the phased sequences of Iron Age construction (an architecturally based system). The second system assigned the bones to specific centuries, Historic periods such as Iron Age I, or other relatively large units of time by using dates arrived at for individual loci through 'pottery readings'. The latter is a common procedure on Middle Eastern excavations, where each day's collected pottery is sorted into diagnostic and non-diagnostic categories and a general date for the locus or pottery bucket[6] derived (Hesse and Wapnish 1985:55). The bulk of the pottery is simply characterized as 'predominate' for the most prevalent type, with the remainder totaled by type; what is often not done is to count or weigh all sherds of each identifiable type. The result of this method is that it is difficult to know precisely how mixed a given context is, but rather only possible to characterize loci into broad groups. These groups can be summarized into four categories: little mixing with pottery date and architectural phasing in agreement; little mixing with discrepancy between the pottery date and architectural phasing; much mixing with date agreement; or much mixing with a large disparity between the two dating systems (Hesse and A. Rosen 1988:125). During Hesse's (1986) analysis of animal bones from Tel Miqne, the latter system was adapted for the occupational periods represented in the sample. Thus, using the pottery readings as a measure of temporal mixture, three bone contexts were derived – Contexts A, B, and C. Context A included bones from loci where ceramics from pre-Iron Age I contexts dominated the assemblage, though a minority Iron I period sherds were also present. Context B grouped bones from those loci that had produced ceramics mostly dating to the Iron I period, but also

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[6]The 'pottery bucket' unit of excavation is used for grouping the artifacts excavated from a locus. In principle this method allows artifacts to be placed in a more specific spatial context than the entire area of the 5 by 5 meter square or locus. Excavators drew daily top plans of their squares and kept track of where in a locus a specific bucket was excavated, by marking on the plan where in unit that bucket was filled.

contained a smaller amount of earlier material. Finally, Context C consisted of bones from loci with ceramics dating mostly to the Iron II period, with some earlier material mixed in (Hesse 1986:20).

The sole criterion available for Hesse to judge which of these dating systems produced the 'correct' results was to see which produced "interpretable patterning" (1986:20). Manipulation of the faunal data showed that, of the two systems – architectural phasing versus dating by pottery – only the pottery-based dating system produced recognizable patterning within and between periods of occupation at the tel. The architectural system, by contrast, produced no interpretable pattern of change in taxonomic abundance over time (Hesse and A. Rosen 1988:121). This method seems to employ a certain amount of tautological thinking – the best system is the one that produces interesting results, and because it produces intriguing patterning, it must be a more accurate chronological tool. Hesse and A. Rosen (1988) attempted a more scientific study to validate this method for detecting and evaluating the presence or extent of chronological mixing in bone samples. They authored a joint geoarchaeological and zooarchaeological study to try to isolate signs of mixing within excavated loci. What proved to be most useful in the study was an attempt at detecting disturbance in archaeological deposits using geoarchaeological methods. They were able to demonstrate that, in presumably undisturbed deposits (i.e., so-called living floors, see discussion below), the grain size distribution of wood charcoal formed a smooth curve, from the smallest geological sieve size (.5 mm) to the largest (4 mm). By contrast, sediments originating in 'bricky' (i.e., decayed mudbrick) deposits demonstrated no continuous distribution between mesh sizes (Hesse and A. Rosen 1988:122-123). This technique, while interesting, is not terribly useful for deciding whether or not bones in a given deposit largely belong to the ceramic-dated period assigned. The vast majority of bones in a tel originate in disturbed contexts while relatively few bones are found sitting on floors or in discrete pits. For this reason it is difficult to utilize only animal bones found in undisturbed loci if the objective is to have the sort of large-sized faunal sample from which meaningful animal management inferences can be derived.

The question, then, is whether the technique of Hesse and A. Rosen (1988) to chronologically order bone samples by grouping them according to the degree to which the pottery in each sample is mixed, is a worthwhile effort. Does this method grant greater insurance that the bone sample studied truly derives from the periods that the deposits are dated to? Aside from the tautological nature of Hesse and A. Rosen's test of the method, there is a major problem in how the technique was conceived. The archaeologists dealing with the ceramics and architectural phasing ultimately grouped excavated loci together according not only to the dates given by pottery content, but also by the activities the deposits represented. The same fill present in several squares was granted a separate locus number each time it appeared, but the field archaeologist would have linked all of these together as all being part of preparations for building structure X. In that case, the archaeological conclusion will be to assign all those fill loci to the same architectural phase, and ultimately to the same stratum. Hesse and A. Rosen's (1988) method has the potential to confuse matters, since each locus is treated as an independent unit according to only the pottery reading. The problem is that there is no guarantee with accumulative loci that the ceramics will be homogenous throughout the spatial extent of the deposit, such that several fills belonging to the same deposit may have quite different associated pottery readings. That handicap undermines the utility of Hesse and A. Rosen's method for detecting and assessing bone redeposition.

Given that many excavated deposits have become mixed both chronologically (vertically) as well as spatially (horizontally), considerable thought must be given to what categories of deposits to incorporate into bone samples selected for analysis. A great number of different types of architectural and depositional loci are encountered when excavating city mounds; from 'pristine' floors, walls, hearths, silos and other architectural features, to a variety of pits, gullies, alluvium, fills, and debris accumulations (Reisner *et al* 1924:37). Architectural loci are often favored over fills, debris, and unlined pits by archaeologists dealing with inherently datable artifacts like pottery, but the same reasoning is not necessarily appropriate for animal bones. Hesse and Wapnish (1985:97) outlined a general excavation context hierarchy for ranking bone samples from a variety of commonly encountered deposit types within tel sites:

5. In situ; an undisturbed occupational or activity surface

6. Probably in situ...an activity surface recognized after excavation
7. Essentially in situ, but some...disturbance or contamination (burials, intrusive pits, rodent holes, etc.)
8. Not in situ, but provenience known with considerable certainty (room fill, collapsed rubble...)
9. Not in situ; derived material, but original provenience more or less sure (...materials washed from a room...)
10. Mixed materials from several strata (...interface of several layers, contents of pits...)
11. Hopelessly uncertain; materials out of context (...slumped profiles and errors in field or lab cataloging)

This seems to be a good general model of how to rank contexts for animal bone analysis, provided that the relevant excavation report is detailed enough to differentiate between occupational surfaces recognized during, rather than after, excavation. The model also requires that the (at least) approximate origin of fills (Hesse and Wapnish's number 4, above) is specified and knowable. The usefulness of the ranking system, however, is dependent upon the nature of the various contexts – surfaces, pits, debris, fills, and slope-wash – and how well they apply to these animal bone samples, as opposed to ceramic assemblages and architecture finds, by which those designations are generally defined.

Most archaeologists who excavate tel sites seem confident that floor loci usually represent primary deposits of cultural material, all of it lying in state on surfaces more or less the way it was left thousands of years ago. Manuals written by tel archaeologists like Blakely and Toombs (1980) or Seger (1992) emphasize that point and, in keeping with a very old tradition in Near Eastern archaeology, recommend a somewhat elaborate system to isolate a surface and its surrounding soil matrix. That isolation is defined by use of a special locus for the deposit immediately above a surface, the so-called "point P" locus[7], and designating an arbitrary locus for the material below a perceived floor, a "point one" locus[8] (Seger 1996:247). The point one locus is an exercise in precaution – the idea is to make certain that a floor's entire matrix is excavated together, rather than with whatever deposits might lie below. Because floors in the ancient Near East were often merely constructed of tamped earth, it is often difficult to see where the floor deposit ends and something else begins. Aharoni (1973:49-50), one of the principal proponents of the so-called 'Israeli' method of excavation, pointed out a fallacy inherent in this emphasis on surfaces. He noted that the builders did not purposely incorporate pottery sherds (and other materials) into the floor matrix. On the contrary, although a pot might occasionally break while the floor is being laid, this is the exception rather than the rule. What usually happens is that, for the material of the surface, people made use of the surrounding tel matrix, thereby incorporating objects from *earlier* periods rather than the present one. Butzer (1978:89-91) also observed this phenomenon, that while habitation floors may incur some deposition of garbage during their use, it is only after they are abandoned that they rapidly accumulate refuse even before the structure itself collapses.

Ethnoarchaeological research, analysis of microartifacts, and micromorphological studies have shown that house floors are a complex depositional environment (e.g., Deal 1985; Matthews *et al* 1997; Sherwood *et al* 1995). This research has demonstrated that excavators cannot assume house floors to be Pompeii-like accumulations of primary and abandonment refuse (Schiffer 1985:18, 24-25). There are several problems with such an assumption, among them the fact that, during use, house floors are swept clean of all debris except that which is either too small or is in an unreachable place (Deal 1985:260;

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[7] The 'P' stands for 'pottery,' a reference to the ceramics often found on house floors. This is an important point, since the rationale behind the surface excavation system is to isolate, and thus better date, the pottery and the structure in which it was found.

[8] The 'point one' refers to the fact that such deposits are arbitrarily defined as the first ten centimeters, 0.1 meters, below the floor. Thus, if a floor was given the locus number 3016, its point one locus would be 3016.1. In practice, the composition of such deposits can vary greatly, depending, of course, on what is immediately below the floor. In many instances, there forms a build-up of debris or actual floor laminations, beneath the surface. As well, floors were sometimes constructed over purposefully-laid fills brought in to level the ground surface in preparation for building. Sometimes, if no special preparations were taken before the floor was laid, the point one locus will consist of whatever type of deposit the structure happened to have been built over.

Metcalfe and Heath 1990). The issue of archaeological scale, macroartifact versus microartifact patterning, has become an important research tool for understanding depositional history, a necessary first step before inferring past activity areas (Dunnell and Stein 1989:33-35). Other research of that nature does demonstrate that when houses are abandoned people *do* often leave behind belongings too awkward, heavy, or no longer valuable (Schlanger and Wilshusen 1993:92). Schiffer's detailed analysis of Broken K Pueblo's artifact assemblages (1989:56) points to a sudden abandonment of the structure, such that it is possible to discuss the refuse as reflecting activity areas rather than a midden palimpsest. But without such studies one cannot assume that house floors are 'pristine' contexts. As soon as a mudbrick house is abandoned, the remaining structure deteriorates quickly and becomes a favored place for refuse disposal (A. Rosen 1986:92-93; Seeden 1985: 291), so that such debris is actually a secondary deposit.

In order to propose valid reconstructions of activity areas within houses or other architectural contexts, the sequence of cultural and natural deposition history must be sorted out. It is sometimes the case that scaled analysis shows no concordance between macro- and microartifact distributions. Analysis of microartifact distributions is a necessary complement to macroartifact studies, as they provide different information from one another (e.g., Sherwood *et al* 1995:431-433, 450-451). In addition to scale analysis, micromorphological study of floors, courtyards, and middens can not only classify different deposits according to origins and make-up, but can also delineate activities carried out in each place (Gebhardt and Langohr 1999:599-609; Matthews *et al* 1997:288-291). With the exception of limited test loci (see Hesse and A. Rosen 1988), no such studies were carried out during the Tel Miqne-Ekron excavations. While it is therefore impossible to presume a Pompeii-like status for floor contexts at the site, bones from such contexts can be used in dietary reconstruction and very general intra-site spatial comparisons.

Samples drawn from architecturally-defined loci are rather useless for zooarchaeological analysis. The time at which bones were incorporated into the material found in foundation trenches, walls, and other such deposits can be far removed chronologically and spatially from where and when the animal was killed or consumed. The single most important contributor by volume to a tel's matrix is mudbrick, both in intact form still in walls, or as rubble making up debris and fill deposits. Mudbricks frequently are manufactured from soils and clays removed from borrow pits placed in or nearby the settlement (Hayden and Cannon 1983:144), and so may contain (possibly much earlier dating) refuse material found in the soil matrix (Blakely and Toombs 1980:22; A. Rosen 1986:93). It is clear that, although ethnoarchaeological observations of modern mudbrick manufacture, as well as many geological studies of ancient mudbricks, record only the use of pure alluvial clays mixed with straw as the binding agent (Morgenstein and Redmount 1998), this was not always the case in the past. Ancient people did not always take care to remove refuse from brick material. Goldberg (1979) as well as A. Rosen (1986) each studied mudbrick samples from Tel Lachish, a Bronze and Iron Age site not far from Tel Miqne, in addition to sediments in the area surrounding the site. Goldberg's (1979:64-65) sourcing study of Lachish mudbrick material concluded that much of it was not made from pure local sediments, but on the contrary avoided raw material rich in clay, presumably either because of the difficulty of working the clay or knowledge that the endproduct would not be structurally sound. A. Rosen's work on mudbricks from the same site demonstrated that there existed considerable variability in the type of material used to manufacture the bricks. Some buildings' bricks were made from alluvium originating in a local streambed, others from valley colluvium, and still others either from sediment on the tel's slopes or actual debris from part of the tel's surface (A. Rosen 1986:78-84). Raw material employed in mudbrick manufacture evidently depended on the importance and function of the structure, so that public buildings were made of finer mudbrick, and simple houses constructed of occupational debris-based bricks. The fact that mudbricks were often made from occupational debris, and that – as A. Rosen (1986:79-80) noted – were sometimes robbed out from earlier structures to be incorporated into new ones, brings up the central point in this discussion. Loci either consisting of intact mudbricks or those with considerable amounts of decayed mudbrick are unreliable deposits from which to draw faunal samples. Even geoarchaeological studies of decayed mudbrick are hard-pressed to differentiate bricks manufactured of debris-laden sediments and decayed bricks that were later redeposited and mixed with refuse (A. Rosen 1986:83-84).

Other deposits are frequently excavated in tels and may have more complex depositional histories, yet are probably better contexts from which to draw animal bone samples. Fill and debris layers are some of the most common deposit types in tels. Differentiation of the two locus types necessary invokes some consideration of how the soil and artifacts got there. Fills are artifacts of ancient dumping episodes, soil deposits intentionally laid for some architectural purpose like raising floors or evening out and solidifying the tel surface in preparation for building. They are often made up of imported sediments, probably excavated elsewhere on the tel, and so contain a variety of artifacts (Holladay 1978:70). On the other hand, a debris locus is meant to encompass those deposits that accumulated either because of a sudden event like the destruction of buildings – a 'destruction debris', or accretional accumulations of rubbish, usually noted only as 'debris'. Because artifacts from a fill provenance were not left as a primary deposition, nor dumped as garbage in a secondary deposition, but rather were a part of the general matrix, they can be tertiary in nature. In practice of course it can be difficult to distinguish deposits resulting from 'catastrophic' events like destruction, and a short-term event like the placement of a construction fill, though the size of artifacts and amount of restorable pottery vessels does help in final determination, after the deposit has been excavated. Depending on the type of sediment deposit – whether a fill or a debris – it can alternately be a rich, chronologically and spatially-controlled source of animal bones and other artifacts, or a rich but contaminated deposit potentially having in it artifacts brought from disparate locales and earlier strata. The excavation strategy employed at Tel Miqne prescribed a number of different locus types for excavators to use in labeling all deposits encountered, but only the broad categories of 'fill,' 'debris,' or 'sediment' were available for excavators to label non-architectural archaeological deposits (Weening and MacKay 1993). Unfortunately, the nature of the excavated sediment is not always clear either from excavators' notes or artifacts found in it.

Still additional categories of deposits present less problems from the perspective of faunal analysis. These include various types of depressions, pits, and installations whose concave shape created a natural receptacle for trash disposal. Artifacts and sediments in disused installations and silos, trash pits, or filled up erosion-created gullies are usually either primary, or secondary but contemporary, deposits (Butzer 1982:92; Holladay 1978:65). Destruction debris are generally thought to be superb loci by archaeologists concerned with pottery, as such deposits trap vessels inside and therefore generate a precise ceramic-based date for the phase. As well, collapsed building walls and upper stories seal the deposit at the time of collapse, and, in the case of a widespread destruction layer, offer a wonderfully undisturbed plan of the city. Such loci also are certainly useful for faunal analysis, though there is the possibility of at least some bones leaching out of decayed mudbrick from the structure's walls. Underneath the collapsed walls, a sometimes large assemblage of artifacts specifically associated with one building may be found, in addition to dumped trash (Butzer 1982:89; Magness-Gardiner 1996:183). Such deposits may or may not be as pure as floor contexts, but certainly provide better preserved samples of bones.

The point behind the preceding discussion of floor, mudbrick, and other loci was to illustrate the variety of deposit types encountered by archaeologists during the course of tel excavation and explain how such features affect animal bone studies. Due to the difficulties inherent in dating or sourcing the artifacts found in mudbrick loci, bone samples from such contexts were not examined. Loci falling into that exclusionary category included mudbrick walls, platforms, benches, and kilns. As well, bone samples excavated from dismantled stone walls were excluded for the same reason – presumably bones present there were incorporated at the time of construction, and may have been used for binding material in mud mortar. Animal bones found in foundation trenches were also categorically excluded from analysis; fill material in such trenches was presumably resorted and redeposited fill material from someplace on the tel. Fill loci, even those containing decayed mudbrick were extensively sampled in the end. Although fills, for reasons discussed above, are problematic deposits because they are generally redeposited sediments, they do frequently contain large numbers of identifiable bone. Presumably, this is because midden debris material was excavated from a dump and moved to another location for construction purposes. The decayed mudbrick in fills probably helped to seal and protect the bones within from further fragmentation. If the pottery readings for fill loci included significant numbers of sherds from periods other than the fill's date according to phasing, that locus was excluded from analysis. This is the intuitive part of the sampling method, since no fixed definition was used to decide whether the pottery from a locus was too mixed in date to be usable. Rather, deposits were first evaluated by locus type, secondly by their sediment inclusions (e.g., mudbrick detritus), and finally by how much of the pottery came from cultural periods other than the one to which the deposit was dated.

Having so far discussed excavation methods, sampling strategies, and tel formation processes in terms of how these factors affected the bone assemblage, it is important to now examine taphonomic aspects. The portion of the Field I bone collection examined by the author totaled 27,694 identifiable and unidentifiable bones. That sum represents a nearly ten percent sample of the estimated total (291,713) from the entire tel, based on the figure of 7,654 cubic meters of earth excavated and approximately 38 bones per cubic meter. The 430 loci sampled were divided into various types of deposits, to examine proportions of the bone sample originating in different depositional contexts (Table 1).

The numbers summarized in the above table require some explanation and commentary. The seven locus categories are grouped together into broadly defined kinds of deposits from a total of 26 locus types present in the sample[9]. Following the sampling logic outlined above, the first priority during

Table 1: Relative proportions of the bone sample according to depositional context.types present in the sample.

Locus Type	Percent of Bone Bags	Percent of Identifiable Bones	Percent of Unidentifiable Bones
Surfaces	44.56	36.95	43.98
Pits	16.20	21.49	18.31
Debris	16.87	14.86	14.84
Fills	20.78	26.22	22.23
Walls	0.10	0.02	0.01
Animal Burials	0.05	0.01	0.06
Balk Trim	0.08	0.03	0.00

[9] The 7 deposit types summarized in the table are comprised of the following different kinds of loci: Surfaces encompass plaster or dirt floors, point ones, and flagstone, cobblestone, or pebble floors. Debris includes unspecified types of debris deposits, ashy debris, destruction debris, and decayed mudbrick wall collapse. Different sorts of fills include unspecified fills, construction fills, mudbrick fills, and foundation trenches. Finally, the pit category comprises a variety of deposit types, all having in common a concave shape: pits, kilns, unspecified installations, tabuns [ovens], hearths, fire pits, and drains.

identification was to analyze all bone samples coming from floors and pits. The second priority was to sample as many pit loci as possible. Debris and fills were designated lower priorities and approximately one in five bone bags from such loci were analyzed. Wall loci were only analyzed accidentally – bones from those deposits were identified before realizing what type of depositional context they had originated in. One sample of bones from an unstratified sample of balk trim was included in the analysis, since it contained two extremely diseased cattle phalanges, useful for illustrative purposes if not for actual analysis (discussed in Chapter 8); only those two bones were recorded, the rest were ignored.

Returning to the discussion of the various locus types present, it is interesting to note the close correspondence between the number of surface, debris, and fill loci sampled on the one hand, and, on the other hand, the relative proportions of identifiable and unidentifiable bones from those contexts. The amount of bones produced by the various locus types was in proportion to the relative abundance of those locus categories in the studied sample. This is despite the fact that fill and debris loci generally contained quite large numbers of bones per pottery bucket, reflected by the fact that there were an average of 24 bones per sample from fills and 19 bones per sample from debris loci. In contrast, surface loci only rarely contained large numbers of bones, and an average of just five bones per bone bag (there being one bone bag per pottery bucket excavated). Further, Table 1 demonstrates that only pits produced disproportionately large samples of bones: such loci account for only eight percent of the sample, yet produced more than twice that proportion in both identifiable and unidentifiable bones. The explanation for the latter, perhaps, is that purposely dug pits or concave features that had gone out of use became convenient trash receptacles – perhaps especially for smelly refuse like food waste – and therefore contained unusually high concentrations of bones.

The portion of the assemblage analyzed by Hesse has a differently ordered depositional context. The period during which Hesse analyzed the samples was during the earlier years of the excavation project, when stratigraphic and contextual information was not readily available to him. Thus all bones excavated in Field I between 1981 and 1990 were analyzed without regard to stratigraphic placement or depositional context. Later, I matched Hesse's catalog with the now available stratigraphic and contextual information, and discarded all data originating in unstratified contexts. This, however, still left quite a bit of material which had been excavated from problematic loci such as mudbrick walls and other architectural features. In other words, this data set probably encompasses bone samples from a number of loci which in Hesse and A. Rosen's (1988) terminology belong to 'mixed' stratigraphic categories because the pottery sherds included in them dated to multiple periods. These data were not further sorted, as for instance by Hesse and A. Rosen's method. Instead, since all bone information had already been collected, it seemed logical to sum the two bone samples separately and compare the resultant numbers (see Table 2) to assess whether sampling strategies resulted in significant faunal patterning differences.

The animal bone sample is composed of samples taken from the nine strata (21 levels when subdivisions of the strata are taken into account) excavated in Field I. Although, ideally, the number of samples per stratum should be equal, this in many cases proved to be an impossible goal. Both the nature of the excavations in Field I and the history of settlement at the site resulted in some strata being either thicker or better preserved, or both, than others. Table 3 demonstrates that the number of bones from each level strongly correlates to the number of samples analyzed from each stratum. That is, although the number of samples examined from each stratum was not even (note especially strata IV and IX), none of

Table 2: Relative proportion of Hesse's bone sample according to depositional context.

Locus Type	Percent of Samples	Percent of Identifiable Bones
Surfaces	31.42	27.39
Pits	7.42	4.10
Debris	26.95	35.99
Fills	21.48	25.18
Human Burial	0.35	0.17
Contaminated	1.01	0.07
Walls	14.13	6.58

Table 3: Number of Samples and Bones per Stratum*.

Stratum	Number of Bone Bags	Percent	Number of Identifiable Bones	Percent	Number of Unidentifiable Bones	Percent
IC/IB	202	13	1044	9	1417	7
II/III	203	13	1470	13	2863	14
IV	71	5	617	5	1412	7
V	238	15	2413	21	2412	12
VI	224	15	1459	13	2587	13
VII	395	26	2647	23	6578	33
VIII	191	12	1832	16	2533	13
IX	23	2	237	2	------	---

*A correlation test demonstrated that columns 2 and 4 are highly correlated ($p = .01$, $r^2 = .904$), as are columns 2 and 6 ($p = .01$, $r^2 = .891$).

the strata produced more bones than expected, given the number of samples. This indicates that bone deposition was quite even throughout the vertical extent of the tel. The fact that all strata produced the expected number of bones probably signifies a lack of recovery biases, in that bones were saved with the same frequency from most or all loci.

A demonstrated lack of recovery bias is an important observation because, over the many years of excavation, Field I was divided into upper and lower parts with each supervised and excavated by different teams, albeit under the same excavation and recording procedures. All of the Iron Age II material (strata III-I) was excavated in the upper part of Field I, whereas most of the Late Bronze Age (strata VIII-IX) sample came from the lower part of the field. Similar numbers of bones per volume excavated were recovered in each of these excavation areas. This helps to verify that bones from the upper versus the lower areas of Field I were excavated in a comparable manner. Bones originating in the strata shared by the two parts of Field I, Field I Upper and Field I Lower, Iron Age I strata VII-V, can therefore be combined for analytical purposes.

Another avenue worth exploring here is the state of bone preservation in different deposit types. Presumably, if the surface loci were truly pristine, undisturbed contexts, then the bones from such contexts should be the best preserved. Aside from assigning bones weathering stages (e.g. Behrensmeyer 1978) – a futile effort here since very few bones showed any such features – there seem to be two practical ways to measure relative preservation. These would be, first, by calculating the ratio of identifiable to unidentifiable bones, and second, by generating a fragmentation index – averaging the weight of bone fragments per deposit type (Table 4).

There are, of course, certain well known problems with relying heavily on bone weights for analytical purposes: Hesse and Wapnish (1985:112), for instance, point out a number of problems with the application of weight to estimating species abundance. Aside from difficulties in using bone weight as an estimation of species abundance, there is an additional problem: bone weight does not remain constant from time of deposition to time of excavation. Various conditions in the soil alter both the composition and weight of bone through processes of chemical weathering, leaching, hydration or dehydration, and sometimes fossilization. Nevertheless, these limiting factors on the utility of bone weight are not so important in this case. Post-depositional alteration in various contexts is precisely what is being measured, roughly, with the bone fragmentation index. This merely provides evidence for the inference that some deposits are primary while others are secondary, and the observation that some species may have been butchered or preserved differently than others. Because the percentage of identifiable bones appears to be somewhat different across the locus types, it is worthwhile to further analyze the relationship between the bone sample and the deposit classes from which they were recovered. The relative degree of

Table 4: Comparison of Bone Fragmentation in Different Locus Types*.

Locus Type	Percent Identifiable by Context	Avg. Wt. of Identifiable Bones (g)	Expected Avg. Wt. of Identifiable Bones	Avg. Wt. of Unidentifiable Bones (g)	Expected Avg. Wt. of Unidentifiable Bones
Surfaces	18	15.79	16.21	2.34	1.92
Pits	24	9.99	9.03	0.11	1.07
Debris	21	9.36	10.02	1.84	1.18
Fills	24	10.18	10.06	1.07	1.19

*According to a chi-square test, neither the average weights of identifiable bones nor the average weights of unidentifiable bones are significantly different by locus type at the .05 level of confidence (x = .69).

bone fragmentation between different types of deposits also reveals something about the manner in which bones were deposited in the site. Since the vast majority of bones were collected by hand rather than from the screen, there is a general bias against the recovery of small bone fragments.

Average weights of bones displayed a different trend from identifiability rates, such that surfaces produced on average the largest pieces of bone, while pits and fills contained smaller fragments. Bones on surfaces, if left behind as primary refuse, should be better preserved and therefore be larger fragments (Schiffer 1989:39-42). When the average weights for identifiable and unidentifiable bones are compared, some differences stand out. Surfaces contained the heaviest average weights (and thus, presumably, the bones were better preserved) for identifiable bones, and displayed the highest average weight for unidentifiable fragments. At first glance then, the assumption that surfaces contained primary refuse appears correct, and the so-called 'Pompeii premise' (Schiffer 1985:18) appears to hold true. However, although the average fragment weight per depositional context can be a useful tool in assessing relative preservation across deposit types, it is necessary to test such differences statistically. The chi-square test of independence revealed no significant differences in the average weight of identifiable bones nor the average weight of unidentifiable bones from the various contexts. Based on this evidence, there is no reason to suggest surfaces contain primary refuse while other contexts contain secondary or tertiary deposits. All the contexts appear to contain a variety of refuse types, such that bones from all contexts can be discussed as a whole and not treated separately because of divergent depositional histories.

Chapter 5: Research Methodology

The animal bones used in this study all come from the so-called 'acropolis' of Tel Miqne, the area designated as Field I during excavations. Field I offers particular advantages over other areas excavated because all periods investigated during the excavations were present there (namely, the Late Bronze Age, Iron Age I, and Iron Age II), and its levels and loci contain some of the best-dated accumulation sequences from anywhere on the tel. Further, several methods of excavation were employed there, which not only exposed all of the tel's strata, but also offer the possibility to analyze the bone assemblage from two distinct viewpoints: diachronic change through the tel's strata, and synchronic change across the squares and structures cut into the mound's top. Excavation strategies employed in Field I included a sondage excavated down the tel's slope, as well as a broader exposure of Iron Age I architecture adjacent to it. In addition, archaeologists opened a broad horizontal exposure of the final Iron Age phase (Figure 2), since, after removal of topsoil and a recent Bedouin cemetery, an intact seventh century BC layer of building foundations and a thick layer of destruction debris was revealed. Six excavation units in the latter area were excavated very deeply, down to Late Bronze Age II strata. Field I also has some interesting architectural elements that may prove relevant to the interpretation of the bone sample in terms of differentiating activities between industrial and other areas. Late Bronze structures there included several pottery kilns and a fire installation, so in that period the area was at least partly industrial, while in another area some type of large storage building was discovered (T. Dothan 1998; Killebrew 1996b). In the Early Iron Age, the northeast slope portion of Field I remained largely industrial. Kilns, along with adjacent domestic architecture, characterized the earliest phases of the Iron Age I. The broad Iron II exposure of the tel's top revealed mostly the gate and fortification wall. The relationship between the area's function and the bone assemblage may be particularly interesting in this last period. Zeder (1988) examined bone samples from several buildings, areas, and phases at Tal-E Malyan (Iran) and demonstrated patterning in carcass portion and butchering mark frequencies, interpreted as reflections of ancient residents' methods of meat procurement (direct or indirect) as well as

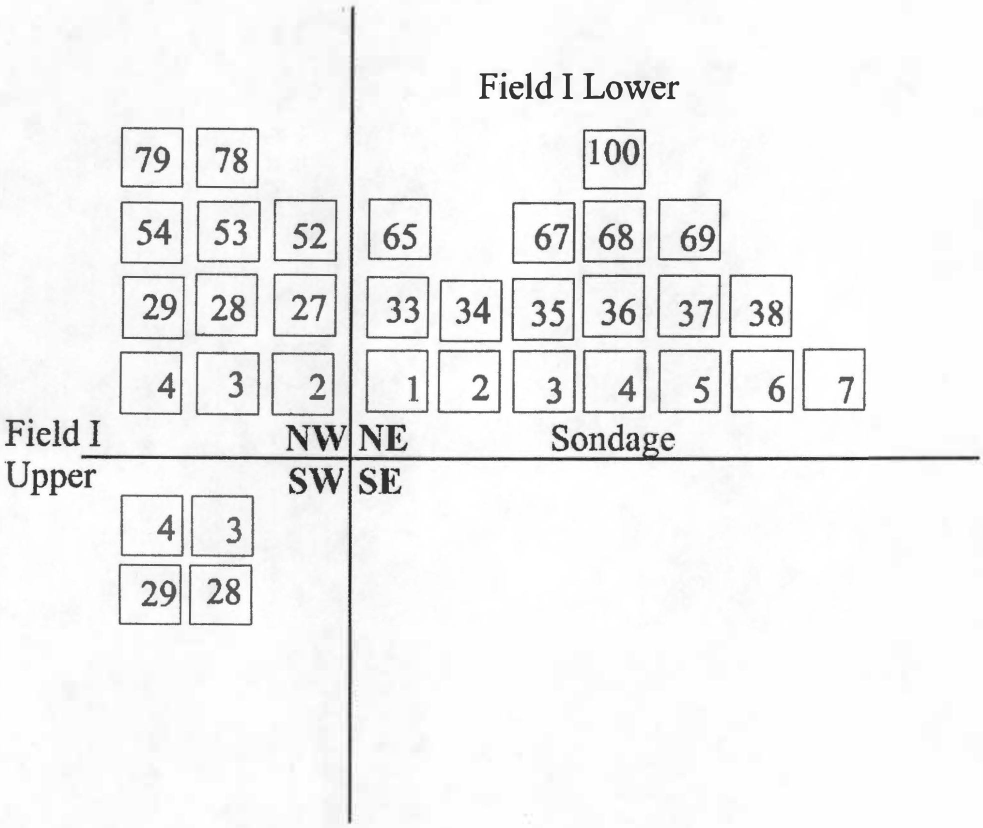

Figure 2: Schematic view of Field I at Tel Miqne-Ekron. Visible here are subdivisions of the excavation area, as well as excavated squares.

status. What may be relevant to the Iron II public structures in Field I is Zeder's interpretation of a building of public function at Malyan. Animal bones recovered from the structure included a greater proportion of butchering waste and less emphasis on particular age groups of domestic mammals. These patterns suggest that the building was used for meat distribution – animals were brought in, butchered, and the favored cuts sold off (Zeder 1988:42-45). Similar patterning at the military-related structures at Ekron would be unlikely, although there may be discernable patterning in the form of provisioning meat to the soldiers posted there, perhaps detectable through analysis of body part distribution.

Animal bones samples selected for analysis – those from reliably dated primary and secondary deposits – had recorded a number of different features based on the research questions discussed in detail below. At the lowest level, where possible, animal species, skeletal element, portion of bone, body side, and fragment counts and weights were noted. Beyond these basic features, observations relevant to age estimation, animal size, bone modification, and excavation provenience was examined. Age at death for domestic ungulates was calculated based primarily on long bone fusion sequences, but also tooth eruption/wear in the case of sheep and goats. Epiphyseal fusion estimates were based on the tables given by Silver (1969), while tooth eruption and wear for sheep and goats was based on Payne's (1973, 1987) analysis of Turkish flocks and related tooth coding system. For pigs, the data presented by Bull and Payne (1982) were applied, but unfortunately rather few mandibles were recovered. Finally, aging cattle was done with tooth eruption using the relative (rather than chronological) ages for them from Grant's (1982) tooth wear stages, though again the usefulness of these data was undermined by the small mandibular sample recovered.

Reconstruction of ancient kill-off profiles from the accumulated age data is an important part of this study. That data can be used to reconstruct the economic orientation of the city's animal economy, as well as examine how it changed over time, for each of three periods to be studied. Wapnish and Hesse (1988) demonstrated how, using such data, one can speculate about the existence of self-contained production/consumption, consumption, or production economies. Such models will be particularly useful for questions regarding the status of Ekron during the Iron II period, when it served as a vassal city-state beholden to the military and commercial interests of the Neo-Assyrian empire (Gitin 1995:63-64). Earlier zooarchaeological research at Tel Miqne demonstrated an anomaly in the mortality profiles: In the Iron II period there was a dearth of market-aged domestic mammals attributed to the Neo-Assyrians' imperial demands on the city's herds. There are contemporary texts from Tel Jemmeh (also in Israel) that report animals being driven back to Assyria as tribute and requisitioning them to supply the empire's armies in the vicinity (Wapnish 1990:436).

Recording all evidence of butchering observed on the bones formed an additional part of this analysis. As discussed in the following section, butchery patterning may form another line of evidence for testing whether it is possible to discern a foodway attributable specifically to the Philistine population at Ekron. Butchering marks were therefore recorded in detail: their location on the bone, their orientation, type of scar, their depth, and how many individual marks are present on any one bone. These notations, when tallied by bone and by species, may form distinct patterns attributable to some ethnically specific meat preparation procedure. In addition to the aforementioned observations, an attempt was made to judge and record the 'intent' of the butchery scar – in other words, what the butcher was doing in terms of carcass division and meat removal when a particular mark was made. Binford (1981) has discussed butchery intent in terms of primary activities – skinning and dismembering the carcass, and secondary ones – further butchery into meat cuts, fracturing the bones for marrow removal, and filleting. Where possible the latter activity categories were noted in this study in order to gain more knowledge about the Philistines' meat cuisine.

Beyond the specifics of cuisine it is also critical to look at more general aspects of Ekron's ancient food strategy. Metric measurements of animal bones have long been a means of deriving information about Near Eastern domestic animal flocks, their wild forebears, and the physiological changes that the animals underwent in between. Boessneck and Dreisch (1978:25) have outlined the ways in which measurements of animal bones can be used to infer information about ancient Near Eastern animals:

1. differentiation of animal species;
2. determination of individual variation;
3. investigation of size changes in wild animals through time;
4. investigation of size changes in wild animals through space;
5. determination of sex and the study of sexual dimorphism;
6. differentiation of domestic animals from their wild forebears;
7. documentation of size changes in domestic animals through the course of pre- and early Historic times;
8. investigation of proportions and differences in proportions.

Of these eight research problems, numbers 1, 3 and 4 are not particularly relevant to the Late Bronze and Iron ages, while it remains to be seen whether there will be a large enough sample of measurable bones to investigate number 2. Further, even given a large enough sample, there is probably not enough time depth to observe the changes that problem 7 refers to. Finally, as Boessneck and Driesch discuss (1978:34), investigating proportions and their differences is basically used to measure sexual dimorphism, the investigation of which is recommended in problem number 5.

After eliminating irrelevant or inapplicable questions, there are two basic avenues left to investigate with metric measurements: sexual dimorphism and the general size of animals in each period. Especially important would be clear observations of sexual dimorphism, and rough estimates of the male and female animal population percentages, respectively. That would be useful for deriving information about the city's animal production orientation – how big a factor secondary products may have been. Driesch's (1976) book illustrated a number of measurements for most of the bones in the mammalian and avian skeletons. Those recommended measurements have become standard in the field of zooarchaeology, and a selection of them, in addition to others derived on my own, will be employed during the analysis of the Tel Miqne-Ekron assemblage. The measurements taken were the following: distal humerus (Bd, GtHt, MDp), proximal radius (Bp, GH), astragalus (GLl, Bd), calcaneus (GL, Hmal), distal metapodials (Bd, Dd), distal tibia (Bd, Dd), phalanges 1 and 2 (Bp, Glpe, Bd) and phalange #3 (MBS, GB, Ld). In the interest of time, only that selection of measurements were chosen (abbreviations are as defined in Driesch 1976). These were selected on the basis of features likely to be frequently preserved, and so as to later combine pairs measurements taken in the same dimension on different bones of the same joint. Such a method, as Davis (1996) has demonstrated, effectively increases samples of measureable bones so that sexual dimorphism in domestic mammal populations may be more easily detected. Of the measurements listed above, the following were not derived from Dreisch's work, and need both illustration (Figure 3) and explanation:

GtHt = the greatest height of the distal condyle, measured on the medial portion

MDp = the greatest medial depth on the distal end, measured from the condyle to the posterior edge

GH = the greatest height of the proximal end, measured on the medial portion

Hmal = the greatest height of the malleolar process

Dd = the distal depth, on the tibia taken on medial portion, and on the metapodials measured at the distal condyles

Some final notes should be made here about which quantification methods will be employed to estimate relative species abundance. The subject of which of the many quantification methods that have been devised for faunal analysis best describes the assemblage or living herd structure is rather confusing and the arguments for and against each method are nearly endless. The subject of bone quantification has recently been reviewed and debated elsewhere (Ringrose 1993). Remarks here are confined to justifying and outlining which quantification techniques will be used for this dissertation. All discussions of species relative abundance, element distributions, and kill-off profiles will be based on uncorrected counts of numbers of bones, the Number of Identified Specimens (NISP). Animals present will be classified to the

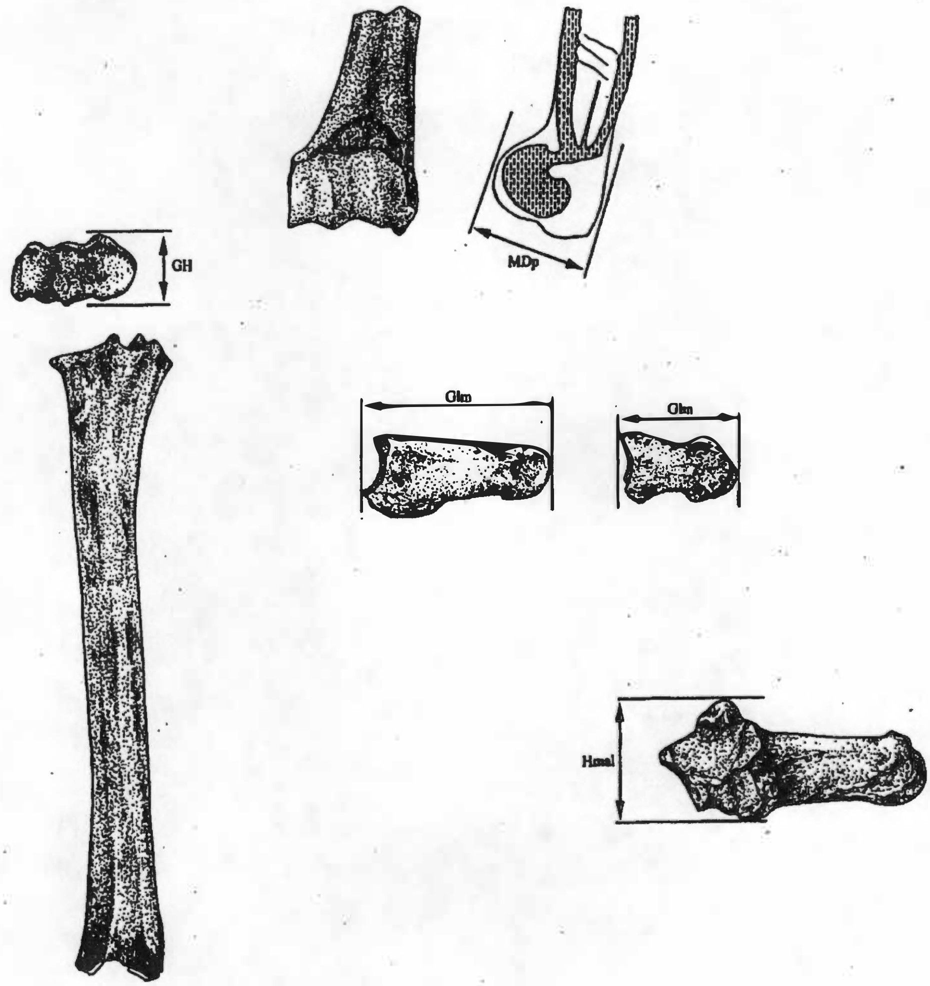

Figure 3: Demonstration of metric measurements. Illustrated here are measurements used in this study which were not discussed and illustrated in von den Driesch (1976).

taxonomic level of subfamily (as in *Caprinae*) or, in most cases, genus (as in *Alectoris* sp.) and species (as in *Sus scrofa*). NISP is the quantification technique most commonly used for summarizing animal bone assemblages from Near Eastern sites. This is probably due to the huge sample sizes common from Historic period excavation, as well as the nature of tel excavations. Tels of course are excavated in many distinct horizontal areas, various strata each from a different period, architectural units with several construction phases within a stratum, and innumerable smaller units, including 'loci' and 'bucket(s)'. Depending on the research questions being addressed by the zooarchaeologist as well as post-excavation decisions by field archaeologists, these excavation areas, phases, strata, etc. may be combined or split, as information is gathered and investigative avenues change. Following such a decision, the bone sample would also have to be combined or split.

Of the two major quantitative methods in zooarchaeology, NISP and MNI (Minimum Number of Individuals), the former is much more appropriate to the type of bones assemblages generated by tel excavations. NISP figures for various species identified are far easier to collapse and divide among vertical and horizontal units of excavation. The NISP figures are additive – they are simple totals of bones per taxonomic category. MNI is not additive in the same way that NISP is: the latter estimate is generally derived by adding up whole or similar portions of the most frequently occurring sideable element for each species (Grayson 1973), as in the MNI for sheep being five, because five right proximal femora were identified in the assemblage. But this estimate is not easily corrected when excavation units and bone samples are combined and divided. It has to be completely recalculated each time, since, as in the example, the proximal right femur may no longer be the most frequently occurring element (Klein and Cruz-Uribe 1984). Further, MNI has a rather complicated relationship with archaeological strata and other units of excavation. Grayson (1973:433) points out that MNI calculations are quite dependent on the way in which archaeological units are combined: if it is calculated for each stratigraphic and horizontal unit, one achieves a sort of 'maximum' MNI. Yet, the MNI estimates are much lower if MNI is calculated in one stratum of many horizontal units.

The problem is that two researchers at two sites, or the same researcher at two sites, may not use comparable archaeological units to arrive at MNI figures, rendering the two assemblages incomparable. Tel sites tend to be very complex accumulations of cultural debris, comprising many strata and architectural phases over wide horizontal areas. Tels can have very different occupational histories even when several date to the same historical period, so that such archaeological projects tend to end up with quite different excavation strategies from one another. That is probably the reason that simple bone count – NISP – is by far the most common method employed. Additionally, the Minimum Number of Individuals assumes, at least implicitly, that whole animals were present at the site at some time. In some instances this may be a reasonable assumption, but in this context it is unlikely that MNI would be a realistic measure of dietary preferences. The redistributive economies of ancient southwest Asian cities, which at times had centralized control of meat distribution, probably resulted in carcass parts, rather than whole carcasses, being distributed to households. In addition, the site formation processes of tels, previously discussed, tend to spread bones around to great extents, such that a carcass that was deposited as a complete pile of bones (as opposed to an articulated animal burial) probably had little chance of remaining that way for several thousand years. For reasons of comparability between sites, ease of recalculation as archaeological units of analysis are changed, and the nature of tel formation with respect to bone deposits, NISP will be the method of species abundance used for this project.

Bone weight is the another relative abundance estimate sometimes used in Near Eastern zooarchaeological investigations. Based on an informal survey of Near Eastern archaeozoological literature, this seems to be the next most popular method of quantification after simple counts. Some authors (e.g., Zeder 1991) report relative abundance of species by weight, but for their interpretations rely primarily on NISP. Others use bone weights as a simplistic method of deriving a gross figure for the amount of meat available per species per unit of time and/or space (e.g., Grigson 1995). Although all bones were weighed as well as counted during this analysis, relative abundance figures for all species will be based solely on NISP values. Bone weights were used only for evaluating the general taphonomic and depositional history of the assemblage and for calculating average weights per bone fragment.

Chapter 6: The Animal Economy of Tel Miqne-Ekron in the Late Bronze Age

The Late Bronze Age: Historical Summary

The principal texts that inform us about the Late Bronze Age of Syro-Palestine (ca.1550-1200/1150 BC) come from Egypt. These sources include records from New Kingdom Egyptian pharaohs' victory stelae found in the Levant, tomb paintings, and the Tel el-Amarna tablets. The latter tablets were accidentally discovered in the nineteenth century at Amarna in Egypt, and constitute royal correspondence, written in Akkadian, between the Pharoanic court and various independent states or vassal kingdoms of Egypt in western Asia. In addition to the Egyptian records, there also exist period texts from cities in what are now Syria and Turkey. From Syria, important archives are known from Ugarit and Alalakh. Both the latter two archives are diverse, and record the mundane daily business of the cities – tax lists, legal decisions, contracts, wills, as well as subjects pertaining to foreign affairs – treaties, letters from foreign rulers, and tribute lists. Excavations early in the century at Hattusas, the capital of the Neo-Hittite state, also uncovered a large library of cuneiform texts pertaining to both intra and interstate affairs (Redford 1992:140-146).

Despite the fact that excavations have unearthed these several large and important archives written in Akkadian, and archaeological research on the Late Bronze Age in Palestine has been intense, we do not have a good idea about the political landscape of the southern Levant during this period. It is therefore difficult to evaluate the implications of the complex geopolitical scene on the Late Bronze Age settlement at Tel Miqne. What we do understand in general terms, on the basis of the correspondence between Canaanite kings and the Egyptian court contained in the Amarna letters, is that Palestine in this period was divided up into a patchwork of petty kingdoms. At least the major city-states of Canaan along with their dependent territories and towns, were under the imperial control of New Kingdom Egypt (Na'aman 1997; Pitard 1998:60-61).

Egyptian pharaoh Ahmose and his successors in the eighteenth dynasty, after militarily expelling the foreign, presumably ethnically West Asian, Hyksos dynasty from Lower Egypt, pursued them into

Canaan. Several of this dynasty's pharaohs campaigned in Palestine from the end of the Middle Bronze Age through the early part of the Late Bronze Age (the last of the seventeenth and first half of the sixteenth centuries). Pharaoh Thutmose III defeated a coalition of Canaanite and Syrian city-states at Megiddo, tightening Egypt's rule over the province. Egypt however was less successful in its Syrian military campaigns. Two new powers in north Syria/south Anatolia -- the Mitannian and Neo-Hittite states -- competed with each other and with Egypt for control over Syria, the Lebanese coast, and even Palestine. As a result, Egypt was forced to mount a number of campaigns to Syria (marching through Palestine) to defend its interests in the north against the latter powers. These military adventures were only partially successful for Egypt; battles with Mitanni eventually reached a point of equilibrium, such that it became in both parties' interests to draw up and stick to a peace treaty. In part that treaty was the result of the emerging Hittite threat. The growing power of the Hittite state eventually challenged the Egyptians' presence in Syria; Egypt fought several unsuccessful battles with the new power before Rameses II eventually signed a peace treaty with them in circa 1258 BC (Pitard 1998:61-63).

Just what the reasons for the Egyptian military actions in Canaan were remains a subject of controversy. It is clear that the Egyptians, even after accomplishing the total defeat of the Hyksos and allies in Canaan, decided to retain control over the area and establish it as a province of the New Kingdom empire. Scholars debate as to whether the lasting Egyptian presence in Canaan was mainly strategic or economic. From a strategic point of view, Canaan was important to control, since it gave their military a base and support area for launching campaigns against the aforementioned northern powers, as well as allowed Egypt to control major trade routes which carried luxury goods from inland areas to the sea (Weinstein 1982). Other opinions do not discount the latter motives, but add that Canaan itself was inherently attractive, given its agricultural production potential, and find proof for this in Egyptian tribute records (Redford 1992). Ahituv (1978) discounts the economic importance of Canaan to the Egyptians, preferring to see Egypt as agriculturally self-sufficient and generally wealthy, and the tribute records representing small amounts of agricultural goods of mainly symbolic importance, except for those goods which were earmarked for Egyptian troops stationed in Canaan. Whatever the amounts, the tribute records do record payments in the form of silver, copper, timber, grain, and cattle (Ahituv 1978; Redford 1992:209-211).

As time went on, the Egyptians governed their empire in Canaan with a firmer and firmer hand, in order to control the local population and ensure payment of taxes by local vassals to the Theban court. To that end, they established garrisons, planted Egyptian governors, and constructed fortresses in important towns and along crucial trade routes or borders (Redford 1992:203-207). The eighteenth dynasty pharaohs campaigned extensively in and to the north of Palestine, and garrisoned mainly those major towns which lay along the *via maris* 'the way of the sea', the ancient trade route which followed the Mediterranean Sea northward from Egypt across Canaan's coastal plain. Later, in the fourteenth and the first half of the thirteenth centuries, the kings of the nineteenth and twentieth dynasties pushed the areas under Egypt's direct control farther inland, perhaps encompassing the inner coastal plains and portions of the hill country to the east of the via maris (Singer 1994:284; 290).

Archaeological surveys and excavations of Late Bronze Age sites in Palestine have painted a picture of a region in decline. The preceding Middle Bronze Age is considered to be a zenith in the development of urbanism in this region, as large fortified cities with grand palaces and other public buildings emerged in that period. By contrast, many of these same cities seemed to have been more meager settlements by the next period of the Bronze Age: fortified cities were uncommon, and many formerly large cities contracted to small settlements. The reason for the lack of fortifications in the Late Bronze Age is unknown, but the traditional view holds either that Egypt forbade their construction, or that the massive walls typical of the Middle Bronze Age were somehow sufficiently strong to last, unimproved or repaired, for several hundred more years. Possible reasons for the decline of Canaanite cities in the Late Bronze Age are hinted at by heavy destruction layers uncovered at a number of late Middle Bronze Age sites. The campaigns of Egyptian pharaohs against the Hyksos in Canaan, especially those of Thutmosis III, are often pointed at to explain these ruined cities. Because of problems in precisely dating the destruction levels, it is difficult to say with certainty that Egyptian military campaigns were the sole cause. It is also possible that at least some destructions were the result of inter-polity aggression between neighboring Canaanite city-states (Bunimovitz 1994:185; Weinstein 1982:1-5). Whatever the exact causes of all the destructions, it does seem likely that Egypt had a hand in at least some. Egypt's aggressive policies, fiercely punishing rebellious Canaanite city-states, conducting large scale military campaigns from Canaan to points north, and constantly exacting at least some tribute from the polities under their control, probably combined to drain both the Canaanite city-states and New Kingdom Egypt of much of their earlier vigor (Ahituv 1978).

By the late thirteenth century and the first half of the twelfth century, Egypt was facing increasing pressures from both internal and external forces which evidently led to its eventual decline and withdrawal from Canaan by the early part of the Iron Age I. Rameses III ascended the throne at the end of a 20 year period of political turmoil in Egypt, and set about greatly enriching the temples and giving new powers to the priesthood. The temples' new-found wealth was likely, at least in part, generated by heavy taxes on the population of Canaan (Singer 1994:290). At the same time, Rameses was probably involved with defending Egypt against both sea peoples and increasingly frequent disturbances by various groups of nomadic people in Canaan, factors which all combined to bring an end to Egypt's empire in Asia by, at the latest, the time of Rameses VI in the second half of the twelfth century (Weinstein 1982:22-23).

The Political System of Late Bronze Age Canaan in Regard to Tel Miqne

No city which can be identified with the site of Tel Miqne is named in the Amarna letters, indicating that it was probably not at this time an important town with a Canaanite vassal king[10]. Only the most important Canaanite kingdoms corresponded with Egypt, and these are the ones mentioned in the Amarna archive. Of those mentioned in the archive, most cities' locations are known (and some even excavated), whereas the locations of other, less important kingdoms or cities, remain unknown. Further,

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[10]'Ekron' was the city's name during the Iron Age, after the Philistines settled there. We do not know what the Bronze Age town was called, as many cities were renamed at the beginning of the Iron Age (Na'aman 1997:612).

the Amarna archive did not survive in a full and complete form, and the correspondence it contains covers only some 30 years of the three and a half centuries of the Late Bronze Age (Na'aman 1997:604). The Late Bronze Age settlement at Tel Miqne was limited to the ten acre 'acropolis' or parts thereof (Killebrew 1998a:163-164), much smaller than its Middle Bronze Age predecessor, and so it's likely exclusion from the Egyptian texts is not surprising. The small settlement on the mound probably was a vassal town belonging to one of the kingdoms of Late Bronze Age Palestine.

At that time the region was probably divided into around 25 kingdoms which were evidently governed in a hierarchical manner: each kingdom controlled a territory surrounding its principal city, but some kingdoms ranked higher than others and dictated political policy to the lesser kingdoms, just as the lesser kingdoms governed their subservient towns and villages. Above this feudal structure were Egyptian garrisons and governors at a few chosen sites, which carried out Pharoanic policies in Canaan. The Egyptian conquest of Canaan evidently left largely intact the pre-existing political structure of the region and simply added an additional bureaucratic level in order to coerce Canaanite kings to obey and collect taxes for Thebes (Ahituv 1978:93-94; Na'aman 1997:615-620). The Late Bronze Age settlement on Tel Miqne was probably one of these small countryside towns incorporated into one of the Canaanite kingdoms.

The Amarna letters, as well as excavations, make clear that three settlements close to Miqne, Lachish, Gath (probably the mound of Tel es-Safi), and Gezer, were in this period thriving, large cities and the seats of Canaanite kingdoms (Na'aman 1997:619; Singer 1994:307). Bunimovitz (1995) has attempted to reconstruct the boundaries or at least spheres of influence for the Late Bronze Age Canaanite polities based on those principles laid out in Renfrew and Cherry's (1986) 'peer polity interaction' model. He posits that these relatively small administrative centers could have dominated the rural population in a radius of about 20 kilometers, a distance possible to cover in a one day round-trip from the dominant city. The mound of Tel Miqne is, as the crow flies, about 11 kilometers distant from Gezer, some 21 kilometers away from Lachish, and only eight or so kilometers from the probable location of Gath.

It is more or less a matter of speculation to try and estimate which of these surrounding Late Bronze Age cities would have been in control of Tel Miqne. Lachish was probably the largest of the three important cities (Ussishkin 1993:899) by the thirteenth century B.C., but is at or beyond the maximum boundary distance which Bunimovitz (1995:326) estimated for these small kingdoms. On the other hand, Gezer, the second closest to Tel Miqne, was already a powerful citadel a century earlier than Lachish and probably hosted an Egyptian governor's residency (Dever 1993:502). As well, Gezer's power at that time is underscored by its mention in ten of the Amarna tablets as well as in two inscriptions of late-thirteenth century pharaoh Merneptah, who boasted of having destroyed it (Dever 1993:496). On a clear day Tel Miqne can be spotted from Gezer, and vice-versa. As for Gath, Na'aman (1997) believes this town to have been the seat of a Canaanite vassal king by the name of Abdi-Ashtarti. Certainly, Gath and Ekron during the Iron Age had a close relationship, as both were the inland cities of the Philistines on the eastern border with Judah. The site is not well known archaeologically. It was (poorly) excavated in the first years of this century, and a project to re-excavate it has only gotten under way in the last few years.

Another possible candidate for Tel Miqne's governing city is Ashdod, a major mound located about 18 kilometers west near the coast. Ashdod is not clearly mentioned in the Amarna letters, but is named in Late Bronze Age tablets discovered at Ugarit in Syria (M. Dothan 1993:93-94) and served as a supply station for Egyptian caravans traveling the coastal route (Singer 1994:285). Tel Miqne-Ekron is in fact situated on a different highway, one which in ancient times led from Ashdod to Gezer (T. Dothan and Gitin 1993:1051). In the Hellenistic period, a 147 BC transaction states that Ekron and its territory were "torn from [the territory of] Ashdod" and granted to a loyal follower by a Hasmonean king (T. Dothan and Gitin 1993:1052). Hellenistic borders are suggestive of more ancient political boundaries, but cannot be relied upon for reproducing Late Bronze Age territorial extents; even Biblical border accounts, presumably reflecting at least seventh century BC political realities, are not considered reliable for delineating Late Bronze Age polities (Na'aman 1997:601).

Given the size, political importance, and proximity of Gezer, it would seem logical that Tel Miqne was closely tied to that city's affairs. Vassal kingdoms' territorial limits probably did shift somewhat over time, as administrative centers rose or declined in importance, were punished or destroyed for rebelling against Egypt, or when territory was seized by one petty kingdom from another. Nevertheless, regardless of which kingdom Tel Miqne belonged to at which point in the Late Bronze Age, the point is that the settlement was probably not completely self-governing but rather was under the political jurisdiction of a neighboring, larger town (Gonen 1992:214). Canaan's Late Bronze Age political system was hierarchical: Egypt viewed Canaan as its province in Asia, and governed all or parts of it for some three hundred years, the territorial extent varying with the vigilance and power of the various dynasties and individual pharaohs of the period. The important towns of Canaan, as revealed by the Amarna letters, corresponded with, hosted administrative and military representatives of, and paid taxes and tribute to the ruling Egyptian king. In turn, the Canaanite vassal cities administered their agricultural hinterlands, together with those relatively few small towns that territory encompassed[11], on behalf of their Egyptian overlords (Na'aman 1997).

This administration presumably involved both tax collection in the form of agricultural products, either for shipment to Egypt or for Egyptians stationed in Canaan, as well as protection for the rural towns in the case of attacks by neighboring kingdoms or nomads (Ahituv 1978). Late Bronze Age stratum IX at Tel Miqne was destroyed by fire, which perhaps temporarily destroyed the entire settlement and could have been the result of one of these border skirmishes (Killebrew 1998b:381). Subsequently, the Late Bronze Age settlement of stratum VIII was also destroyed by fire, presumably this time a result of the Sea Peoples/Philistine invasions which resulted in the substantially different Iron Age city of Ekron (T. Dothan 1998:150-151, 1995:42). Thus even as, at best, an unfortified secondary town in a petty kingdom, the settlement at Tel Miqne may have been incorporated into a social and economic system which extended further than the small town's houses and surrounding fields (Bunimovitz 1995; Knapp 1992b). The political arrangement into which Tel Miqne may have been incorporated could be indicated by the

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[11]Bunimovitz (1995) and others have characterized the Late Bronze Age as having been a period of diminished rural settlement, in contrast to the preceding Middle Bronze Age. This phenomenon is usually attributed to the collapse of the Middle Bronze Canaanite city-state system and the concomitant conquest, military campaigns, and tribute demands of New Kingdom Egypt's administration of the region.

pattern of livestock production visible in the Late Bronze Age faunal assemblage. Pastoral production of course varies according to the goals of herders (or the bureaucrats who orchestrated production), which in turn depends upon the type of system into which livestock raising is incorporated – subsistence agriculture and local exchange, or cash-cropping and long distance/market exchange (Hesse and Wapnish 1988).

To what degree the small settlement at Tel Miqne was involved in the wide-ranging political, economic, and military affairs of the Late Bronze Age is an open question. Although the settlement was small and overshadowed by large neighboring cities, there are indications that there was at least some contact between the town and the outer world. Throughout the Late Bronze Age strata there are inclusions of imported goods, mostly Cypriote and Mycenaean wares, but also gray burnished ware, a type of pottery native to Anatolia (T. Dothan 1989:2). A Late Bronze human burial interred into the slope of the mound, discovered during the course of excavating a step trench there, is interesting in that the person was buried with a variety of Egyptian New Kingdom memorabilia, including a nineteenth Dynasty scarab, a faience seal, a calcite goblet, as well as a variety of pottery vessels imported from not only Egypt, but Cyprus and Mycenaean Greece as well (T. Dothan and Gitin 1993:1052); perhaps the deceased was an official representative of Egypt at the town. The political background of Canaan during this period is somewhat confusing, as we have a strong empire ruling the area at least in name, yet one which seems to have tread lightly on its Asian territory, given the conflicting and controversial nature of the archaeological evidence. Tel Miqne, as well, displays a contradictory personality in the period: it exhibits an unimpressive ten acre settlement, yet boasts a "cosmopolitan flavor" (Dothan 1995:42), with a variety of imported goods present. Economic evidence in the form of faunal remains may therefore go a long way toward clearing up some of the remaining mysteries surrounding the settlement's role during the twilight of Bronze Age in the Levant.

Characteristics of the Late Bronze Age Faunal Assemblage

The faunal assemblage from Late Bronze Age strata at Tel Miqne-Ekron was large, though most of it emerged from stratum VIII (fourteenth to thirteenth centuries) contexts, and only relatively small numbers from stratum IX (fifteenth to fourteenth centuries). In all, a total of 2,268 bones was identified to species or other taxonomic categories, while an additional 2,533 fragments were not identifiable beyond very general categories (see Table 5 for list and relative abundance of identified species). The relative abundance of the various animal species present in the two strata differed somewhat over the three century period which these strata represent, though the temporal trends are not reliable since the stratum IX sample (237 identifiable bones) is much smaller than the stratum VIII one (1,832 identifiable bones).

Both Late Bronze strata contained a small number of pig bones. Finds of pig bones in archaeological faunal assemblages always elicit great interest on the part of archaeologists and zooarchaeologists working in Israel. Hesse (1990) has discussed at length the relative abundance and distribution of archaeological pig remains in Israel over both time and space, and has categorized a variety of sites as being 'pig-poor' or 'pig-rich'. The pig bone sample from stratum IX is almost nonexistent, and comprises less than one percent of the identifiable bones. Yet by the following period, stratum VIII, pig bones are more common in the sample, totaling three percent of the diet. According to Hesse's (1990)

Table 5: Species List for Tel Miqne-Ekron during the Late Bronze Age

Species	**Stratum →**	**VIII**		**IX**	
	Common Name	Number	Percent	Number	Percent
Bos taurus	cow	525	27	57	24
Capra hircus	goat	86	5	6	3
Ovis aries	sheep	87	5	18	8
Ovis/Capra	sheep/goat	1199	57	178	65
Equus asinus	donkey	3	<1		
Sus scrofa	pig	59	3	1	<1
Canis familiaris	dog	12	1		
Dama dama	fallow deer	2	<1	1	<1
Gazella sp.	gazelle	1	<1		
	Fish	18	1		
TOTALS		1980		261	

survey of pig use during the Late Bronze Age of the region, both these percentages are typical for sites of the period, though the ratio of pigs to sheep/goats to cattle here is extreme compared to contemporary sites, at 1:22:9. Zeder (1998), working with faunal data from a Bronze Age site on the edge of the Negev desert, categorizes four percent pig as indicative of a relatively intensive swine agriculture program, as compared with preceding and postdating periods.

Hesse (1990:212) and Zeder (1998:115-116) both characterize the relative abundance of pigs at several Late Bronze sites as being high, ranging from 13 to less than one percent, and offer explanations centering on the political and regional economic status of the respective cities in the period. They propose that cities unincorporated into regional economic networks and large trans-regional political entities are more likely to seek (or be free to pursue) livestock economies which return both maximum benefit for labor input, and which foster an independently sustainable agricultural economy, characteristics with which swine agriculture has often been associated (Diener and Robkin 1978:501).

Zeder's and Hesse's similar ideas about the reasons for emphasizing pig-raising have much merit, but need to be adjusted and re-examined for the current case study. The animal economy of Tel Miqne-Ekron varied significantly over the millennium of time uncovered by excavations. When Late Bronze Age animal economy of the site is examined in isolation from other periods present, the theory fits the data well: the amount of pigs consumed at Tel Miqne during the fifteenth through thirteenth centuries does seem high. Yet, when this part of the faunal assemblage is compared with the post-ceding, Iron Age I sample from Ekron, when pigs accounted for a much greater portion of the diet (Hesse 1986:21-23), the herds of hogs eaten and raised in the Late Bronze Age seems rather low. Indeed, the Late Bronze Age figure for this site is within the range of pig use at some Islamic period sites (e.g., Loyet 1999:37), when we would otherwise interpret the animals' presence to be rather low. Thus the diachronic pattern of pig use at Ekron is somewhat at odds with Hesse's (1990) and Zeder's (1998) characterization of Late Bronze Age swine-raising as being a high period, and begs the question of which pattern is more relevant – synchronic change across the region, or diachronic change within the site?

The question becomes more complex when pig use patterns during the preceding Middle Bronze Age II (ca. 2000-1550 BC) are taken into account and placed into the politico-economic setting. The Middle Bronze Age in Canaan is generally characterized as the period of urban fluorescence in the region, when, after the Early Bronze Period of state formation and city development, and subsequent decline of both phenomena during the Early Bronze Age IV/Intermediate Bronze Age, many Canaanite cities rebounded and reached a size not again achieved until much later in time (Mazar 1990:174-175). It is within this period that pork consumption, obviously a cyclical phenomenon in the area, attained a high unparalleled since late prehistory (the Neolithic and Chalcolithic periods) and unmatched during 'Biblical' times except in some of the early Philistine cities (Hesse 1990).

Because pork consumption seems firmly linked to degrees of state-level integration, it is important to understand the political map of the mid-second millennium Levant. The city-states of Canaan during the Middle Bronze Age were under strong influence from both Syrian kingdoms to the north and the Egyptian twelfth and thirteenth dynasties to the south. The Egyptian Execration Texts consist of three groups of inscriptions on bowls and figurines which curse various peoples and places in Canaan considered hostile to Egypt. At the minimum the curses denote a strong interest by the Nile kingdom in controlling Palestine, and at a maximum (along with scattered other evidence) may be interpreted to mean that Canaan was all or in part under direct Egyptian rule: few scholars, however, now support the latter theory (Kempinski 1992:160-161; Mazar 1990:186).

One consistent aspect of excavated Middle Bronze Age cities in the Levant, which casts doubt on the idea of the region having been under external rule, are their massive fortifications. Most large cities of the period were surrounded by thick mudbrick walls built atop huge (both tall and wide) revetments made from compacted debris, mudbricks, and stone chips, which were sometimes separated from adjacent fields by deep defensive ditches (Kempinski 1992:175-177). If the general lack of city fortifications in the Late Bronze Age is taken to mean, as it generally is (e.g., Bunimovitz 1994), that the Egyptian New Kingdom pharaohs forbade their construction during a time when they ruled Canaan, then the presence of such massive architecture during the Middle Bronze Age perhaps should be taken to mean the opposite, that external powers did not control the area. The political situation during this period probably resembled a patchwork of powerful, largely independent Canaanite city-states each controlling a rural hinterland. Both Egypt and the Syro-Mesopotamian kingdoms vied for political and economic influence over the southern portion of the Levant, but it is doubtful that any external power truly governed Canaan as a province, and at best maintained alliances and trade relationships with the city-states.

It appears then that, at first glance, the evidence from Tel Miqne supports Zeder's (1998) hypothesis concerning relatively high pig use in the Late Bronze being a consequence of low regional economic integration. The relatively low amount of pig use at Tel Miqne in this period is then understandable as an indicator of high regional integration in the coastal plain, as a part of the larger economy of a Canaanite petty kingdom to some extent politically and economically tied to Egypt. In the case of both Tel Halif (Zeder 1998) and Tel Miqne, the relative proportion of pig bones is the same, three percent. Yet, what is apparent is that pig use at the desert border site of Tel Halif varied relatively little over time as compared to many of the Philistine sites. At Tel Halif, pig use varied from a high of three percent in both the Early Bronze I and Middle Bronze, to a low of one or less than one percent in both the Early Bronze III and Iron Age (Zeder 1998:112).

Therefore it seems that, while there may be much merit in Zeder's pig theory, the case chosen to illustrate it is a poor example of the phenomenon: the relatively small range of variation present in the sample would seem poor evidence used to support a good theory. Certainly, Zeder's Mesopotamian examples of the same pig phenomenon (1998:117-119), where pork drops from a high of 20 percent to two percent or less during a period of gradual regional economic integration, make more convincing case studies. Indeed, the variation present over time at Tel Miqne-Ekron is much greater even than Zeder's Mesopotamian examples, ranging from less than one percent to 24 percent over the course of approximately three centuries.

The concern about varying levels of pig consumption over time and its link to politico-historical trends, is intriguing given the (at least) late antique to modern Jewish and Moslem populations' almost uniformly negative attitude toward the animal. Yet the link between pigs and politics, as well as pigs and ethnicity, should not be considered in isolation from other zooarchaeological and artifactual evidence, as has sometimes been the case with archaeological discussions of ancient ethnicity and dietary rules (e.g., Finkelstein 1997). Animals other than pigs played more important roles in the diet and general agricultural economy of the town at Tel Miqne. Information concerning the importance of other animals aside from pigs must be analyzed in coordination with the relative abundance of the latter animal, in order to gain a realistic picture of the town's agricultural economy at the close of the Bronze Age. In fact, overwhelmingly, the most important animals in the Late Bronze age animal economy were sheep and goats, followed by cattle, and distantly, pigs.

As is common through most periods and in most places in the Eastern Mediterranean region in general, and Palestine in particular, since the Neolithic, sheep and goats dominated the diets of the townspeople. The small sample from stratum IX yielded an assemblage comprising 75 percent sheep and goats, whereas the larger, later, sample from stratum VIII ameliorated that figure somewhat, containing 65 percent ovicaprids. These animals are of course difficult to differentiate based on osteological evidence, and so only a small percentage of each stratum's caprine sample could be identified as one or the other species. From the stratum IX sample of 178 sheep/goat bones, fourteen percent (24 elements) could be classified as sheep (75 percent or 18 bones) or as goat (25 percent or 6 bones). The 3:1 ratio of sheep to goats might normally be indicative of a specialized livestock economy, concentrating, perhaps on wool production. Yet the small sample size precludes such a conclusion, and the numbers from the large stratum VIII assemblage argue against such an economic orientation. The ratio of sheep to goats in the final Late Bronze stratum was 1:1 (87 sheep to 88 goat bones), indicating an economy not oriented toward wool production beyond the household or village level. Given the much larger sample size for this stratum's bone sample togther (1,832), of which two thirds were sheep/goats, the evidence indicating an unspecialized economy seems the more likely characterization of the village's Late Bronze production system.

The ratio of sheep to goats is, however, not the only tool available for zooarchaeologists wishing to use animal bone evidence as a key to an ancient society's degree of economic specialization or incorporation into regional market and production systems. Payne (1973) has developed a model for interpreting sheep and goat mortality profiles, based on his work in Anatolia, as a reflection of a given ancient community's interest in the production of milk, meat, wool, or some combination of the three products. Hesse and Wapnish (1988), basing their research on a bone assemblage from Middle Bronze levels of Tel Jemmeh in southern Israel, have also used mortality profiles to understand ancient cities' economic orientations: that research led them to delineate three broadly-defined animal production strategies which may be detectable in sheep and goat slaughter patterns.

The latter pastoral schemes consist of (1) the *self-contained production/consumption model*, where animals are "maintained and exploited locally" so that the harvest profiles should display "all of the mortality experienced by a domestic herd" (2) a *consuming economy*, in which "animals are purchased or acquired from pastoral specialists in addition to those raised locally", recognizable archaeologically when slaughter patterns "include an abundance of market-age animals and a relative dearth of animals of reproductive age" and (3) a strategy labeled the *producing economy,* such that "animals are raised locally both for community consumption and for outside sale". Producing economies can be further divided into those whose primary products are meat, milk, or wool -- an adaptation of Payne's (1973; summarized above) earlier formulations of livestock-raising goals. In such an economy, communities specializing in raising animals for meat should return harvest profiles showing "a dearth of market-age animals". In a dairy system, the very young and very old animals -- surplus stock -- which could be marketed for meat would "be poorly represented in the sample". Finally, a lack of old male and female animals in a harvest profile may be indicative of sheep and goat herds kept primarily for wool production (Hesse and Wapnish 1988:84).

The mortality profile for Late Bronze Age sheep and goats makes it seem unlikely that village residents of the period specialized in producing secondary products, as for market or tribute demands. There exist two basic methods for estimating an animal's age at death, epiphyseal fusion, as cataloged by Silver (1969), and tooth wear patterning analysis, as demonstrated by Payne (1973). Tooth wear is generally a finer aging tool than fusion-based age estimates, but mandibles containing teeth generally do not survive as well, often creating relatively small samples from which to reconstruct mortality profiles, as is the case here. Similarly, the long bones of very young animals tend not to survive postdepositional processes as well as those of older animals, creating an additional taphonomic problem. Aside from preservation biases, there are inherent methodological biasing tendencies in each ageing method; tooth wear tends to underestimate the presence of young animals, whereas fusion tends to underestimate the presence of older ones (e.g., Wapnish and Hesse 1988) . Where possible, it is best to use both methods to reconstruct ancient economic orientations.

The Late Bronze Age slaughter pattern based on fusion estimates (Figure 4) is a classic example of the 'prime-dominated' population model known from archaeological faunas but not documented in wildlife population biology (Stiner 1990:309-310). Although Stiner (1990:317) attributes the cause of such mortality profiles to forms of selective hunting, the case here is somewhat different. What is involved in this instance are not uncontrolled wild ungulate herds, but rather flocks of domesticated sheep and goats managed in accordance with the human population's economic interests. In Hesse and Wapnish's (1988) terminology, the profile most resembles the self-contained production/consumption model, since there is an emphasis both on young and prime-aged animals -- a rather generalized economic orientation with flocks managed for more than one goal. Interestingly, the same mortality profile which Stiner (1990:317) interprets as a special case when wild ungulates are involved, seems to be the product of unspecialized culling given herds of domesticated ungulates.

On the other hand, the mortality profile based on tooth wear sequences (Figure 5) gives a somewhat different picture. The latter data is in agreement with the fusion-based profile in so far as kill-off of young animals is concerned, but otherwise paints an opposing portrait of the economy. Rather than a high rate of slaughter for prime-aged animals, the tooth wear profile shows a comparative lack of animals dying in this age class. Instead, the mandibular data demonstrates a concentrated kill-off in the age class comprising animals more than three years old. A reconciliation of the two separate mortality profiles, taking into account the biasing tendencies of each method, again suggests the unspecialized production/consumption model which the fusion data alone supported. Given this generalized mortality

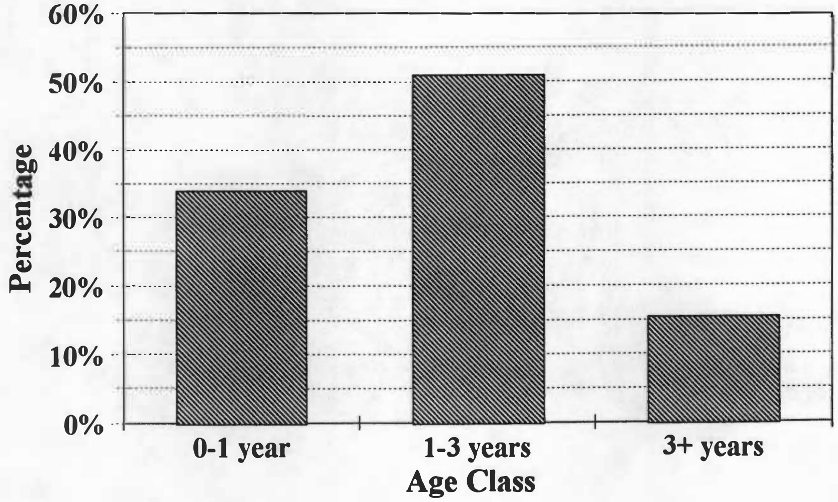

Figure 4: Late Bronze Age sheep/goat mortality patterning, based on epiphyseal fusion.

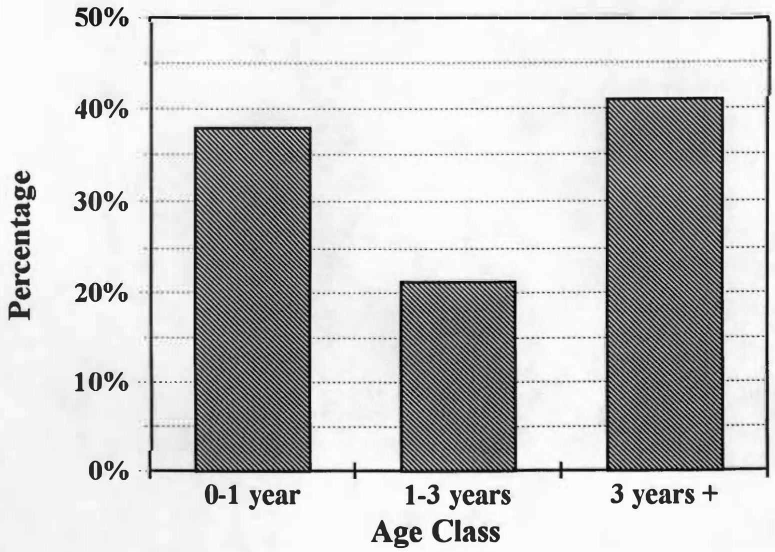

Figure 5: Late Bronze Age sheep/goat mortality patterning, based on tooth wear analysis.

pattern, it seems most likely that, during the Late Bronze Age, this town was self-sufficient, in the sense that residents raised their own animals for meat and secondary products, rather than buy them from nomadic herders.

In Payne's (1973) idealized sheep and goat economies, the Tel Miqne sheep and goat harvest profile most resembles an orientation which did not specialize in secondary products, since no one age category dominates the mortality profiles. It is most likely, therefore, that the mortality profile represents some sort of combination of goals, that is, a flock kept to produce mainly meat and milk with wool as an additional but unemphasized product. A very similar Late Bronze Age slaughter pattern was observed earlier, in Hesse's study of a smaller sample of faunal remains from Tel Miqne. That mortality profile led him to the same conclusion as stated above – the Late Bronze Age animal economy was diversified, producing both secondary products and meat for local consumption (Hesse 1986:22).

Metric measurements on skeletal parts can be used as another indicator of economic orientation. Wapnish and Hesse (1988:92-93) for example identify a bimodal pattern in sheep measurements as evidence that there was an emphasis on dairy products at Tel Jemmeh during the Middle Bronze Age. In that study, most of the specimens fell into the lower end of the measurement range, and were therefore presumed to be female, and the larger ones male. They concluded that most (female) sheep survived past one year of age, making it likely for them to have been kept for milk production. When used in conjunction with mortality profiles, metric measurements of bones fusing at different ages can assess the degree to which female and male animals were differentially selected for slaughter. The idea behind this approach is that domestic animals are usually quite sexually dimorphic, and a comparison of linear bone measurements often produces a bimodal pattern, where the mode of smaller measurements is presumably female, and the large, male (e.g., Hesse 1984:251).

The methodology behind metric comparisons is fairly straightforward. Metric measurements (mostly following the standardization recommendations of von den Driesch 1976) are taken on various elements in the faunal assemblage. One of two comparative methods is then followed: either the measurement which was most often taken (i.e., on a bone commonly occurring in a sample) is graphed and its variation (bimodal or otherwise) is examined, or all measurements on a given species are normalized by logarithmic transformation to the same theoretical dimension of a 'standard' animal (Grigson 1995). The latter method has the advantage of utilizing all measurements taken, an important consideration given that faunal assemblages are sometimes small and heavily fragmented. However, a disadvantage of that method is the mathematical transformations are only useful so long as one retains the assumption that the chosen standard animal, usually a modern animal's skeleton for which a complete set of measurements is available, is a reasonable baseline to contrast with the archaeological sample. There seems quite a bit of room to doubt the appropriateness of such a comparison, given the millennia of breed selection and refinement which has taken place in much of the world since ancient times.

The first method, simple comparison of the same measurement, has the opposite characteristics – its weakness is that there may not be enough of any one measurable skeletal element in an assemblage to make a meaningful comparison, but has the advantage of being a comparison only unto itself. Davis (1996) has presented other methods, one of which is used in this study. Utilizing metric measurements taken on an entire flock of sheep as his baseline, Davis explored the statistical relationships between various elements of the animal skeleton. Among other points of the study was an extensive analysis of how different measurements on different bones were correlated with one another. Broadly speaking, Davis (1996:604-607) found that measurements along the same axis of the body -- length, width, or depth -- are highly correlated, while those taken on different axes of different bones, or different axes of the same bones, are not so highly correlated. Additionally, it seems that measurements taken in the same or analogous areas of the body are as well closely related. Therefore it is possible to combine several measurements, so long as they are highly correlated, and treat them as being the product of the same measurement. This is a great advantage, since it enables the combining of certain correlated measurements taken on more than one element into one measurement, and in so doing greatly increase the measurement sample size for a given sample.

In the Late Bronze Age assemblage, the most frequently occurring measurable sheep elements were first phalanges, second phalanges, humeri, and radii. Unfortunately, there were not enough goat elements to explore population sex ratios. Several measurements were taken on each of the four sheep elements (following von den Driesch 1976) and their statistical relationships explored. Due to preservation reasons, the measurements which could most frequently be taken on these bones were the proximal and distal breadths. The distal breadth of phalanx 1 and the proximal breadth of phalanx 2 (the points at which the two elements articulate) were chosen for the metrical comparison because measurements of the two sets of elements, the two phalanges on the one hand, and the distal humerus and proximal radius on the other, correlated very strongly with one another (correlation coefficient =.978; p<.01). The metrical data revealed bimodal distributions for measurements of phalanges 1 and 2 (Figure 6), as well as the proximal radius/distal humerus (Figure 7). This probably indicates that the majority of the sheep were females. Because all of the bones studied fuse around one year of age, it is usually difficult to know whether these were mostly old, no longer productive, females being slaughtered, or whether young females were for some reason culled from the flock. Ideally, this could be calculated by examining the distribution of bone measurements from late-fusing elements. However, too few measurable elements which fuse at ages (three years or beyond) when we would expect females to be killed, were found in the relatively small Late Bronze assemblage.

One other clue is present in the metric data from the phalanges: four out of the ten measured specimens were not yet fused, with two of these measuring 11 millimeters and two at 13 millimeters. The larger unfused pair were undoubtedly from males, and it is likely that the others were also since they fell only one millimeter below the mean. If we assume that the latter two specimens would have attained further growth had they lived longer, then these as well must be males, making the sheep population in fact mostly male. That a significant number of males were being killed young, even before one year of age can be interpreted as evidence of milk production, although as Payne (1973:281-283) points out, female sheep and goats are allowed to live longer in order to promote herd security and growth, not only to produce milk. Nevertheless, dairy production must have been at least an important secondary goal, after

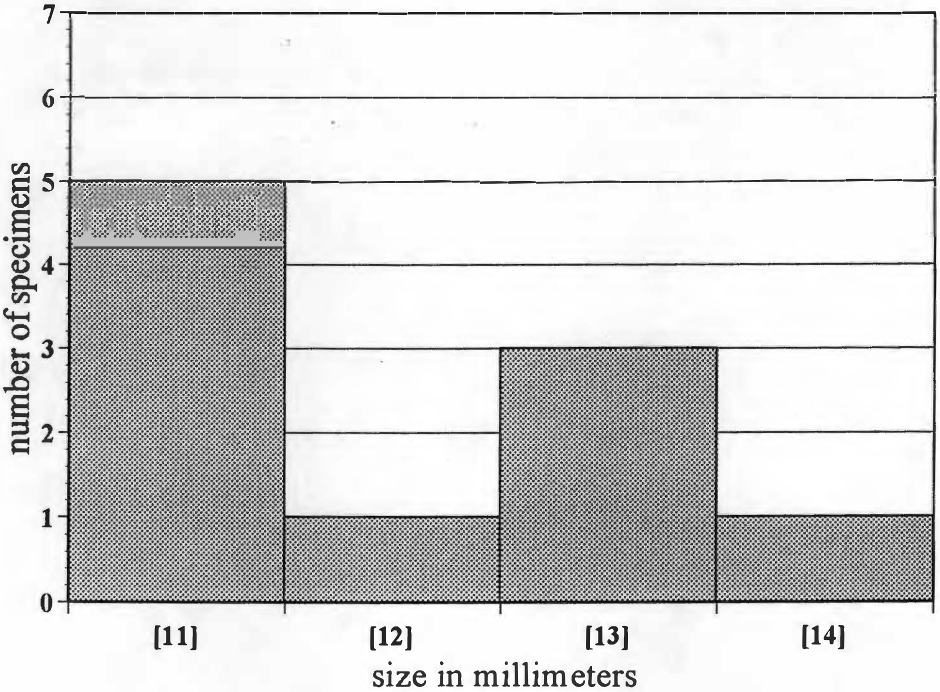

Figure 6: Metric measurements of sheep phalanges 1 and 2 from Late Bronze Age contexts. Note the bias of the distribution toward the smaller end.

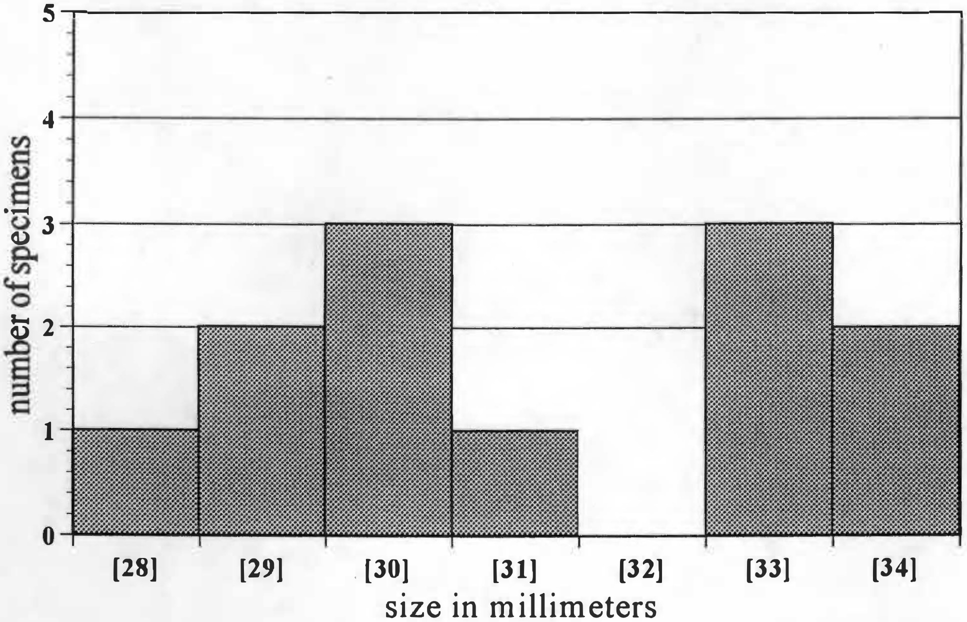

Figure 7: Metric measurements of sheep distal humeri and proximal radii from Late Bronze Age contexts. Most specimens plot smaller than the sample mean of 32 millimeters.

herd security and meat production from excess males. Therefore the metrical data are in agreement with the mortality profile, and indicates a generalized economy with a dual emphasis on meat and dairy production.

Thus far three of the four principal species – sheep, goats, and pigs – appearing the in Late Bronze Age faunal assemblage have been discussed. Cattle, however, were the second most important component in the sample. During this period, cattle contributed more than 20 percent of the bones and increased somewhat in importance, from 21 percent in stratum IX to 27 percent in stratum VIII. Cattle, like sheep and goats, had a variety of uses in the ancient world. Perhaps most importantly, the animals could be harnessed and their strength used to pull plows and wheeled vehicles. The mortality pattern for Late Bronze Age cattle, based on epiphyseal fusion only, demonstrates that the primary importance of the animals was for supplying meat and labor (Figure 8). Greater than 90 percent of all cattle in town herds lived past one year of age, with approximately half of those surviving being killed before their third year to supply meat, and the other half allowed to live some years longer, to supply labor. The paucity of animals dying in their first year of life indicates that surplus bulls, beyond those necessary for mating with cows, were probably kept for their labor and castrated to make them easier to manage. Metric data based on a combination of greatest breadth measurements from the distal end of the first phalange and proximal of the second are in agreement with such a scenario. The bimodal distribution of the distal phalange 1 and proximal phalange 2 measurements indicates that most of the cattle slaughtered after one year of age were large and, presumably, males (Figure 9).

The mortality patterning established that sheep and goats were most likely being both raised and consumed locally by village residents, as opposed to being purchased from nomadic pastoralists or driven off to meet market and tribute demands elsewhere. Similarly, the metrical data revealed an economic pattern emphasizing meat production and herd security over other possible options. The mortality data for cattle also seem to be supported by metric data: both lines of information indicate that they were not slaughtered young for meat, but rather preserved for several years for use as draft animals.

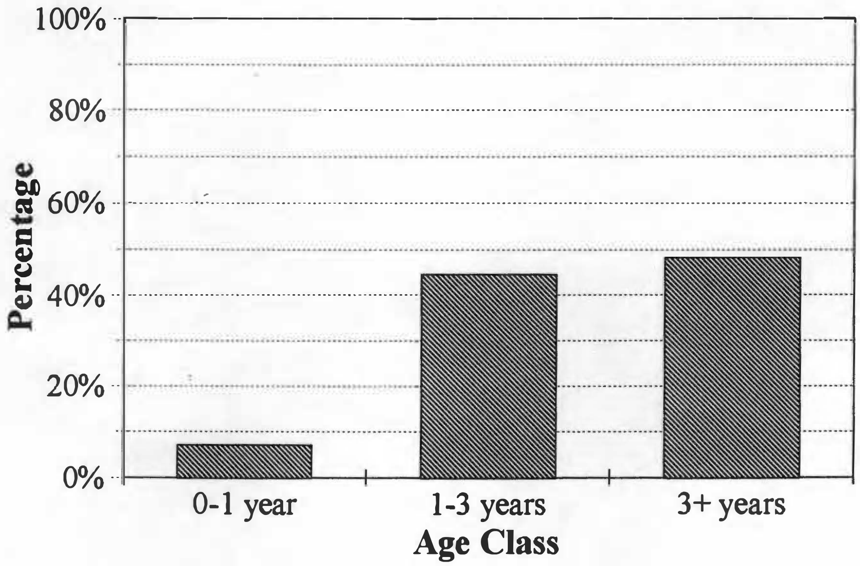

Figure 8: Late Bronze Age cattle mortality patterning, based on epiphyseal fusion.

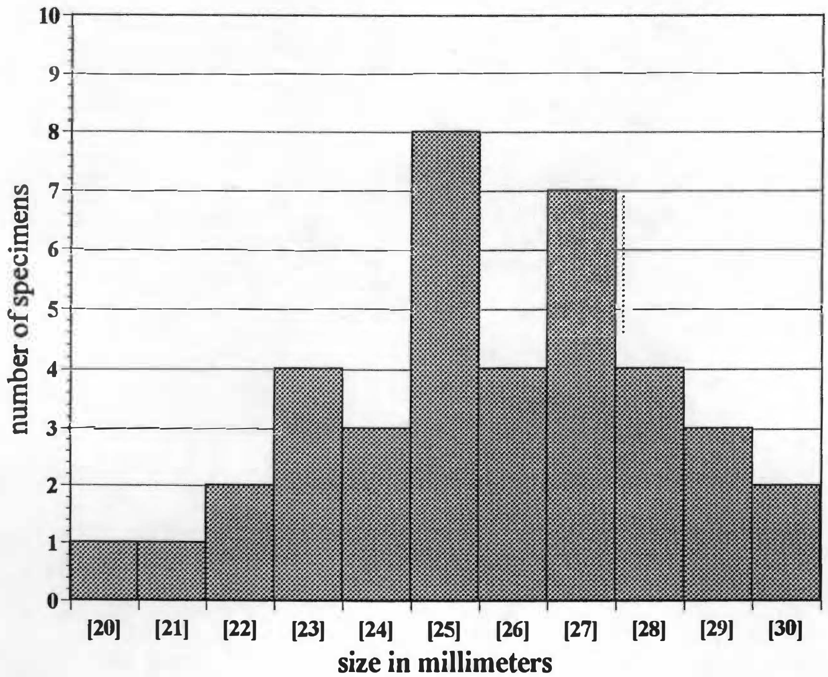

Figure 9: Metric measurement of cattle phalanges 1 and 2 from Late Bronze Age contexts. Note the rightward skew of the sample distribution from the mean of 25.6.

Analysis of the relative frequency of skeletal elements, when grouped into butchering units, can add information to this trend. Such information has been used to demonstrate redistribution of meat within ancient cities (e.g., Zeder 1991:149-153), as well as show socioeconomic stratification by indicating that certain areas or households procured 'valuable' cuts of meat or areas of the carcass (Horwitz and Dahan 1996). Uneven distribution of skeletal parts across the excavated areas of Late Bronze Age settlement at Tel Miqne might be expected, given that two physically separate and architecturally distinct areas were excavated in Field I. The storage building in the upper part of the excavated area, given that stores of figs and lentils were discovered there (Dothan 1998:151), might have been some sort of market or redistribution center, such that meat may have been stored or distributed from there as well. This may well contrast with the combined domestic/industrial area excavated on the mound's slope several meters away (Killebrew 1996a; Meehl and Goren 1996), where slaughter and initial butchery of animals could have taken place away from the population center.

The distribution of skeletal parts was examined to try and detect the presence of a meat redistribution system rather than economic stratification[12]. Skeletal elements of pigs, sheep/goats, and cattle were all grouped in the same manner: cranial, axial, forelimb, hindlimb, and feet, following the method of Horwitz (1997). The 'cranial' category included all head elements save teeth, which were not included in this part of the analysis at all, because they tend to fragment into many small but quite distinctive pieces, tending to skew element distribution analyses. Ribs, where (rarely) identifiable to species, as well as vertebrae made up the 'axial' bones. Fore- and hindlimb elements were considered to be those above the wrist and ankles. In other words, the former category contained scapulae, humeri, radii, and ulnae, while the latter comprised the pelves, femora, patellae, tibiae, calcaneus and astragalus (the latter two bones tend to stay with the large leg segments during butchering; see Klenck 1995). 'Feet'

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[12]There seems little reason to believe that any socioeconomic differences which did exist in the small Late Bronze Age settlement would manifest themselves in terms of access to meat cuts. The population of such a small village in a rural surrounding must have had easy access either directly to pastoralists selling live animals, or meat markets where the edible portion of the animal carcass was hung whole, and only divided into smaller cuts at the time a purchaser requested a certain portion of meat. The latter system is at least the one which operates in less urbanized parts of the region to this day.

elements were those that remain – metapodials as well as carpals, tarsals, and phalanges. Sesamoids were not included in any category. The latter elements are often overlooked during artifact recovery due to their pebble-like appearance, and very few were identified in the faunal assemblage from Tel Miqne-Ekron.

None of the body part distributions of the domestic ungulates indicated any sort of redistribution system. In all cases, whether sheep/goat, cattle, or pig element frequencies were examined, very equable proportions of 'meaty' trunk or limb elements and 'non-meaty' butchering offal from the feet and heads were present. The sole exception to this pattern is with respect to pigs. More than half of this species' identified elements were from the cranium, a pattern which, for any other animal, would be indicative of butchering waste. It is well known, however, that almost all portions of pigs are edible, the head organs and meat no less than other areas. Luff (1994:159), for instance, found many butchering marks on various skull bones of hogs from a Tell el-Amarna (Egypt: Middle Bronze Age), indicating not only slaughter by head trauma and separation of the head from the body, but as well its dissection to facilitate removal of the brain, skin, as well as other cranial organs and muscles. Only one butchered pig bone, a femur, emerged from the Late Bronze Age sample, but the Egyptian evidence does support the idea that pigs' heads were utilized in ancient Near Eastern cuisines.

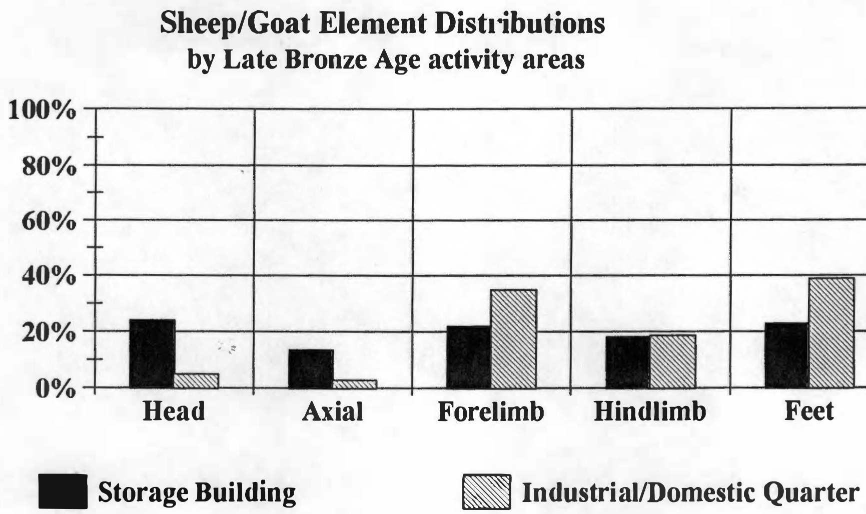
In terms of relative abundance of species, the two areas of Field I were essentially identical (Table 6). Both assemblages were, not surprisingly, dominated by sheep and goats. Moreover, the two areas have an equal proportion of sheep and goats, and the ratio of sheep to goats was 1:1 in each area. This equality also held for cattle, which accounted for about 28 percent of the bones in each of the assemblages. Some minor differences in relative abundance did appear: in general, it seems that the storage building assemblage, though smaller, was more diverse, since some non-domestic species (gazelles, fish) were either found only there, or found there in greater numbers. Interestingly, the opposite was true with pigs, which is the only animal of minor dietary importance to be more common in the industrial/domestic area than in the storage building. Although the difference in percentage is not great –

Table 6: Comparison of species relative abundance between Late Bronze Age architectural units

	Storage Building		Industrial/Domestic Area	
Animal	Number	Percent	Number	Percent
Cow	246	28.0	276	27.0
Dog	4	1.0	0	0.0
Donkey	4	1.0	1	0.1
Fish	17	1.0	1	0.1
Gazelle	10	1.0	1	0.1
Goat	33	4.0	52	5.0
Pig	13	2.0	46	5.0
Sheep/Goat	499	58.0	598	59.0
Sheep	38	4.0	48	5.0
Turtle	3	0.4	0	0.0

five percent in the slope area versus two percent in the other – it could be an important piece of evidence if other differences were apparent, in element distribution and/or butchery scar patterning.

Evidence from the differential distribution of skeletal elements from sheep/goats and cattle, the most numerous species in the collections, did display some differences between the two areas. Visual examination of butchering unit frequencies suggests that, for both sheep/goats and cattle, head elements were more common in the storage building, while foot bones were more frequent in the industrial area (Figure 10). The greater proportion of foot bones in the slope area is the only indication that this area could have served as, among other things, an initial processing area for animals brought to the city for consumption or a dump for butchering waste. A lesser indication of such a phenomenon could be the high amount of cranial elements found at the storage building, since in the Middle East the organs and muscles of the head are considered edible and even coveted, such that carcasses are brought to market with only the feet, but not the heads, missing (Klenck 1995; Loyet 1999:45). A chi-square test performed on the percentage of bones from the various butchering units indicated that there were no significant differences



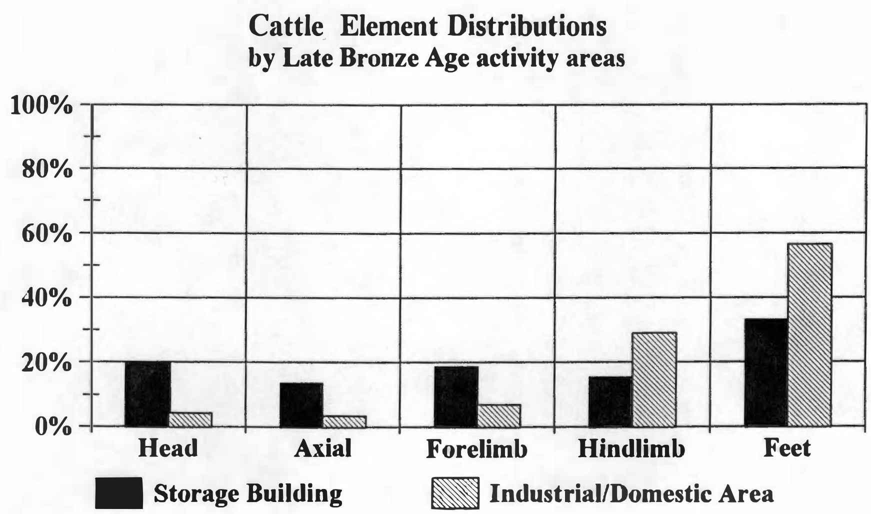


Figure 10: Comparative distribution of sheep/goat and cattle skeletal units between the activity areas of Late Bronze Age Field I.

in the distribution of both sheep/goat ($p = .05$, $\chi = 6.09$) and cattle ($p = .05$, $\chi = 3.25$) butchering units despite the numerical differences which otherwise suggest that there were.

The faunal assemblages from the two distinct Late Bronze Age architectural areas were also examined for differences in the location and frequency of butchering marks. The placement of marks on different portions of the animal carcass may reflect sequential butchering, primary and secondary. More marks located on the lower limbs might reflect separation of butchering waste from edible meat -- a pattern which, if identified in the industrial rather than storage area, would be consistent with the idea that some type of meat redistribution system existed. Conversely, in the storage building assemblage, a consistent pattern of cut marks located on meaty limb and trunk elements would indicate secondary processing of animal carcasses, an artifact of redistributing the meat in smaller portions. Unfortunately, the effort to compare cut mark patterning was significantly hampered by the disparity in the number of such marks in the assemblages; a total of 18 was recorded on bones from the industrial/domestic area, as opposed to 158 from the storage building. The latter totals do not reflect differential ancient cultural activities, but rather divergence in recording methodology: the vast majority of identifiable bones from the former area came from excavations in the 1980's, and were examined by Hesse, who chose not to record detailed butchery information. Excavations in this area during 1995 and 1996 reached Late Bronze Age levels in only a few loci, and therefore produced relatively few bones (Meehl and Goren 1996). The sampling bias unfortunately renders any such comparison meaningless, but comparison within the storage building area between sheep/goats and cattle was possible. A t-test revealed no significant differences between sheep/goats and cattle in the distribution of cut marks across the carcass ($p = .05$, $\chi = 2.24$), indicating that all the domestic species were butchered similarly.

Given the lack of statistically significant differences, it seems likely that households either procured and butchered their own animals, or that they obtained carcasses from a more casual meat redistribution system, perhaps from kin who had butchered an animal. This non-standardized form of meat procurement is as well indicated by butchering marks. The similarity in placement of the marks probably has more to do with anatomical constraints, rather than being the hallmark of professional butchers. Instead what is interesting is that among the bones excavated from the storage building, most of the observed butchering marks (70 percent for sheep and goats, 74 percent for cattle) probably resulted from primary butchering (dismembering) activities, rather than secondary butchering processes. This is another indication that butchering activities were not segregated to the outlying area. A final piece of evidence regarding the lack of activity separation is the find of a butchered left frontal of a sheep (Figure 11). The butchery mark is interesting since the impression of the tool used to create the mark was left in the skull. This stab wound clearly pierced the skull and penetrated into the animal's brain, and may have been the cause of death. If so, it would be another indication that slaughtering of animals took place at or close to the area of consumption, rather than in a designated peripheral area.

Summary

The settlement at Tel Miqne-Ekron in the Late Bronze Age can, on the basis of the faunal assemblage from those levels, be characterized as a self-sufficient town with an agricultural economy that was largely driven by local demands. Mortality data indicate a generalized economic orientation, with sheep and goats being slaughtered so as to emphasize subadults and young adults, what Stiner (1990) has called the 'prime-dominated' age structure. Because most of the animals were killed either young or in their prime there is no indication of specialized production such as wool, nor evidence for marketing of prime-aged animals off the site for sale at, for instance, larger neighboring towns' meat markets. The metric data indicate that most of the sheep and goats being killed before maturity were males, whereas females were not slaughtered until sometime later, presumably only after they had ceased to be productive in terms of dairy and lambing. Therefore what emerges is a generalized economy which probably produced meat as well as dairy products. Cattle mortality patterns and metric data also indicate a very generalized agricultural production scenario, where meat production was probably a secondary concern to raising animals for traction uses.

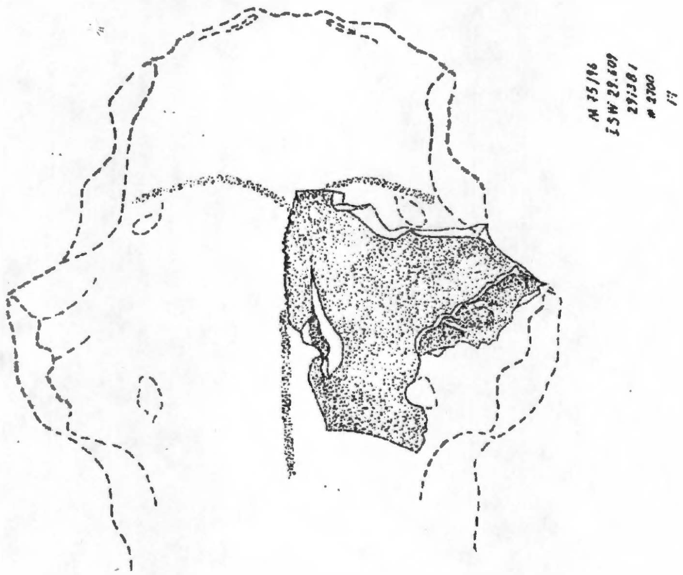


Figure 11: Fragment of a sheep's left frontal, shown as it would fit into a complete skull. The negative impression of a puncture wound caused by a blade is shown by the jagged, narrow white space near the midline of the skull. This may represent the blow which killed the animal.

The scant presence of pigs at Tel Miqne during the Late Bronze Age is interesting in light of both Zeder's (1998) views on the subject, as well as the animal's greater importance in the following period at this site. Although Zeder's point concerning low pig use being a sign of tight incorporation into regional economic and political structures is well taken, the evidence from Tel Miqne does not consistently support such a conclusion. Despite the fact that the latter site was obviously a large and therefore probably important site during the Middle Bronze Age, it is clear that by the Late Bronze Age the city had suffered a decline. Though the town of the Late Bronze Age still may have had importance in its immediate region, as shown by the number of imported objects which flowed into the city in this period, the agricultural economy's orientation seemed to have been decidedly local.

Further, the lack of internal differentiation in the distribution of animal carcasses across the site may indicate a lack of specialized occupations, where residents all had the opportunity to procure their meat still on the hoof, and a lack of an administrative entity which encouraged or oversaw market redistribution of agricultural products. Thus Tel Miqne in the Late Bronze Age seems to have been uninvolved in trans-regional trade of agricultural products, given the totality of the evidence – from species frequencies, mortality profiles, metric data, and element and butchering mark patterning. Whatever political system the Egyptian New Kingdom empire brought to Canaan, it appears that it did not penetrate so deeply into the countryside so as to affect the agricultural economies of hinterland towns, to judge only from the limited example of the Late Bronze Age animal economy of Tel Miqne-Ekron.

Chapter 7: The Animal Economy of Tel Miqne-Ekron in the Iron Age I

Iron Age I: Historical Summary

The Iron Age I (ca. 1200-1000 B.C.) represents a period of Palestine's history which, at least in terms of ethnic make-up and political entities which emerged in that period, marks a radically different period from and cultural break with the preceding Bronze Age. To begin with, this period was the first in several centuries during which Egypt did not either directly rule or greatly influence the lands and polities of Canaan. New Kingdom Egypt after the year 1200 or possibly as late as 1160 no longer actively campaigned against or intervened in the internal affairs of the peoples of Palestine. The nineteenth dynasty, after the death of Merneptah, as well as most of the succeeding twentieth dynasty, suffered a series of less than great pharoahs, and as well had to tend to internal unrest in their Nile Valley homeland. At least partially as a result of the power vacuum left by the Egyptian withdrawal, or perhaps a contributing cause of that retreat, new ethnic groups apparently settled Canaan, and brought with them or invented new political systems (Mazar 1992:258-260).

The Egyptian empire was not the only political and military power of the Bronze Age to stumble or crumble at the onset of the Iron Age. In fact, in many of the formerly wealthy and powerful political entities of the Mediterranean littoral – Mycenaean Greece, Hittite Anatolia, and the Mesopotamian powers – Assyria and Babylon – dynasties came to an abrupt end, key cities were destroyed, and new ethnic groups apparently migrated in from elsewhere to take control over the chaos they had found or perhaps helped to create. Whereas sites of the Late Bronze Age seem to have been cosmopolitan centers of trade and the base of flourishing palace economies, the succeeding Iron Age I cities were conspicuous for their lack of exotic goods and destroyed palaces (Leonard 1989; Sherratt and Sherratt 1993). Among those credited with the complete disruption of trade and crushing of established empires have been the somewhat enigmatic Sea Peoples, and among them, the Philistines, who of course eventually came to settle along the southern coastal plain of Canaan.

The other politico-ethnic group which entered the historical record, and perhaps the geographic area, of Palestine at this time were the Israelites. According to the Biblical tradition of Exodus, the Israelites left Egypt, and after a 40 year period of wandering in the desert, were finally allowed to enter into and conquer Canaan. The archaeological evidence for the specific events described in the books of Exodus and Joshua, such as finding traces of the large nomadic encampments which the wandering tribes should have left in Sinai, as well as proof for the conquest of various Canaanite cities, has proved both elusive and controversial for archaeologists laboring under the Biblical Archaeology paradigm over the last 100 years (e.g., Finkelstein and Na'aman 1994; Mazar 1992:281-285). Regardless of the historicity of the Exodus and the conquest of Canaan described in Joshua, the Israelite tribes by around 1200 B.C. had already established themselves in portions of the central hilly area of Palestine, a geographic region bounded on the western side by the coastal plain and *shephelah*[13], and to the east, the Jordan Rift Valley. The earliest secure archaeological evidence for the Israelite presence in Canaan is a victory stele of Merneptah, which records a campaign to the region by that pharaoh. The Merneptah stele records Egyptian victories over several cities in Palestine as well as over two states in the north, Hatti and Hurru. What is intriguing about the hieroglyphic inscription is that, unlike the other foes mentioned, Israel is signified with a 'people' rather than a 'city' sign. This indicates to many scholars that the Egyptians recognized the Israelites at that time as a nomadic people without a home in the sense of a definite territory with cities, though others believe the hieroglyphic sign to be a scribal error, of which the stele has many (e.g., Leonard 1989:27; Redford 1992:257-280).

Biblical accounts suggest that, during the Iron Age I, the Israelite tribes did not coalesce into a single population under a central government, but instead each tribe maintained its own territory and chief. The Israelites seem to have undergone a process of social evolution during the period, starting as a segmentary tribal society lacking central government, later forming a chiefdom, and eventually forming a monarchical state society by circa 1000 B.C. (Hackett 1998:196-197). What figured prominently into at

[13]The Hebrew term for the geographic region of low, rolling hills which divides the flat coastal plain from the higher hills of Biblical Judea and Samaria (the West Bank) to the east.

least the proximate cause of social changes among the early Israelites were the wars with the Philistines, which according to the Biblical narrative caused the people out of desperation to long for a more centralized form of political organization to counter the latter threat. Portugali (1994:215), on the other hand, has taken a Darwinian evolutionary view of this process, and sees the development of the Israelite state as a stage in the cyclical stability/instability processes of human society. The importance of the latter view is that it casts Biblical historical accounts in a broader framework: thus Samuel's conflict with Saul is that between the traditional tribal leader and a man who would be king of the tribes, while David's struggle with Saul involved the former's wish to organize a single nation state, perhaps on the Philistine model.

The Philistines were evidently part of a major new population which apparently settled in Canaan around the end of the thirteenth century/beginning of the twelfth century B.C. Understanding both the history of the Philistines themselves, so far as is known, as well as the history of research on them, is crucial to setting the context for the interpretation of the faunal assemblages from Iron Age Tel Miqne-Ekron. Therefore an extensive review of scholarly thought concerning Philistine migration and settlement is offered here as a long preface to the discussion of the Iron Age I faunal remains and what they may add to this picture.

Who were the Philistines and where did they come from?

The Philistines are known of from several ancient historical sources, including the Old Testament, Egyptian temple paintings, Egyptian papyri, and Assyrian and Babylonian annals recorded in cuneiform on clay tablets. Because the Philistines are discussed in the Bible, they have throughout the ages been a known entity in theological circles. The names of their former cities, some long since ruined and buried, were preserved by the inhabitants even after the successive Roman, Byzantine, Crusader, and Moslem conquests of Palestine built the cities anew or shifted populations elsewhere. As well, European pilgrims, traders, and other travelers since the time of the Crusades had looked for the remains of the Philistine civilization; one French merchant even conducted an excavation in Gaza in 1659, searching for the temple of Dagon (T. Dothan and M. Dothan 1992:6-7). But it was not until the eighteenth century that scholars began to methodically probe various texts for information on the origins, history, and culture of the Philistine people (T. Dothan and M. Dothan 1992:8-10).

Perhaps the first real breakthrough in understanding the origins of the Philistines came during Napoleon Bonaparte's conquest of Egypt. He sent out members of his army to sketch the visible monuments along the Nile Valley. One of those monuments was a temple near the village of Medinet Habu, which had detailed paintings of a great sea battle, of people in Egyptian-style headdresses fighting (and winning) against others in feathered or horned headdresses. Only later, after developments which led nineteenth century scholars to be able to read Egyptian hieroglyphic writing, was the significance of the temple paintings and accompanying inscriptions understood. Frenchman Chompollion was the first to translate the inscriptions at that temple, and he and later scholars eventually unraveled the entire account. The hieroglyphics mentioned by name the Philistines, along with other so-called 'Sea Peoples' (a term coined by modern scholars but not found in any ancient text), and relate that these foreign island-dwellers had made a confederation between themselves. Along the route of the their journey toward Egypt, these peoples evidently also attacked various areas of Asia Minor and perhaps Cyprus (apparently, the land referred to as 'Alashiya' in the text). The funerary temple and the battle it portrayed were eventually linked to Pharaoh Rameses III, who probably reigned in the early twelfth century BC (T. Dothan 1989:7). Later in the inscription we are told the outcome of the battles – Pharaoh boasted that he had defeated this coalition, taking some of the attacking 'nations' prisoner to serve as his mercenaries, and simply eradicating others (T. Dothan and M. Dothan 1992:19-27).

The interpretation of various aspects of that inscription and the 'Papyrus Harris 1', which also speaks about the battle is controversial (e.g., Wood 1991). The details of the arguments are beyond the scope of this paper since they have been extensively argued elsewhere (Bunimovitz 1990; Finkelstein 1995a; Muhly 1984). Still, a summary is crucial since the various positions of archaeologists differ in their reconstruction of the historical sequence for Philistine settlement and origins in Canaan. The first problem is one of origins. The Philistines (literally transcribed as *Paleshtim*; T. Dothan and M. Dothan

1992:6) are said to have come from the land of Caphtor in the Bible [Amos 9:7], while the Medinet Habu inscription speaks of the various Sea Peoples as having come from islands, across the 'great green' (Nibbi 1975). Still, the Bible is not consistent in that regard – elsewhere they are said to be indirectly descended from the 'sons of Egypt' and related somehow to a people called the *Casluhim*. Drews (1998:41-42), taking a very different approach, explains that the name Caphtor cannot be linked to any specific Mediterranean island or region. He argues that the name had changed from a specific geographic referent (suggesting the town of Kition in Cyprus as the original place) to a subjective label which ancient Hebrew speakers, who may have had no knowledge of Mediterranean geography, used to signify that someone else had ancestors who came from a far away locale.

One set of linguistic hypotheses transforms 'Caphtor' into 'Keftiu', the Egyptian word for Crete, and then a further leap with rather indirect evidence links the Philistines to that place; the Egyptian texts do not themselves make that connection (Muhly 1984:46). T. Dothan (1982:13) constructed a different but equally meandering connection between Biblical references to Philistines, Caphtor, and an origin in Crete. The Papyrus Harris 1 is also unclear: In that text Rameses III boasts about having slain the attackers who had come to Egypt 'from their lands', but only the Denyen (a nation allied with the Philistines according to Egyptian records) are specifically said to have come from islands. Many scholars today equate the land of Caphtor with the island of Crete. Others, however, believe it to have been Cyprus or coastal Turkey (Muhly 1984; Singer 1988). Still other researchers contend that the phrase 'great green' refers not to the Mediterranean islands, but rather to the marshy islands of the Nile delta (Nibbi 1975:35-36).

Another problem is the equation of the Egyptian reference to the *Paleshtet* and their identification as Philistines (Nibbi 1975). Archaeologists and other scholars have by tradition equated the Biblical *Paleshtim* and Egyptian *Paleshtet* with the Septuagint label of 'Philistine'. Likewise, they have tried to find places of origin and settlement for the other named 'Sea Peoples' by correlating known place-names and the peoples listed. For instance, by academic tradition the idea has now solidified that the *Sheklesh* of the Medinet Habu inscription were repulsed from Egypt and eventually settled in southern

Italy – the origin of Sicily (Nibbi 1975). Finally, there is the question of settlement process. The traditional view among researchers is that the Egyptians defeated the Sea Peoples coalition and forced them to become mercenaries, settling them along various frontiers in supplied garrisons. Wood (1991:46-48) however believes that a careful reading of the relevant passages from the temple and papyrus reveals that the Egyptians made into mercenaries some but not all of the Sea Peoples. Those that came to serve the Egyptians, Wood argues, did so within Egypt proper, not borderlands like Canaan. The Philistines are not among those peoples whom Rameses III explicitly states were defeated and made to serve him. Because allies of the Philistines were named as the defeated parties, most assume that the Philistines were simply a party to the fight not named in the list of those vanquished. Some archaeological evidence can be found to support the Philistines having come to the Levant not as Egyptian mercenaries, but rather as conquerors. In this interpretation, a subsequent foray by the Philistines into Egypt proper was repulsed, and this engagement forms the basis for the boast that the temple and papyrus convey (Wood 1991:51-52). The main archaeological evidence supporting that scenario is the stratigraphy of Tel el-Far'ah (south), a small but strategically placed site in the Negev. Excavations there were done early in the century and the exact stratigraphic contexts of many crucial, datable, objects are difficult to determine.

To return to the Medinet Habu paintings, there is a certain problem of artistic license and historical interpretation. We know that in general Egyptian tomb paintings and accompanying inscriptions are only partially historical records of Pharaoh's deeds. Some events discussed are known to be folk tales, and even historical writings assume a particular rhetorical form of royal boasting, elevating even minor victories and omitting major defeats (Muhly 1984:54). Further, it was a common practice for Pharaohs to 'steal' the deeds listed in their forebears' tombs and give credit to themselves. It is interesting to note that Rameses III's father, Merneptah, in his fifth year as Pharaoh, repulsed a similar invasion of foreign peoples (T. Dothan and M. Dothan 1992). Some Egyptologists would go so far as to say that the events related in the Medinet Habu inscriptions are anachronistic, taken from Merneptah's funerary temple (Lesko 1980, cited in Muhly 1984:55; *contra* Finkelstein 1995a:226, footnote 13).

What we can assert with relatively little opposition is that some foreign peoples, from somewhere in the Mediterranean area (beyond the Levant), attacked Egypt and some of its colonies but were repulsed, perhaps winding up as garrison troops on Egypt's northern frontier. Another interpretation of the attack on Egypt is that, though unsuccessful in their raids there, the peoples of the sea did conquer the Egyptian colonies in Canaan and settled there at the close of the Late Bronze Age, sometime in the twelfth century BC. Exactly in what part of that century the Philistine occupation of coastal Canaan occurred in is a matter of some debate (Mazar 1985). The two principal positions in the debate are divided by one camp favoring an early twelfth century settlement (T. Dothan 1982; Stager 1995), and an opposing camp arguing for a late twelfth century one (Finkelstein 1995a), a difference of as much as sixty years. The arguments for and against the early and late dates are each very complex, and depend to a large extent on the distribution of 'Philistine' monochrome pottery in Israel, the strata and contexts it has been found in, and whether it is more Aegean or more Cypriot in inspiration.

The traditional interpretation of Philistine-associated pottery is that it appeared with the arrival of the Sea Peoples, dated by Egyptian literary evidence from Rameses III's funerary temple, to the early twelfth century. Adherents to this scholarly tradition often advocate a 'two wave' migration theory, with an early wave of Sea Peoples (including, perhaps, Philistines) being defeated by Pharaoh Merneptah and settling on the Levantine coast in the late thirteenth century, an event marked by the appearance of the monochrome pottery. A later wave, refugees, defeated invaders-cum-Egyptian mercenaries, or possibly triumphant conquerors of coastal Canaan, settled after their battles with Rameses III – the event marked by the appearance of Philistine bichrome pottery (Gitin and T. Dothan 1987). Other researchers prefer a single wave migration/invasion, occurring in the early twelfth century with monochrome pottery (Mazar 1985). Those who favor the so-called 'low chronology' for the Late Bronze/Early Iron Age period prefer a single wave migration with a settlement date toward the other end of the twelfth century (Finkelstein 1995a).

Dating the appearance of new pottery styles is done on the basis of correlation with Egyptian artifacts – either found in the same strata as the pottery in question, or found elsewhere with the same type of pottery. The dating of Philistine pottery by this system was begun at a series of pottery-rich tombs at Tel el-Far'ah (south) early in this century by Starkey and Harding (1932), who followed their supervisor's, Sir William Flinders Petrie, previous example. McClellan (1979), using various statistical clustering and seriation methods re-dated those original dates and the tomb contents in an effort to understand the relationships between various tombs and their contents. He advocates a date of *circa* 1140 BC for the appearance of Philistine bichrome pottery, some 50 years after the time they were supposed to have settled in Canaan. The Egyptian artifacts upon which this dating system rests, items like rings and scarab seals that bear various pharaohs' cartouches, are themselves somewhat difficult to date. Egyptian seals were often collected and curated for centuries after the pharaoh whose name they bear had died, and therefore they tend to be difficult artifacts to interpret. Singer (1985:113) has pointed out the problematic nature of such Egyptian artifacts, asserting that they "provide no more than a *terminus post quem,* and scholars...interpret their meaning according to their own preconceived ideas".

Whichever date – high or low – one uses, the point is that a foreign people, the Philistines, eventually settled along the southern coastal area of what is today Israel, forming a new and strong nation. Whether the Philistines came from Crete or elsewhere in the Aegean is an ongoing and intricate argument involving both textual and archaeological inferences from somewhat equivocal data. Many archaeologists believe that aspects of Philistine material culture are very much Aegean in inspiration, including pottery, temple architecture, weapons, and even their diets (T. Dothan 1995; Hesse 1986; Singer 1985). Others believe that those things claimed to be Aegean are in fact a mix of local Canaanite, Cypriot, and Egyptian traditions (Bunimovitz 1990; Finkelstein 1995a; Muhly 1984). But even Muhly (1984), who tends be unconvinced of migration theories, concedes that there is at least some historical reality behind the Biblical and Egyptian texts dealing with Philistine origins, and even admits that many features of their material culture are foreign in origin.

Philistine Settlement and Political Organization in Canaan

Once the Philistines did settle Canaan, in the early years of their occupation, they concentrated their population in five cities and the surrounding areas. Those five cities were Ashkelon, Ashdod, Ekron, Gath, and Gaza. Archaeological investigations since the turn of the century have explored and positively identified at least four of those cities. The location and identification of Gath remains controversial, though many archaeologists believe it to be the mound called Tel es-Safi, excavated early in the century and the now the focus of renewed excavations (Stager 1995:332, 343). Archaeological research at these Philistine cities contradicts the earlier idea that these immigrants founded entirely new cities on virgin soil. It is now clear that the Philistines concentrated their population, or some part of it, in five previously-existing Canaanite cities that were later to become their seats of government. The usual assumption is that the destruction levels found in those cities dating to the Late Bronze Age-Iron Age I transition period were caused by the conquering Philistines. Yet the archaeological evidence – pinpointing the time of destruction – is not at present clear enough to exclude other hostile forces, such as late-thirteenth century Pharaoh Merneptah's campaign to Canaan (Singer 1994:299).

The cities built anew by the Philistines were larger than their Canaanite predecessors and laid out according to a preconceived plan. This phenomenon became quite clear during the excavations at Tel Miqne, since the Late Bronze Age Canaanite city of Ekron occupied only the ten acre 'acropolis' (Gittlen 1992:31). The succeeding Iron Age I Philistine city occupied the entire rectangular 50 acre tel, whose shape and size were evidently taken from the preceding Middle Bronze II city and surrounding wall, most of which had lain abandoned for some three hundred years (T. Dothan 1995:42). The urban building spree inaugurated by these immigrants is frequently used as supporting evidence for a Philistine Aegean origin, as there was supposedly a vigorous Bronze Age urban tradition in Crete and Mycenaean Greece (Mazar 1985:105-106; Stager 1995:345-348).

There are a number of problems with that linkage. Scholars of Bronze Age Greece have long pointed out that the 'cities' (better 'towns') of Mycenaean Greece and Minoan Crete (with Knossos being an exception) were quite small in size and with a spread out population. By comparison, the contemporary cities of Western Asia were densely populated, sprawling, metropolises (Evans 1976:506-508). The idea of a Mycenaean urban tradition is probably an anachronistic scholarly supposition, based on the much later Iron Age *polis* development in Greece. In fact, aside from being smaller urban entities, the Late Bronze Age political organization of the Aegean world seems to have been quite different from that of the Philistines. Mycenaean cities by many accounts functioned as chiefdoms, rather than as developed state-level bureacracies. The Mycenaean centers were not built following an architectural master plan, but rather seem to have developed gradually, with houses built next to tombs, and residential areas built in a seemingly random fashion (Dickinson 1994:78, 81-86). Aside from the Homeric epics, which are difficult to ascribe to any particular period and especially the period around 1200 B.C. (e.g., Snodgrass 1974), there is no textual or archaeological evidence to suggest that Mycenaean cities ever formed league alliances as the later Greek city-states did.

In Crete, the hierarchical size of Minoan palaces, the lack of fortifications surrounding them, and finds of nearly identical clay sealings and seal stones has been argued by some to be an indication that the island had a united political organization during at least the Late Minoan I Period (e.g., Cherry 1986:25-26). Even supposing that Crete had such a political organization, the argument lends little to the Philistine urban tradition/Aegean cultural heritage cause. Even the squabbling Bronze Age West Asian minor states, petty kingdoms, and powerful Canaanite cities occasionally formed alliances with one another against perceived common military threats from external powers (Gonen 1992:212; Redford 1992:193-195). Indeed, the idea of a hierarchy of palaces throughout the island seems much more reminiscent of the situation described in the Bible with respect to the series of royal cities built during the United Monarchy, yet no one argues for an Israelite origin among the Minoans.

The five Philistine cities, whatever their degree of physical resemblance to the Aegean palatial centers, were each governed by a lord or prince, *seranim* as they are labeled in the Bible. The cities in times of war confederated under one of these lords, first the lord of Gaza and in later times that of Gath (Singer 1994). Later, after the Philistines had lost some of their former power to the United Monarchy of Israel and Judah, the cities became more independent; the lords were known as *melakhim* (kings), and rarely united (Gitin and T. Dothan 1987:214). Their original territory was much of the entire southern coastal plain of what is now Israel: the area of Gaza and the 'the brook of Egypt'[14] formed the southern boundary of Philistia, while to the north the Nahal Sorek seems to have been the limit (Finkelstein 1996). But the Philistines entered Canaan as a dominant military force. They first subdued native Canaanites as well as perhaps Egyptian outposts, and later expanded their territory to include part of the Israelite hill country to the east, former Egyptian territory to the southeast, and the coastal areas north to the area which Tel Aviv occupies today (Singer 1994:315-316).

The Philistines' battles with Israelites are quite well known, so that they need not be summarized here. What is immediately relevant about those wars is, first, that the Philistines, as mentioned, were the dominant power in Early Iron Age Canaan, as they consistently defeated rival groups, conquered rivals' territory, and controlled Israelite commerce until perhaps 1,000 BC. Even the famous king Saul was killed in battle with the Philistines, who afterwards controlled the Israelites, as the Egyptians had the Canaanites, from military garrisons rather than direct territorial annexation (Singer 1994:322-323). Though the Promised Land was given by God to the Israelites, they nevertheless had to try and conquer the occupants themselves. Some of the promised lands, a part of those apportioned first to Judah and perhaps later to the tribe of Dan, included areas already inhabited by the Philistines. The Philistines' military prowess, seen metaphorically in the Bible by references to their iron weapons and great military heroes like Goliath, evidently prevented the Israelite tribes from occupying all of their assigned territories for some time (T. Dothan and Gitin 1993:1052). The might of the Philistines was evidently not broken until the time of King David, who formed the United Monarchy along with his successor Solomon. Only at that time were the Philistines forced to retreat from their expanded territory. After the time of Solomon some of their cities, Ekron for one, became vassals of the southern kingdom of Judah when the United Monarchy split back in two (Singer 1994:326, 331). These political struggles themselves have important implications for Philistine archaeology since, as the power of the Philistines waned, there is a parallel

[14] A large wadi in the southern Negév or northern Sinai desert, used by many ancient sources as a boundary reference feature. Today it is a matter of debate as to exactly which of several possible wadis the expression referred.

trend visible in the archaeological record. Their material culture gradually became less distinctive as they became more and more influenced by the surrounding *milieu* (Gitin 1992). Still, they evidently remained a distinct political entity even after their loss of political hegemony over much of Canaan and their culture became more strongly influenced by their neighbors (Gitin 1998:162-163). Thus, in anthropological terms, that trend should be labeled 'acculturation' rather than 'assimilation', as many have erroneously called it (Stone 1995).

The second point is that Ekron through much of this time served as a border city, located very close to Israelite territory of the hill country and the Israelites' westernmost city, Beth Shemesh. After one early battle with the Israelites, the triumphant Philistines carried the Ark of the Covenant off as booty, eventually depositing it in Ekron, before giving it back to the Israelites at Beth Shemesh (Singer 1994). Ekron's status as a frontier post has important implications for the material record. Most studies of frontier interactions between rival ethnic groups favor the view that such border societies display their distinct cultures – ethnic identity – very strongly, as sort of prehistoric flags for territorial marking (e.g. Wiessner 1983). Yet some more recent approaches to these archaeological situations posit that border areas in fact encourage blending and homogenization of cultural traits, that "frontiers are the front lines in the creolization...of cultural constructs in culture contact situations" (Lightfoot and Martinez 1995:472).

The material culture excavated from Ekron therefore is not only important in shedding light on the history of Philistine culture and settlement, but also has interesting anthropological implications with regard to the above opposing theories. The affinities of various categories of Philistine material culture to Aegean, Levantine, or Cypriot culture is a hotly debated subject. Ceramics, as usual, have attracted the lion's share of attention. The mainstream view of Philistine ceramics was that they formed a homogenous and distinctive corpus of styles and types generally different from Canaanite ceramics but similar to Cypriot and Mycenaean pottery (T. Dothan 1982:94). Somewhat later, with more data available, even strong supporters of this view had to admit that Philistine pottery was 'eclectic' in that it included Canaanite, Egyptian, and other elements, but was nonetheless a unique assemblage. Still more recently, however, others have challenged that view, contending instead that which was labeled 'Philistine Material

Culture' was in fact a jumbled mixture of assemblages from the various cultures that coexisted in Philistia during Iron Age I (Bunimovitz 1990:210-211). Some archaeologists believe that the only unique parts of the ceramic corpus attributed to the Philistines are sort of 'elite' vessels of the types used for serving and other public functions, but that the more utilitarian vessels followed various local traditions (Bunimovitz and Yassur-Landau 1996:92; *contra* Killebrew 1998a:164-165). In light of this two-tiered ceramic corpus, some have suggested that the Philistine settlers were largely a military contingent who conquered and then ruled over the native Canaanites as an upper class, forming a minority ethnic component in the area they governed (Muhly 1984).

That proposed class structure has found more recent support in the views of Sherratt (1998) and Bauer (1998) who take a distinctly different view of the Sea Peoples phenomenon. Both the latter authors present similar economic explanations to explain the historical events and archaeological cultures which have traditionally been used to construct the mass migration from the Aegean/Cyprus/western Anatolia to settlement in Palestine scenario. Essentially, Sherratt (1998:294, 301-302) sees the Sea Peoples as a class of independent merchants who plied the sea trade routes and originated from a variety of port cities along the Eastern Mediterranean coastline. This merchant class grew gradually richer and more powerful, eventually subverting the palace-based economies of the Aegean and undermining the wealth-producing trade Egypt carried out through its domination of Palestine during the Late Bronze Age. These traders gradually established trading centers on land as well, infiltrating the cities and regions in Palestine which a weakened Egyptian state had been forced to abandon little by little. Thus, rather than a mass migration, Sherratt sees a relatively small group of very successful merchants settling in Palestine and thoroughly mixing with native Canaanites to create a new economic orientation and revitalize urbanism on the southern coastal plain. Bauer (1998:150-151, 163) draws heavily from this work of Sherratt, and further posits that the so-called ethnic distinctions many archaeologists recognize in the material culture of Iron Age I Philistine and other sites actually arose from economic connections and activities which differed from those of neighboring groups of people (the Israelite tribes) to the east.

The exact method by which the Philistines settled the coast of Canaan in the twelfth century BC may not be of the utmost importance for this study, so long as it is generally agreed upon that they were a population derived from some area to the west. What seems to be the case is that in a rather amazingly daring act, the Philistines and allied refugee groups decided to establish a new homeland by either attacking the major power of the Eastern Mediterranean region, Egypt, or else economically overwhelmed the reigning powers of the area and settled as a small group of economic visionaries in Canaan. If we accept the widely held view that they with allied nations or merchant groups attacked Egypt during the time of Rameses III, and that they did come from someplace in the Eastern Mediterranean, then it matters little whether they settled as conquerors or were settled by the Egyptians as mercenaries.

Since coming to the conclusion that this foreign-derived, probably Aegean, population settled in the Levant, archaeologists have tried to find their cities, feel out the boundaries of their settlement area, define their material culture and place of origin, and unify these data into an overarching concept of group identity and fit this into the Near Eastern historical narrative. To date studies of Philistine material culture have nearly all focused on ceramic fine-wares, temple and tomb architecture, and other types of 'upper class' artifacts, rather than plebeian cooking pots, domestic architecture, and foodways. As well, these studies have asked historically particular questions, concerning who lived where when, which neighboring state was responsible for which destruction level, and how we can tell one group's material culture apart from their neighbors. What has been absent from the discussion is not only more broadly-based material culture studies, but moreover questions which use such plebian economic data to address overarching considerations of the social transformations which occurred in the period of 1200-1000 BC and beyond (Sherratt and Sherratt 1993).

Characteristics of the Iron Age I Faunal Assemblage

The Iron Age I faunal assemblage from Tel Miqne-Ekron is by far the largest portion of the total assemblage from this site, totaling 7,327 identifiable bones and 11,443 unidentifiable fragments. The other two principal periods, the Late Bronze Age and Iron Age II, by way of comparison each produced somewhat over two thousand identifiable bones – approximately one third the sample size of the Iron Age I. This disproportionate distribution of faunal remains essentially reflects the nature of the excavations in Field I, as well as the stratigraphy of the mound itself. In all, four Iron Age I strata were excavated, with the earliest being stratum VII (first third of the twelfth century) and the latest – actually transitional between the Iron Age I and II – labeled stratum IV (eleventh-tenth centuries). Stratum VI (last two thirds of the twelfth century) and stratum V (first half of the eleventh century), were contained between the latter two strata, and complete the Iron Age I occupational sequence. Field I was the earliest area of the tel to be intensively excavated, and, as such, two areas were eventually excavated into the mound's slope which revealed much of the Iron Age I and Late Bronze Age sequence. The Iron Age II was exposed only in the upper portion of Field I, away from the slope where those layers had eroded away. Thus Iron Age I remains were excavated on the slope of the mound as well as in the deeper trenches in the other area of the field, and explains why faunal remains from that period are so numerous.

The principal species exploited did not change over the course of the Iron Age I, as sheep, goats, cattle, and pigs made up at least 95 percent of the identified bones in each of the successive strata (Table 7). What did change over time, however, was the relative importance of the latter domestic animals – a topic which will be addressed below. Other species which were included in the faunal assemblage included fish, turtles, birds, and wild game – fallow deer and gazelles. In addition, a number of equid bones were identified. All of the equid bones, with the exception of four, were small and therefore should probably be identified as *Equus asinus,* the domestic donkey. The four larger specimens are probably from *Equus caballus,* the domestic horse. Finally, a donkey burial was excavated in a pit feature phased as stratum VI (Meehl and Goren 1996). The latter is an odd feature for several reasons, including its position in the pit and its date, and is discussed extensively at the end of this chapter.

Despite the presence of various wild animals, it is clear that hunting was not economically important to the Iron Age population of the city. Rather, it seems more likely, given both the variety of wild species present and their small numbers, that occasional opportunistic hunting of animals caught in

Table 7: Species list for Tel Miqne-Ekron during the Iron Age I

Species	Stratum →	IV		V		VI		VII	
	Common Name	number	percent	number	percent	number	percent	number	percent
Bos taurus	cow	232	36	954	40	518	35	921	33
Capra hircus	goat	13	2	39	2	31	2	89	3
Ovis aries	sheep	32	5	71	3	28	2	93	3
Ovis/Capra	sheep/goat	292	46	697	29	537	36	1203	43
Equus asinus	donkey	4	1	9	<1	8	1	95	3
Equus caballus	horse							4	<1
Sus scrofa	pig	42	7	575	24	348	23	357	13
Canis familiaris	dog	2	<1	1	<1	4	<1	7	<1
Dama dama	fallow deer	4	1	10	<1	7	1	10	<1
Gazella sp.	gazelle					8	1	8	<1
Hippopotamus amphibius	hippopotamus			1	<1	1	<1		
Lepus sp.	hare					1	<1		
Meles meles	badger	1	<1					1	<1
Rodentia	rodent					2	<1	4	<1
Anser sp.	goose							1	<1
Passeriformes	songbird					1	<1		
Phasianidae	pheasant			4	<1	1	<1		
Testudinata	turtle			2	<1			2	<1
Ranidae	frog/toad					1	<1		
Lates niloticus	Nile perch			1	<1	1	<1	7	<1
	fish	16	3	9	<1	5	<1	10	<1
	crab							1	<1
TOTALS		638		2374		1502		2813	

the grain fields surrounding the city or infrequent trapping was practiced as a way to bring in extra meat. The most important wild animals were fallow deer and gazelles, the sorts of animals that would be attracted to fields of grain. Hunting, an activity frequently portrayed in palace friezes and tomb paintings, was a leisure activity of the elite, sometimes to the exclusion of lower classes, in the Bronze and Iron Ages. Nevertheless, Field I in the Early Iron Age contained no monumental architecture associable with an elite

residence, nor were the deer and gazelle bones found all in a single deposit. Rather the small collection of bones from those species were scattered through the Early Iron Age strata, making it unlikely that elite activities were responsible for the animals' presence.

Other, rarer, wild animals identified included birds – a goose and pheasant – fish, a turtle, a frog or toad, as well as some small mammals (badger, hare) which could have been trapped. Most of the fish bones were quite large, and probably came from Nile perch, a species which is today limited to the Nile River of Egypt. This species prefers fast-moving, well-oxygenated waters, and as such it is an unlikely animal to have ever inhabited the Levant despite the fact that other Nilotic species apparently once did (Lernau 1986/87). Among those Nilotic species formerly inhabiting Western Asia is the hippopotamus. This animal's bones have been found in archaeological and paleontological contexts in Israel dating between 1.4 million years ago to the Early Iron Age, during which period it evidently became extinct outside of Egypt (Horwitz and Tchernov 1990:69-70). The two hippopotamus bones identified in the Early Iron Age strata here were both teeth. Amid domestic debris in a pit from stratum V, the root of a canine, which had been sawn from the occluding portion of the tooth, was recovered. Clearly, the presence of the canine root is waste from ivory working. The second hippo bone was found in a construction fill of stratum VI. This was a complete and unmodified premolar, an element which cannot be directly related to ivory production. Possibly, the animals were hunted in their marshy coastal habitat, and only the heads brought back to the city, where the canines could be cut out by the craftsman.

In general, the population of Ekron relied almost entirely on domestic animals for their meat, and undoubtedly gained 'secondary products' – milk, hair, wool, and labor from them as well. In that economic strategy, the Philistines were absolutely typical of their time. What is atypical about the Philistine diet, at least for the Near East, is the suite of domestic animals they relied upon, and the relative of importance of each during the Iron Age I. As compared to the Late Bronze Age dietary strategy, the Early Iron Age was quite different. Sheep and goats, as sources of meat, declined in their relative importance. During the Late Bronze Age, caprids accounted for more than half of the identified bones in the faunal assemblage, yet for the entire duration of the Iron Age I, those animals made up less than half of the identified bones. In fact, with the exception of the transitional stratum IV, the importance of sheep and goats actually declined over time, reaching a low of 29 percent in the eleventh century (stratum V). At the same time that herding of sheep and goats was decreasing in importance, herding cattle became more important. In the earliest Late Bronze Age stratum, IX, cattle accounted for 21 percent of the identified bones; in stratum VIII they made up 27 percent of the assemblage. That trend continued in the Iron Age I, as they continued to increase in importance over time, from 33 percent in stratum VII to 40 percent in stratum V. Stratum IV again reverses the earlier trend, with cattle falling to 36 percent.

The opposing trends – decreased emphasis on sheep and goats and increased emphasis on cattle – suggest that, perhaps linked to the new population influx, the local economy underwent a significant change, partially due to settlement pattern shifts in the area of Palestine south of modern-day Tel Aviv and west of the Judean hills. Certainly, these shifts are not visible all over the southern Levant during the Late Bronze/Iron I Period. As an example, Tel Dan, located in the extreme north of modern Israel, displays the opposite trend: sheep and goats underwent a threefold increase between the Late Bronze and Iron Age I, while cattle decreased to less than half the proportion the animals had made up at the close of the Bronze Age (Wapnish and Hesse 1991:77). Finkelstein (1996) has demonstrated through archaeological survey of the region surrounding Ekron, that a dramatic change in settlement patterning occurred between the fourteenth and twelfth centuries B.C. Whereas in the Late Bronze Age the landscape was dotted with cities, towns, and villages of all sizes in relatively high numbers, the Iron Age I was characterized by a significant decrease in small satellite settlements near large towns, such that populations were largely concentrated in urban centers. Evidence from the animal bone assemblage of

Ekron agrees with that urbanized scenario. In the ancient Near East, animal economies which concentrated on sheep and goat pastoralism are generally thought to have typified villages, where an economic mix of horticulture, agriculture, and seminomadic pastoralism was practiced, rather than the more specialized herding strategies of cities (B. Rosen 1994).

At the beginning of Iron Age I the settlement at Tel Miqne expanded from the ten acre town of the Late Bronze Age to re-encompass the full 50 acres of the tel which had lain abandoned since the Middle Bronze Age (Dothan and Gitin 1993). The subsistence economy of Ekron's new population reflects the urban nature of the settlement. Cattle must have become important not only as a source of meat and milk products, but perhaps even more importantly, as a source of labor, pulling carts as well as plows. The mortality profile for cattle, based on epiphyseal fusion of the long bones (Silver 1969), indicates that most of these animals, about 60 percent, reached ages greater than three years before being slaughtered (Figure 12). Only a very small portion of the cattle herds were killed off in their first year of life, which may indicate either that the city's dairy industry was based more on sheep and goats than cattle, or as Hesse (1986:22) suggested, that dairy production was non-local in this period.

Cattle slaughtered for meat are generally killed off in the so-called 'prime-age,' between one and three years old. The prime-age category in the Iron Age I sample shows that nearly forty percent of the herds were slaughtered for meat, slightly less than in the preceding Late Bronze Age sample. In fact the Early Iron Age mortality pattern is overall only slightly different from the Late Bronze Age one. The main difference is that, in the Late Bronze Age, one to three year old animals were slaughtered with approximately the same frequency as older ones. As well, in the Iron Age sample a slightly smaller number of calves were slaughtered. The slight differences between the two periods, taken together, reveal a trend where, in the later period, a greater proportion of the cattle herd was preserved until relatively old ages. This pattern is in agreement with other data indicating urbanization and, as a consequence, intensification of some type of agricultural production.

Metric data based on cattle phalanges seem to agree with the mortality data (Figure 13). The histogram produced by the measurement of the distal first phalange and proximal second phalange

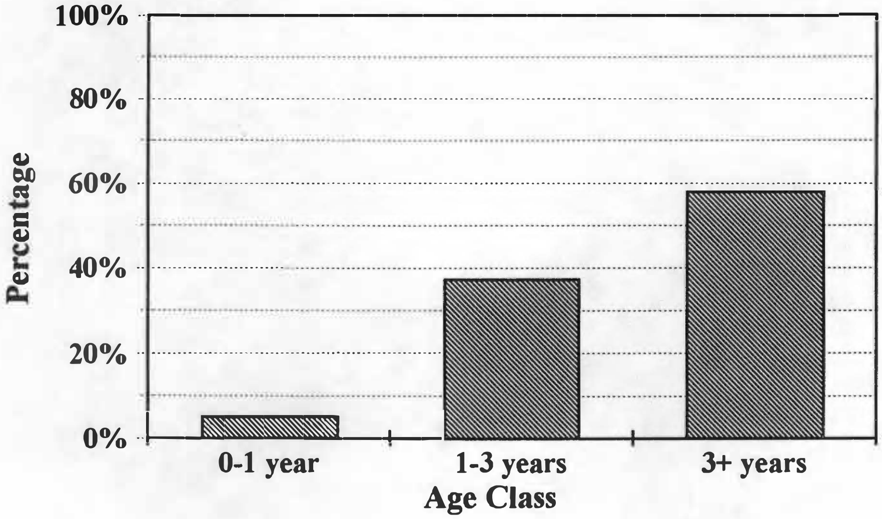


Figure 12: Iron Age I cattle mortality patterning, based on epiphyseal fusion.

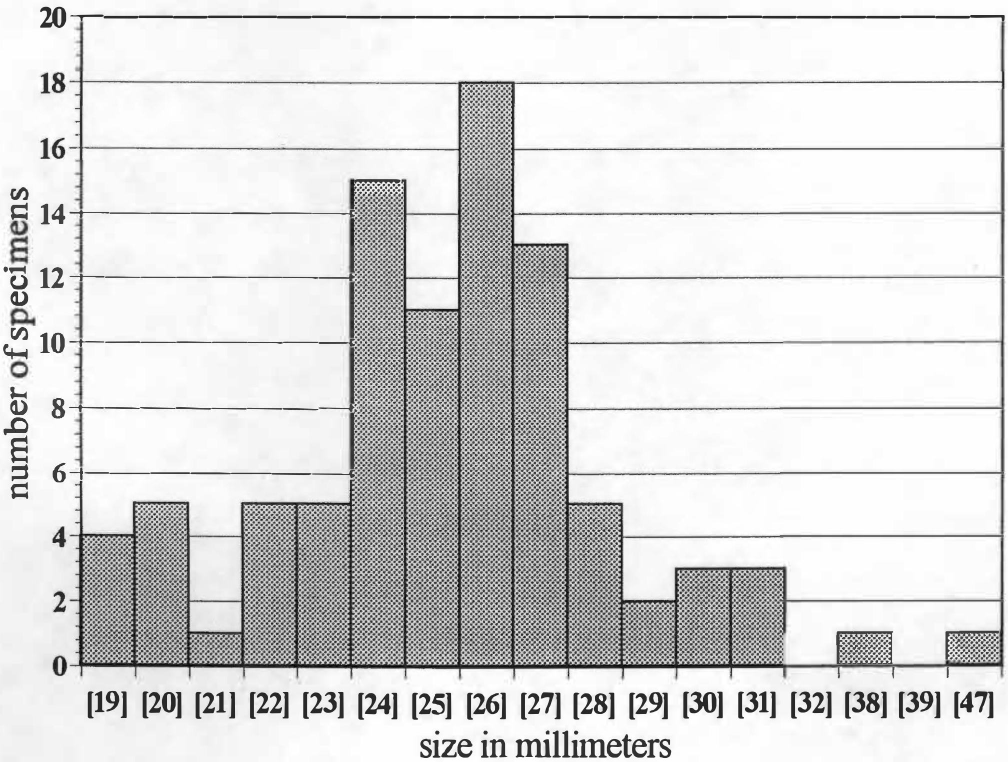


Figure 13: Metric measurement of cattle phalanges 1 and 2 from Iron Age I contexts. The unimodal distribution clusters around the sample mean of 25.6. Note, however the two outlying specimens at the right side of the histogram.

produced a unimodal pattern, with the mean toward the high end of the distribution. Nevertheless, only slightly more than half of the measured specimens were larger than average, indicating no strong emphasis on either male or female cattle. This may indicate a generalized agricultural system, where dairying was a goal coordinated with needs for meat and labor for the grain fields and elsewhere. Both the mortality evidence for the Iron Age I sample demonstrates a greater emphasis on older, larger cattle as compared to the Late Bronze Age. That tendency is not reflected in the metric analysis of the phalanges, though two very large measured specimens may hint at a similar phenomenon. This agricultural profile is again a generalized one with some indication of intensification in agricultural production.

The animal management strategies the Philistines adopted for cattle seem paralleled to a great extent by the herding decisions they made with respect to sheep and goats. Caprids, as the Iron Age I progressed, gradually became a less important contributor to the Philistine diet, while cattle grew in importance. Hesse (1986) also observed such a trend, and attributed it to the new population's dietary preferences for beef and pork over the meat of sheep and goats. Dietary preferences probably are in large part responsible for the observed changes, since the timing of the shifts corresponds with the period of Philistine settlement, the twelfth century B.C./stratum VII at Tel Miqne-Ekron. Sheep and goats declined quite a bit in importance, from stratum VII where they made up 43 percent of the assemblage, to stratum V where they fell in importance to only 29 percent, a decrease of more than one third. At the same time, cattle increased in importance, though not as drastically. The importance of pigs also grew during the Iron Age I, becoming prominent not only at the beginning of the period, but more and more so as the Early Iron Age progressed. On the surface, then, it appears that animals other than sheep and goats became more important to the population of Ekron at this time.

The overall decrease in sheep and goats during this period does not, however, take into account their full role in the population's diet and city economy. According to mortality evidence for sheep and goats, the Philistines managed their flocks somewhat differently than had their Bronze Age predecessors. While the Late Bronze Age population seems to have been primarily interested in raising the animals for meat, in addition to supporting a local dairy industry, the Philistines seem to have had somewhat different economic goals. Fusion data indicate that the Philistines probably concentrated on raising sheep and goats for meat, in addition to preserving a portion of the flock to use as sources for wool (Figure 14). That is to say that about half of the sheep and goats were slaughtered between the ages of one and three, while 30 percent of the flocks were allowed to live past three years of age. Therefore, the principal difference between the Late Bronze Age herding strategy and that of the Iron Age I, is a shift in which secondary products were emphasized – from dairying earlier to wool production later.

The sheep and goat mortality pattern produced by analysis of tooth wear rates does not demonstrate precisely the same trend (Figure 15). Indeed, this mortality profile shows a nearly even emphasis on all three age categories – a very generalized herding strategy which differs from the Late Bronze Age tooth wear-based mortality pattern in that a greater proportion of prime-aged animals were slaughtered in the later period. A reconciliation between the two sources of mortality evidence would give greater weight to the proportion of young animals in the fusion-based graphic, as well as to the percentage of old animals in the tooth wear-based chart. Such a mortality profile would therefore be much in agreement with the epiphyseal fusion mortality sample. The potential production goals which the Philistines sought from sheep and goat herding would primarily have been meat and a lesser emphasis on wool. Hesse's earlier study came to essentially the same conclusions: during the Iron Age I the Philistines did not have a significant dairy industry but did raise sheep and goats for wool production, among other aims (1986:22).

Metric measurements of sheep and goat bones produced evidence complementary to the mortality data. The studied sample of measured bones included the first phalange (breadth proximal) of both sheep and goats. The distributions of the phalange measurements was difficult to interpret since they did not produce bimodal pattern. Lack of such patterning is due either to the presence in the sample of only one sex or because the sheep and goat populations were simply not dimorphic. In order to further investigate population sex ratios, distal humeri (breadth distal) and proximal radii (breadth proximal) were then grouped together and their measurements plotted, since these bones fuse at the same age (by the end of the animal's first year) as do the phalanges. The goat histogram's shape indicates that the majority of

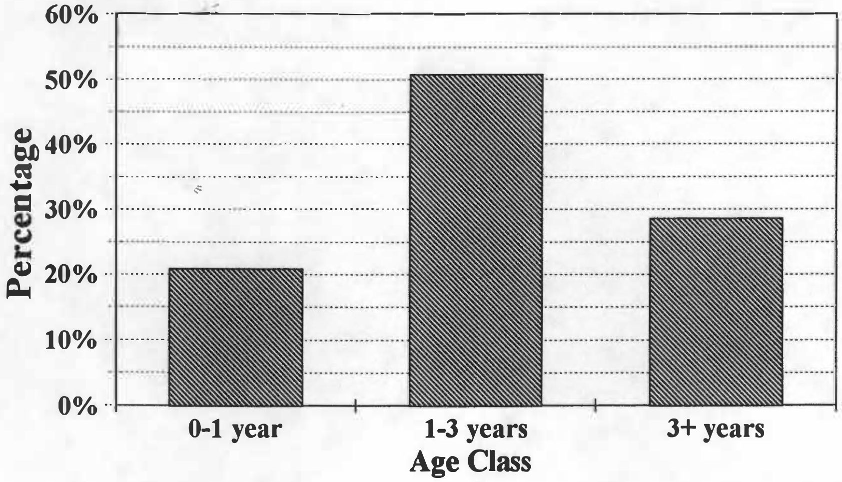


Figure 14: Iron Age I Sheep and goat mortality patterning, based on epiphyseal fusion.

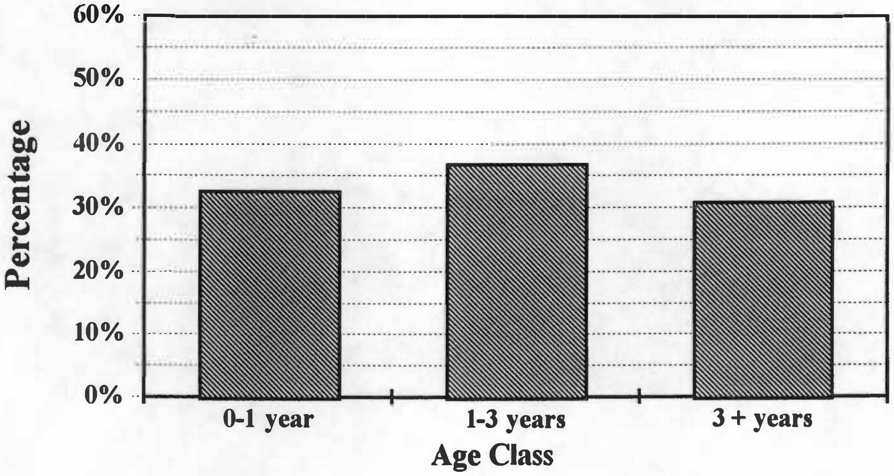


Figure 15: Iron Age I sheep and goat mortality patterning, based on tooth wear analysis.

animals were smaller than the mean. Most of the goats in this sample were therefore probably female (Figure 16). Sheep on the other hand displayed an opposite pattern, where the majority of specimens plotted above the mean, such that the sample is biased in favor of males (Figure 17). This indicates that goats were raised primarily for meat, since many females were slaughtered, while sheep were kept longer, presumably for wool production. In comparison with the metric histograms based on the sheep from the Late Bronze Age, which contained even numbers of both sexes, the Iron Age herding economy appears to have been more specialized.

Sex ratios of domestic animals should, where possible, be explored with a number of elements fusing at different ages, so as to understand which sexes were culled at which ages (Hesse 1984:251). The calcaneus fuses around three years of age; animals surviving up to and past that age are often culled in large numbers since their productivity declines past their first few years of life. Although Driesch (1976), in her attempt to standardize zooarchaeological measurements, recommends taking the greatest length of the calcaneus, this is often problematic when the element is broken. Instead, the greatest height of the malleolar process was taken and used for the following histograms. The histogram for sheep (Figure 18) showed the expected pattern, in that the majority of specimens were smaller than the mean. In other words, the females were slaughtered *en masse* only when they had ceased to be productive after their third year. The metric evidence for goats (Figure 19) was more equivocal. Slightly more specimens (eight) plotted above the mean than below it (six). This may indicate that sheep were valued for their wool while goats were not, since a somewhat greater proportion of them were slaughtered at younger ages.

The Philistines seem to have settled quickly into the Levant, and adopted a diversified agricultural economy as well as possibly established relations with nomadic pastoralists to trade their surpluses in exchange for animal products they did not themselves produce. Cattle exploitation intensified during the Iron Age I, a phenomenon which may be a reflection of the increased size of the urban population of Ekron in specific and the shephelah in general (Finkelstein 1996). Cattle, while important for providing milk and meat, probably became more highly valued for their ability to pull plows, wagons, and thresh grain during the Iron Age I. Sheep and goats seem to have been managed in a

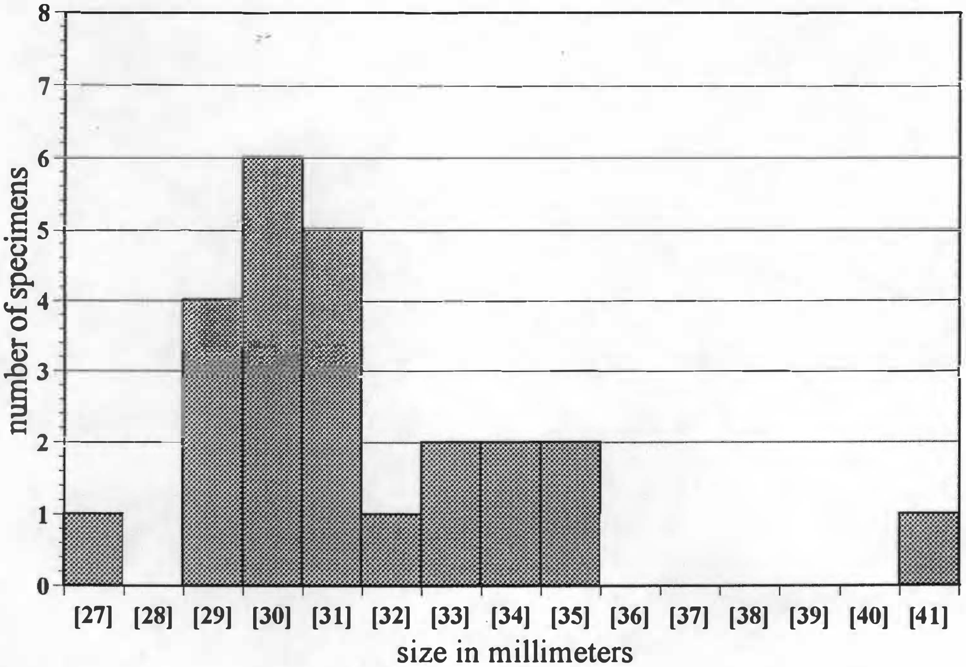


Figure 16: Metric measurement of goat distal humeri and proximal radii from Iron Age I contexts. The sample is biased toward animals smaller than the mean of 31.6.

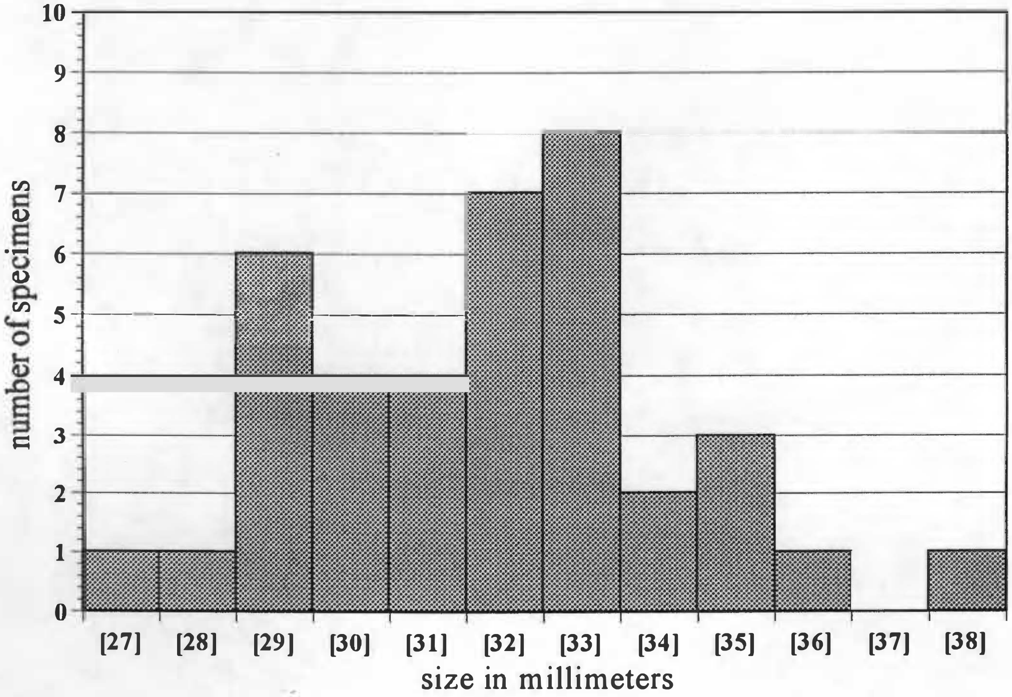


Figure 17: Metric measurement of sheep distal humeri and proximal radii from Iron Age I contexts. Slightly more than half the sample plots larger than the mean of 31.8.

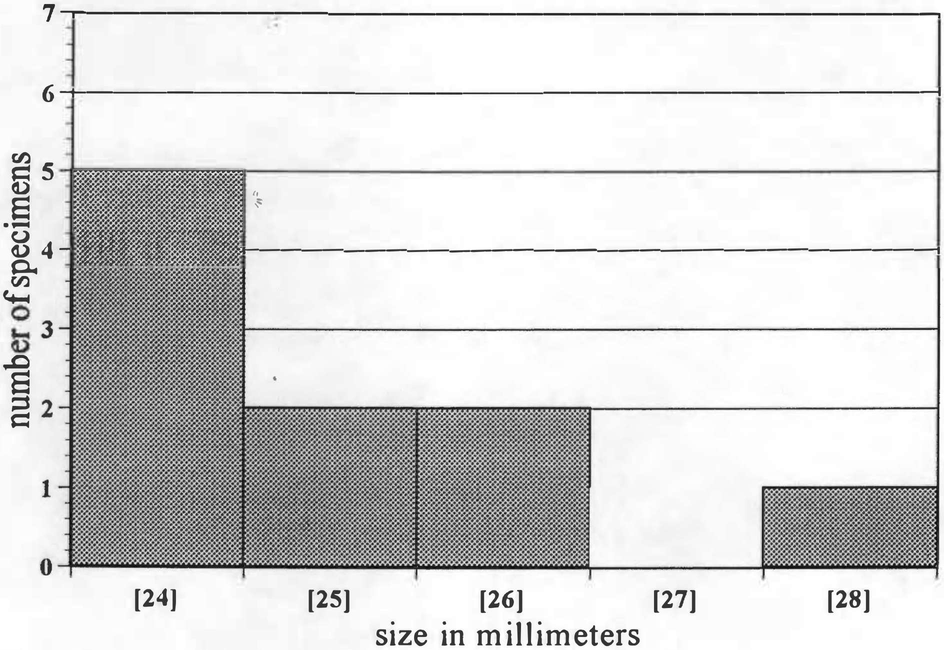


Figure 18: Metric measurement of sheep calcanei from Iron Age I contexts. Most specimens were smaller than mean of 24.9.

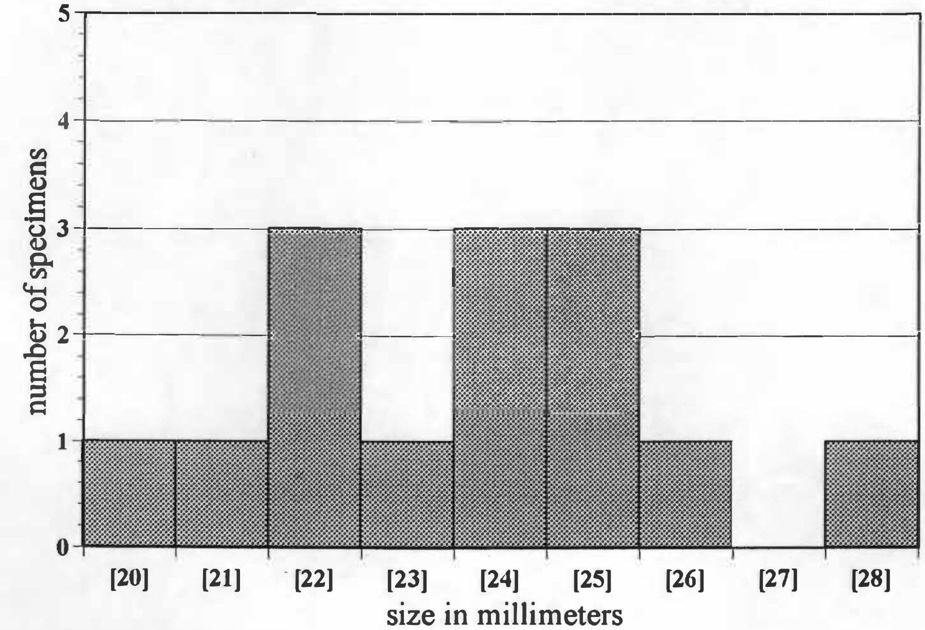


Figure 19: Metric measurement of goat calcanei from Iron Age I contexts. Unlike the sheep, a slight majority of goat specimens plotted larger than the mean of 23.6.

divergent manner. The mortality profiles, using bones from both animals, indicates a dual emphasis on both meat and some secondary product, probably wool. The metric evidence, separating the two species, reveals that female sheep were preserved until old age, while female goats were not preserved to the same extent. Female sheep were probably important not only for long term flock survival and reproductive success, but also could produce wool, albeit not as much as castrated males could.

Pork Consumption at Ekron in the Iron Age I: Evidence and Implications

No analysis of faunal remains from a site in Israel and especially from a Philistine site would be complete without a long discussion of the extent to which pigs were eaten by the populace. The faunal assemblage from Iron Age I strata at Ekron is remarkably abundant with pig bones. Hesse (1990, 1986) has previously commented on the presence of a significant proportion of pig bones within collections of animal bones from both this, and other Philistine sites. The fact that pig bones are found at Philistine sites has been a subject of much discussion among archaeologists working in the region, since ethnicity is generally an important topic. Several scholars therefore have been quick to make a cultural link between Philistines and an ethnically distinct diet which included an emphasis on pork. There are two parts to the 'porcine ethnicity' hypothesis: the first (historico-geographic) part attempts to link swine agriculture to the Aegean, while the second (methodological) part asserts that pig percentages can be used as index fossils for identifying ancient ethnic groups' settlements in Israel. As to the historico-geographic branch of the porcine hypothesis, Stager (1995:344) has made the argument that the Philistine interest in pigs was related to their cultural heritage in the Aegean, as Mycenaean as well as descendant cultures there "had a...preference for pork...[which]...the Philistines brought with them to Canaan...." On the other hand, Finkelstein (1997:230) argues that the relative importance of pigs in faunal assemblages is a useful methodological tool for demarcating general ethnic boundaries as well as for assigning ethnic labels to Iron Age I sites. Explanations for why the ancient inhabitants of the Levant either avoided or favored pigs has generally, as the above examples demonstrate, been approached in a simplistic manner. This is despite the efforts of Hesse (1990) and Hesse and Wapnish (1997, 1998) who have in recent years repeatedly tried to make the point that a number of variable 'pig principles' determine the extent to which a population raises and consumes swine.

This faunal assemblage constitutes one of the largest collections of animal bones from an Iron Age site in Israel, and is one of the only well-collected assemblages from a published site. The animal bones from Ekron are all that much more important because they are intimately involved with the question of pig use, a research agenda which touches on archaeological approaches to ethnicity (Hesse and Wapnish 1997:239-240) as well as the emergence and development of complex societies in the ancient Near East (Zeder 1998:109). In order to assess the validity of the various pig positions, outlined above, it is necessary to review the pattern of pig use in the Late Bronze and Iron Age I strata.

Late Bronze Age strata at Tel Miqne, as we have already seen, contained only relatively small numbers of pig bones, forming no more than three percent of all species present. That proportion changed dramatically with the advent of the Iron Age I in the first third of twelfth century. Stratum VII, the earliest Iron Age stratum, contained many more pig bones than the preceding stratum, a total which formed a full 13 percent of this assemblage. That shift in itself is intriguing, since this is precisely the stratum and time period when the Philistines must have arrived in Canaan and (re)built their principal five cities according to their liking. Nevertheless, the increased number of pigs in the assemblage should not be overemphasized: as in the preceding period, the Iron Age population of Ekron got most of their meat from sheep, goats and cattle. In fact, fully 84 percent of the animal bones identified from stratum VII belonged to the latter three species. Even though these animals may not have been raised primarily for meat production as pigs were, it does nevertheless paint a picture of a diet dominated by the meat of animals other than pigs. Still, the correlation between the appearance of Philistines in Canaan and the (re)fluorescence of swineherding is intriguing.

The proportion of pig bones in the Late Bronze Age and stratum VII is not the whole story of pigs and Philistines at Iron Age I Ekron. The following two strata, VI and V, contain an even greater number of pig bones, 23 and 24 percent respectively, than the earlier Iron Age I stratum did. At the same time that pigs became relatively more important in the Philistines' cuisine, so too did cattle, which became the most important source of meat by the early eleventh century (stratum V). Pigs and to a lesser degree cattle increased in importance very suddenly, going from a total of 30 percent in stratum VIII to nearly 65 percent in stratum V – a period of time spanning somewhat more than a century. This dietary phenomenon was not long-lived, however. The last Iron Age occupational level, stratum IV, is radically different from the preceding three strata in the relative abundance of the domestic taxa. Sheep and goats increased in importance by 50 percent, from an earlier low of 29 percent, to a high of 46 percent in stratum IV. In that same span of time, between the beginning and end of the eleventh century, pigs declined rather suddenly and sharply, falling from a high of nearly 25 percent in stratum V to a low of only seven percent in stratum IV.

What remains to be answered, then, is the relationship between the observed shifts in diet and the ethnic identity of the Philistines. Since there does appear to be a connection, at least in timing, between the settlement of the Philistines and the beginning of more intensive swine-raising, it is worthwhile to consider whether there are cultural precedents for pork consumption in the region where scholarly consensus places the Philistine homeland, namely, the Aegean. Hesse (1990:218), in an early work on the pig problem, speculated that the Philistines' "...pig husbandry may have roots in what had been successful adaptations in their old homeland" and Stager (1995:344) concluded positively that "there can be little doubt that differences in pig production...have more to do with culture than ecology. The Mycenaeans...had a...preference for pork in the diet. The Philistines brought that preference with them to Canaan..." Assuming that the Philistines did migrate at the end of the Bronze Age from the Aegean region to Canaan, then it is worthwhile to know what people in Greece and the Balkans ate at that time.

Many reports on faunal assemblages from Aegean sites have been published, so that it is possible to gain a very clear idea of what an Aegean diet once comprised. Of course, the Aegean as a region is much larger and more geographically diverse than is the Levant, so that it is much harder to make generalizations about pastoral practices given the close relationship between environmental possibilities and farming practices (e.g., Gamble 1982). Keeping the latter caveat in mind, it is feasible to search through publications of Greek sites and outline a rough dietary picture. Trantalidou (1990) published a survey of Greek faunal studies from a wide geographic range of sites. What is immediately apparent is that pig use, though variable from site to site, was consistently intensive for the entire duration of the Aegean Bronze Age. More specifically, in the Late Bronze Age, pigs made up anywhere from 17 to 37 percent of the assemblages at the surveyed sites. The other principal animals in the diet of the Bronze Age Aegean populations were sheep, goats, and cattle. The relative importance of these animals also varied quite a bit from place to place: cattle at Akrotiri comprised only nine percent of the assemblage, but at the northern Greek site of Pevkakia they made up 27 percent. Sheep and goats, on the other hand, display a contrary geographic distribution: at Pevkakia, they totaled 31 percent, versus a high of 73 percent at Phylakopi on the island of Melos (Gamble 1982:168; Trantalidou 1990:398).

The faunal patterning suggests that the variation in Aegean animal frequencies is not entirely random, but in fact has a climatic/geographic explanation behind it. The Aegean islands receive much less annual rainfall than does the mainland, and on the mainland itself rainfall is more generous on the western side (Dickinson 1994:25). One might therefore hypothesize that sheep and goats were important in the islands because, as Gamble (1978:752) suggests, cattle are not well-suited to the environments of small islands. Gamble (1978) has outlined a generalized model for animal economies of the Aegean islands, in which sheep and goats were kept mainly for secondary products and cattle principally for their labor. This economy also featured a system where each household had "its own pig which it kept in or near the settlement, fed on a low quality diet and slaughtered between 2 and 3 years old" (Gamble 1978:752). That husbandry strategy, Gamble asserts, resulted in faunal assemblages from Bronze Age island sites which consistently contain no more than 20 percent pig bones.

Animal husbandry practices in Bronze Age Greece thus provide a general model by which to evaluate the claims that the Philistine herding system was somehow (1) foreign to the Levant and (2) specifically Aegean in character. To examine the first claim it is necessary to evaluate the relative proportions of the domestic species at other sites in the Levant. The extent to which past Levantine populations herded pigs seems to have varied cyclically over time, and the Middle Bronze Age seems to have been the most recent period of pig popularity before the Early Iron Age. Hesse (1990:211) collected pig percentages from a few published sites from the former period, and found that proportions varied from eight to 34 percent. The ratio of pigs to sheep and goats to cattle also varied quite a bit – 1:2:1, 1:6:4, 1:7:1, and 3:4:2 – compared to the more consistent ratios from the first three Iron Age strata at Ekron. The latter strata produced two ratios, 1:4:3 for stratum VII, and 1:2:2 for both stratum VI and stratum V. To a certain extent, Stager (1995) is correct to assert that there is a foreign character to the Philistine faunal assemblages. However, the relatively high proportion of pigs, while unusual for the Early Iron Age, is not what is so foreign. Rather, as shown by the ratio comparisons, what is strange is the relatively high importance of cattle as compared to sheep and goats.

The second point, the idea that the Philistine animal economy was Aegean in character, is more difficult to answer. Certainly there was an Aegean Late Bronze Age precedent for swine herding, an economic strategy which was either absent or de-emphasized in contemporary Palestine. Hesse and Wapnish (1997:238), referring to a tendency among some archaeologists working in Israel to use the absence of pig bones as an indicator for the presence of Israelites, point out that, by using that criterion alone, one could come up with Israelites living in "...a wide swath from Anatolia to southern Mesopotamia, from Persia to the Mediterranean..." A similarly unlikely scenario could be painted for the homeland of the pig-loving Philistines: given that virtually all bronze age peoples inhabiting the Aegean and Europe had a preference for pork in their diets, the home of the Sea Peoples might have been just about anyplace with pigs. Of course, there are other reasons for thinking that the Philistines indeed came from the Aegean region – among other things, similarities in pottery styles, architecture, and perhaps personal names (Dothan 1995; Gitin *et al* 1997), but it is clear that pig remains do not, alone, make reliable index fossils.

The other unusual aspects of the Early Iron Age Philistine diet – the relatively high importance of cattle and lesser emphasis on sheep and goats – are more difficult to fit into an Aegean precedent. Cattle, with the exception of Pevkakia in Thessaly, make up less than 20 percent of faunal assemblages from Late Bronze Age Aegean sites, while sheep and goats are generally dominant (Trantalidou 1990:398). When the Philistine animal economy of the Early Iron Age is examined as an entire system, rather than looking at pigs in isolation, there do emerge patterns which are different from either Levantine or Aegean herding precedents. Given this, the question which must be asked is, for what reasons was the Philistine animal economy different?

Hesse and Wapnish (1998), basing their hypothesis on Crabtree's (1989) earlier work with the diet of Anglo-Saxon settlers in England, propose that the Philistines' relatively brief interest in raising pigs, a phenomenon which lasted some 150 years, was a strategy they adopted to ease their settlement of a new land. As Crabtree's theory goes, pigs are a useful animal in such situations because the animals easily adapt to a wide variety of environmental conditions, multiply quickly, eat nearly anything, and put on weight rapidly: a livestock economy which gives maximum benefit for minimal input. That adaptive strategy is eventually abandoned, as cattle, sheep, and goat flocks attain natural age structures and begin to produce secondary products (Hesse and Wapnish 1998:125). Through various computer simulations of sheep and goat flocks Cribb (1991:29-34) has demonstrated that within a period of 20 years, caprid herds can easily withstand a number of natural or human-induced population setbacks, and rebound to comfortably large numbers in the long run. Cattle mature and reproduce at slower rates than sheep and goats, so that it could take longer periods for these herds to reach optimal levels, though they are not usually kept in the same numbers that sheep and goats are. A period of livestock adaptation may therefore be generally said to last something on the order of one generation, at most.

With the above constraints in mind, the pig adaptational theory is an attractive one, and appears to have a lot of explanatory potential for the Philistine situation, though it is not without at least minor problems. There are two potential discrepancies between the theory and the case at hand: First, just how much time is necessary for a population to adjust and settle comfortably into a new natural and social environment? The period of intensive pig use at Ekron spans approximately 150 years. If livestock reproduction and maturation rates in ancient times were at all similar to Cribb's (1991) calculations, then this seems much too long a settlement period. Perhaps, though, other factors aside from periods of livestock adjustment need to be considered in calculating an appropriate adaptation timespan.

Is 150 years too long a time for an immigrant population to adjust, or is it a normal span of time? The answer probably depends a lot on who the Philistines were and where they came from. Assuming that they indeed originated in the Aegean region and emigrated *en masse* eastward, then they would have found in Palestine a very similar climate to the one they left behind. But possibly they found a very different social landscape, one filled with neighboring groups hostile to the newcomers, and where cultural and linguistic barriers existed between themselves and other populations. On the other hand, if the Philistines and other Sea Peoples were actually a mixed group of Eastern Mediterranean sea-based traders who emerged as a powerful socio-economic group at the end of the Late Bronze Age (Bauer 1998), then the population would already have had extensive contacts with and knowledge of the southern Levant before settling permanently there. In the latter scenario there would be even less reason to expect that the new population would find it necessary to resort to such an adaptive strategy for several generations.

The second problem has to do with the relative proportion of pig bones in each of the first three Iron Age I strata at Ekron. During the first century and a half of Ekron's existence as a Philistine city, the relative abundance of pig bones, and presumably pork in their diets, increased over time, from 13 percent in the first third of the twelfth century, to 24 percent in the first half of the eleventh. If the Philistines at one time adopted pig husbandry solely as an adaptive strategy to get them through difficult times, then the relative abundance of pigs should have declined over time. Once their bovid livestock herds reproduced and reached sufficient population sizes and age/sex ratios to produce all necessary products, pigs would have become redundant. We know from the Biblical accounts that the Philistines emerged as a militarily and economically successful polity in Palestine, whose regional superiority lasted until the establishment of the Davidic kingdom (Ehrlich 1996:23-24), which archaeologists date to the beginning of the tenth century (e.g., Barkay 1992). If the Philistines had already adjusted well enough to the Levant to become a dominant power there by the eleventh century, then why should they have continued to follow a dietary regimen whose purpose was to ease their adaptation? The proportion of pigs in the Iron Age I strata of Ekron reveal that, instead of declining over time, pork increased in importance until, in the late eleventh century (stratum IV) it suddenly declined precipitously.

Zeder (1998) has offered a different hypothesis to explain the highs and lows of pork consumption in the post-Neolithic Levant. That hypothesis states that it is in times of political disunity that raising pigs becomes an economically important activity, but fades with increasing political centralization. The idea behind that observation is that large, well-organized polities tend to discourage economic activities among its subjects which tend to give them independence from the state's imperial economy. In contrast to the preceding Late Bronze Age, the Eastern Mediterranean region during the Iron Age I was a period of political decentralization (Sherratt and Sherratt 1993). The former great powers of the Bronze Age – Egypt, the Neo-Hittite Empire, and the Mycenaean kingdoms among others, all crumbled or entered periods of introspection, causing much of the international trans-Mediterranean trade to cease (Mazar 1992:300). At the same time, because of their weakening powers, these mighty empires could no longer prevent their conquered territories from slipping away and giving rise to autonomous small polities: Canaan and Transjordan were transformed from some sort of Egyptian overlordship ruling over weak city-states, to a region witnessing the evolution of several territorial states. Although the latter states only became politically centralized during the succeeding Iron Age II, the political vacuum left in the wake of Egypt's retreat already allowed for the creation of new forms of nascent states (Portugali 1994:211-215).

Within this politically disunified *milieu* the Philistine agricultural system emerged, with its emphasis not on the standard Late Bronze Age fare of sheep and goats, but rather focusing on cattle and pigs, in addition to caprids. Zeder's (1998) hypothesis has the explanatory power to account for the former absence of pigs during the Late Bronze Age, as well as their rapid decline beginning with stratum IV. The late eleventh/early tenth century stratum IV at Tel Miqne-Ekron was the period which witnessed the beginning of the Philistine decline, evidenced both in historical sources and from the stratum's material culture. The rise of the United Monarchy of ancient Israel under King David at this time unified the Israelites, previously less centrally-organized (Hackett 1998:200-201), against the expansionist Philistine cities, and in so doing won a series of military victories. These victorious Israelite campaigns against the Philistines won back not only territory formerly held by Israelite tribes and conquered by the

Philistines, but may have also brought at least some measure of Israelite control over some of the original five cities of Philistia (Ehrlich 1996:24-26, 34-37).

In terms of material culture, stratum IV displays a marked cessation of Aegean-inspired architectural forms and ceramic styles, in favor of stylistic influences from neighboring cultures, most notably Phoenecia, Judah, and Egypt (Dothan 1998:158; Gitin 1998:162-164). In fact the occupational level of stratum IV came to an end with the city's destruction, such that for the following 250 years only the acropolis area was rebuilt and inhabited (Gitin 1997:86). It seems significant that this destruction, which coincided with significant changes in Philistine foodways and material culture, was the first the city had suffered since the Late Bronze Age Canaanite town was sacked at the end of the thirteenth century. Philistia was physically and culturally overwhelmed by its neighbors beginning in the tenth century, a cultural realignment which continued for the duration of its existence (Gitin 1998:162-163).

This brief historical overview gives a context for the dramatic changes that swept the Philistines' animal economy near the end of the Iron Age I. The political situation of the Iron Age I up to that time fits well the description of a regionally disunified social structure, where, according to Zeder's (1998) hypothesis, we might expect to see a large investment in raising pigs. Given the two principal problems with the pig-settlement hypothesis, the relatively long duration of pig popularity and their increasing relative abundance over time, the question is whether the interpretation holds any explanatory power at all. Possibly, it does. Without that hypothesis, it is difficult to find a reason for the abundance of pigs in Early Iron Age Philistia while they were virtually absent elsewhere.

Zeder's theory (originally outlined by Diener and Robkin 1978) is perhaps complementary to Crabtree's (1989) view of pigs as the favored livestock of an immigrant population. Combining the two theories, what emerges is a herding economy designed to aid the Philistines in their settlement of a new homeland, but as well acted as a sort of economic insurance policy within this period of military conflict and political instability. The hardiness and fast reproductive abilities of pigs could have helped the Philistines cement their territorial holdings in Canaan and even create surpluses which allowed for military expansion. As a collection of loosely allied city-states, the Philistines did not have to fulfill a specific role in a large regional political and economic bureacracy, and thus were free to pursue herding decisions which buoyed their economic independence during the Iron Age I.

Regardless of why the Philistines raised pigs during the Early Iron Age, some archaeologists would still assert that the mere fact that they did so, while the Israelites did not, amounts to an ethnic difference. Such a dramatic difference, so the argument might go, could be traced archaeologically by quantifying the number of pig bones in relation to those of other species at Iron Age I sites. In some respects, this is a difficult argument to refute. Although some Biblical historians even question, on linguistic grounds, whether the Biblical *kashrut* laws existed in the twelfth and eleventh centuries, others assert that this is beside the point: whether or not they had been codified by that time, the general injunctions existed at least as oral traditions by the Early Iron Age (Hesse and Wapnish 1998; see latter reference pp. 130-131 for a summary of this debate). The evidence for such an oral tradition is the lack of pig bones at hill country sites dating to both before and after the appearance of the Israelites in the historical record (Finkelstein 1997).

But the other side of the argument, which addresses the relationship between pigs and Philistines, is one based on the presence of this scorned animal. At each of the major Philistine sites for which faunal assemblages exist (Ashkelon and Ekron, so far) large numbers of pig bones have been found in Early Iron Age levels. However, at other ancient cities which became Philistine territory – sites like Qasile in Tel Aviv, Beth Shemesh between Ekron and Jerusalem, and Tel Jemmeh in the vicinity of Gaza – pigs are absent (Hesse and Wapnish 1998:128). Still, the pigs and Philistines hypothesis would be salvageable in terms of an early 'culture enclave' (e.g. Dothan 1989:8-9) where the Philistines maintained a more conservative core of material culture, and later expanded into border areas where hybridization and outside influences were stronger forces, and which in the long run subsumed much of the original material culture trait constellation (Dothan 1989:9-12; Lightfoot and Martinez 1995). Yet, if we accept such a reduced view of Philistine ethnicity, we are left with a model of pig-loving Philistines that predicts only that we will find what we have already found: that the Philistines for some reason pursued swine agriculture at their principal cities for about one and a half centuries.

Butchering Patterns: Comparison between the Late Bronze Age and the Iron Age I

If relatively straightforward demonstrations of change in species abundances, most notably pigs, over space is not a very promising avenue for ethnic distinctions, then perhaps butchery patterning is. At least, this was a hypothesis which I set out to test at the beginning of this study. What became clear, however, in examining the type, orientation, depth, frequency, and placement of butchering marks on animal bones during analysis was that there seemed to be only one pattern. The pattern which appeared was the same throughout all the cultural periods present in the assemblage. Most notably, the placement and orientation of butchering marks varied neither across strata nor across the principal domestic food animals. Butchering marks, whether on Late Bronze Age or Iron Age I bones, were principally concentrated around joints, and, to a lesser degree, on the shafts of marrow-rich long bones. This similarity in butchering methodology across time is illustrated in Figure 20. These drawings show two humeri with identical butchery scars. Bone 2971 is from a Late Bronze Age (stratum VIII) sheep: the diaphysis of the bone has clearly been cracked open with some blunt instrument to facilitate marrow removal. The same damage can be seen on bone number 3434, a goat originating in an Early Iron Age (stratum VI) context. These butchering scars illustrate not only parallels of purpose (in this case, marrow extraction) but also point out that tools used for butchering varied principally according to the specific task at hand.

Other illustrations of bones demonstrate additional similarities in method. Separation of leg joints tightly connected by interlocking bones, tendons, and sinew can be a difficult task, and the city's butchers approached the problem with different methods and tools according to which joint needed to be separated. The next illustration (Figure 21) displays an Iron Age I pig humerus from stratum V (bone number 5572). The pig humerus shows what was a typical approach to the elbow joint, which was usually opened by cutting away the muscles and tendons locking together the distal humerus and proximal radius. That action often left knife cut marks on the medial side of the distal humerus. By contrast, the ankle joint, where the distal tibia intersects a number of small, tightly locked together bones (tarsals), was more often opened with a heavy chopping tool such as a cleaver. Two Late Bronze Age bones, a sheep/goat

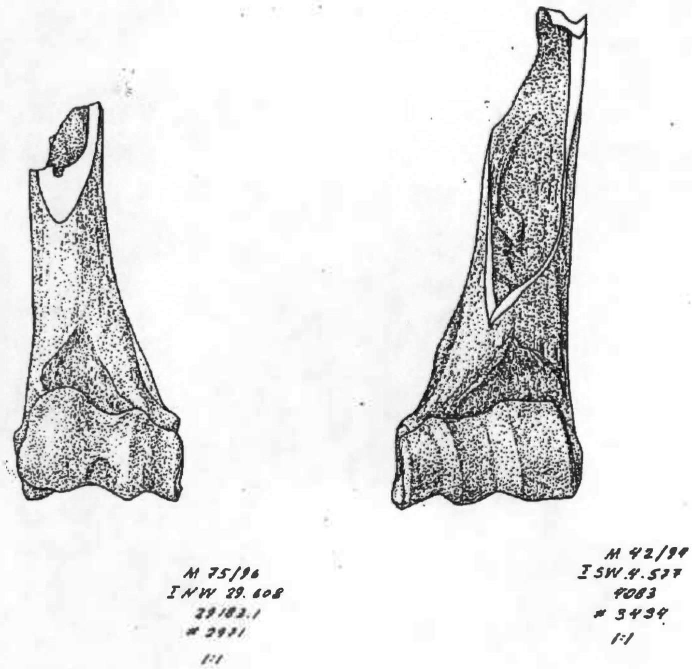


Figure 20: Illustration of sheep (left) and goat (right) humeri, with the diaphyses broken open.

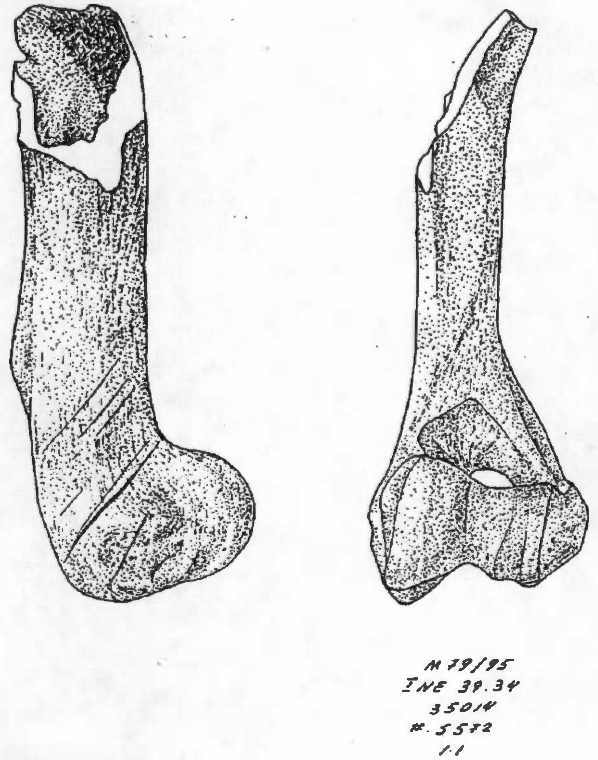


Figure 21: A pig humerus displaying typically-placed butchering marks along the medial side.

tibia (bone number 3704) and a cow astragalus (bone number 2723), demonstrate this type of butchering technique (Figure 22). The tibia shows the negative impression left by such a tool on the medial side of the shaft. The astragalus illustrates a variation on the same approach, where the joint was separated by chopping entirely through the astragalus. The latter two bones demonstrate another trend – differentiation of butchery techniques according to animal size. The ankle joints of animals smaller than cattle were more often divided by hacking through the tibia, while the more substantial bones of cattle were separated by chopping through the tarsals. In effect, this is a 'path of least resistance' approach to butchery.

The survey of butchering scars turned up similarities not only in the dismemberment of limbs, but also the axial portion of carcasses. Commonly, vertebrae of both large and medium-sized animals bore clear evidence of heavy butchering tools. The atlas and axis frequently bore both cut marks encircling the articulation point either between the two vertebrae, or at the point where the atlas articulates with the rear of the skull. Others, like axis # 2449 from the Late Bronze Age (Figure 23), were chopped all the way through the bone, indicating that the head was severed from the body using a cleaver rather than cutting it away with a knife. In fact, the preferred method for dividing the vertebral column into smaller units seems to have been through use of a cleaver. Two Late Bronze Age cattle specimens 2716 (lumbar vertebra) and 2687 (thoracic vertebra) displayed the straight-walled, deep cuts typical of heavy chopping tools, though several other vertebrae also were scarred by blades in a cranial-caudal direction, certainly as a result of meat removal along the vertebral axis (Figure 24). The chopping scars left on many of the bones showed a degree of smoothness which is possibly attributable to the use of metal rather than stone instruments.

Finally, in addition to carcass dismemberment and meat/marrow removal, there were also oddly placed scars which may have been from other activities. In fact, several horn cores, among them one from a goat (specimen number 3465, Late Bronze Age), had been cut off from the skull through a series of chops directed at the base of the bone (Figure 25). The aim of these cutting actions probably was to make the horn sheaths available for use while allowing the head to be skinned more easily. Other evidence that even the skin on heads was used is visible on bones 3041 and 5492, two fragments of sheep/goat maxillas

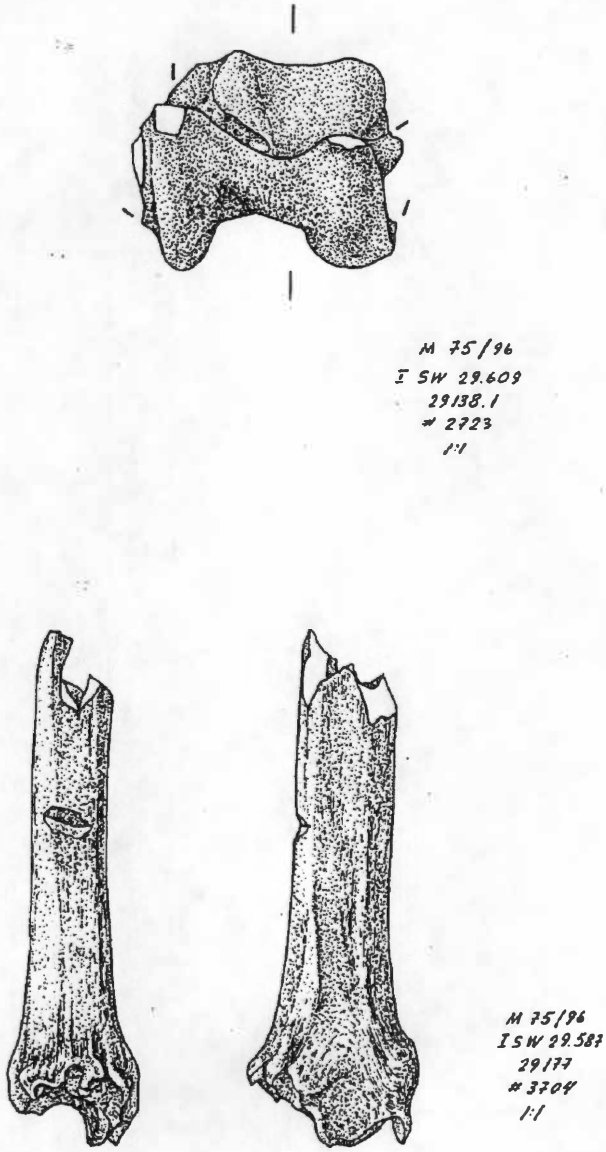


Figure 22: A butchered cow astragalus (upper illustration) and sheep/goat tibia (lower illustration). Both show heavy chopping blows aimed at severing the ankle joint.

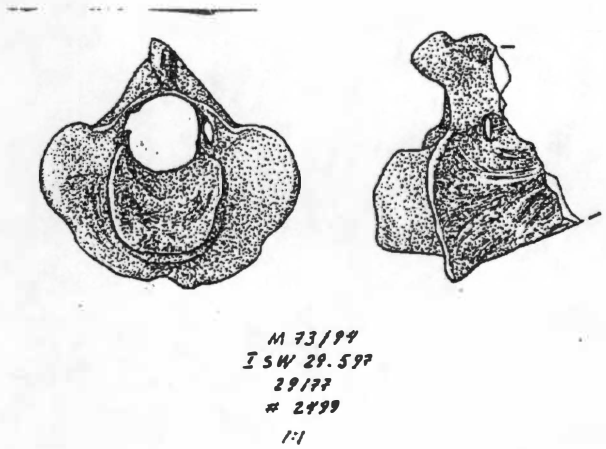


Figure 23: An axis of a sheep or goat, chopped in half to remove the animal's head.

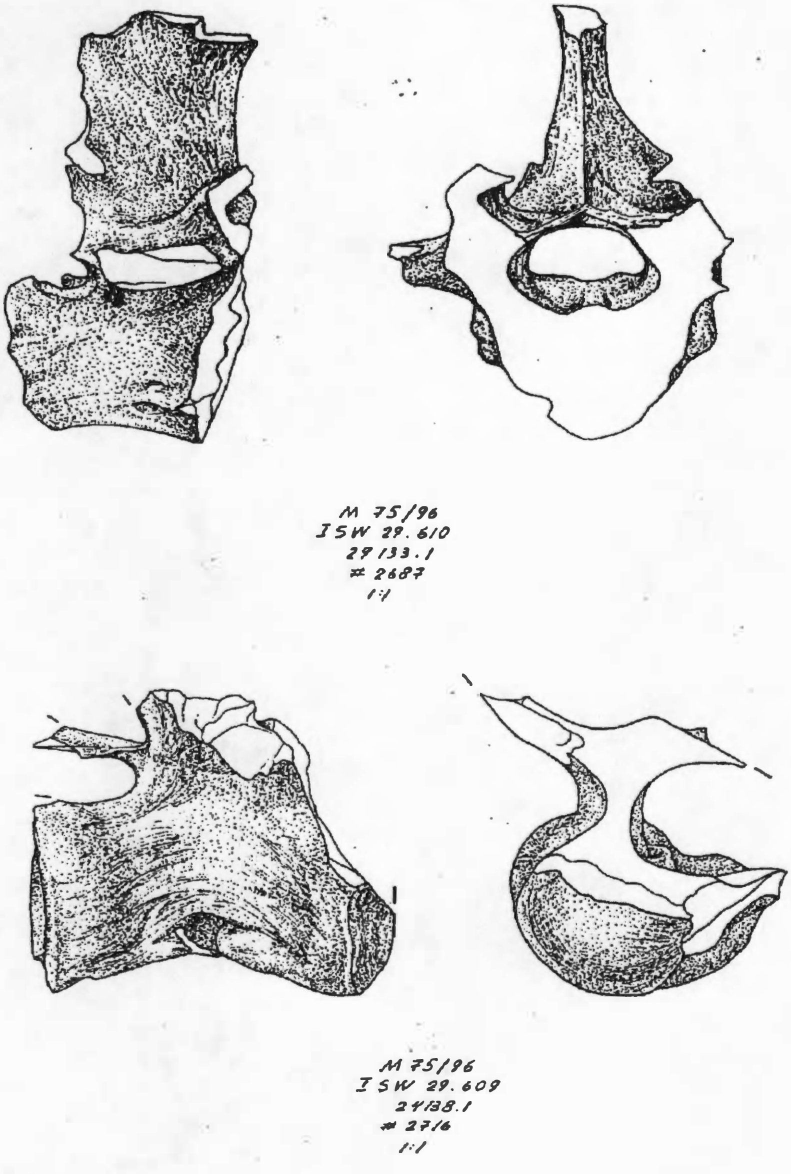


Figure 24: Two cattle vertebrae displaying chop marks through the centrum. Such butchery scars, common on vertebrae, demonstrate how the carcass trunk was cut into smaller units.

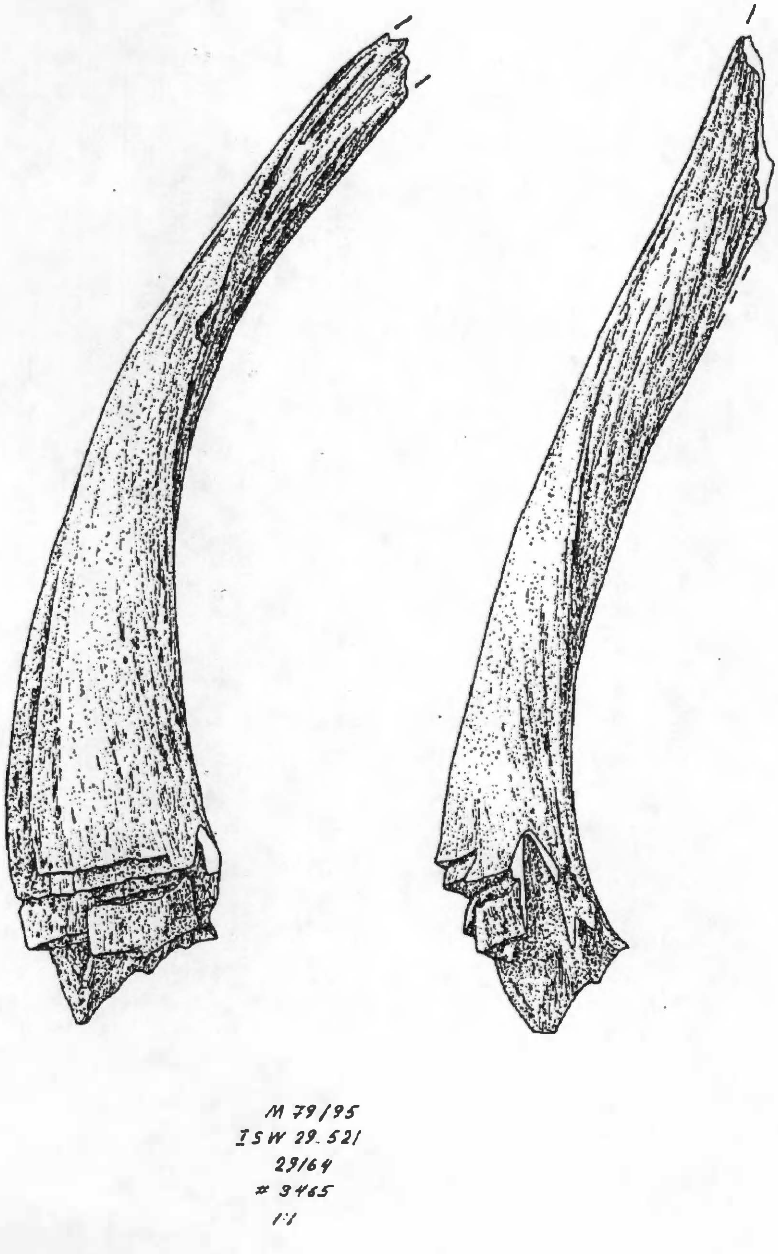


Figure 25: A goat horn core chopped away from the skull at its base. This was probably done in order to facilitate skinning the head.

from Late Bronze and Early Iron Age (stratum VII) contexts, respectively (Figure 26). These two fragments show fine scars, appearing almost as scratches, running in a nasal-nuchal direction, which are the result of a sharp knife being used to sever the soft tissue of the cheek. Butchering scars are unusual in this area of the skull (these are the only two specimens in the collection displaying any) and probably have to do with loosening the skin in order to pull it off of the skull; certainly, there is little meat to bother with in that area.

The results of this butchering study suggest that no differentiation in butchering method was associated with the Philistine settlement of Ekron at the onset of the Iron Age. Given that butchering marks are often the unintentional byproduct of related activities, namely, dividing a carcass into more easily handled parcels of meat (Lyman 1992), this result is not entirely surprising. What the lack of differentiation may be hinting at, as has been suggested elsewhere on the basis of other material culture continuities, is that, despite many changes which occur at Ekron and elsewhere at the onset of the Iron Age, the Philistines were not such a force in numbers that they completely drove off the pre-existing population, but instead absorbed both local people and cultural traditions (Bunimovitz 1990). Conversely, however, it is tempting to argue that variation in butchery techniques is seldom relatable to dietary preferences, due to the uncertain relationship between observed butchering marks and the specific meat cuts which were created. The value of this limited study, beyond adding limited evidence to the debate about Philistine foodways and ethnicity, is instead what it reveals about general butchering procedures and technology. A variety of tools must have been used, at least thin knives, heavy cleavers, and blunt hammers, to produce the categories of damage and support the breakdown of the carcass into categories of byproducts. Animal carcasses were evidently taken apart first by removing the head, and then by cutting the vertebral column into smaller segments.

A common butchering practice in the region today is to hang the animal by one of its rear legs and then split the entire vertebral column with a cleaver, and only afterward dismember the carcass further (Loyet 1999:38). That method was used in the Bronze and Iron ages at Tel Miqne-Ekron, but not exclusively; the latitudinally split vertebrae shown in the illustrations demonstrate another practice. In

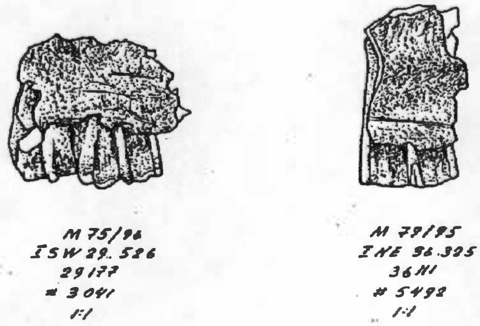


Figure 26: Fragments of sheep/goat maxillae bearing knife scars. The scars run in a cranial-caudal direction, and likely result from skinning the head.

fact, modern Islamic butchering methods appear to be a poor ethnographic model on which to base expectations for more ancient butchering practices. Bronze and Iron Age butchering practices generally inflicted more damage on the bones than current practice evidently does. Loyet (1999:39) as well as Cope (1999) have both noted that modern and Medieval Islamic butchering practices in the Levant leave relatively few marks, apparently due to an 'anatomical' approach to animal musculature, where meat is stripped away from the bone rather than reduced to chunks containing both meat and bone portions. The difference in approaches to animal carcasses, ancient versus medieval and modern, may allude to a later, post-Iron Age, development of butchers as a specialized profession.

Equid Remains in Iron Age I Contexts

One unusual deposit encountered during excavations along the northeast slope of Field I was a burial identified as a donkey by the excavators (Figure 27). Though the taxonomic relationship and morphological differences between ancient Near Eastern equid species is not clear (e.g., Clutton-Brock 1992), it is most likely that the excavator's first impression was correct; most other equid bones found at Tel Miqne-Ekron fit within the size range of this skeleton with the exception of several much larger bones which presumably belonged to horses. The skeleton was discovered in square NE37, locus 37041. The burial pit in which the donkey was situated belonged to stratum VI, which dates it to the second third of the twelfth century, and measured 1.5 meters long by .55 meters wide. Aside from the fact that equid burials are virtually unknown for the Iron Age Levant, the deposit is interesting for taphonomic reasons. The burial pit cut into the foundation trench for the stratum VII mudbrick city wall, and extended into neighboring square NE38, where it was excavated as pit 38011. The accompanying photograph of the exposed skeleton shows that, although all or most of the animal was present, few of its skeletal elements were in proper anatomical order – its disarticulated bones seemed to have been dumped in a heap. Given the pit's dimensions, which were certainly large enough to accommodate the entire, intact, carcass, the donkey's disturbed layout requires some explanation. The excavator's notes indicate that he did not realize that the skeleton was a secondary internment, and assumed it to be in anatomical order. The

Figure 27: The donkey burial discovered in square NE37, locus 37041. Note the jumbled disposition of the skeleton, specifically the fact that the mandible lies next to rather than underneath the skull, and faces in the opposite direction.

primary reason the deposit was labeled a burial was that several large stones and a fill made of decayed mudbricks covered the more or less complete skeleton, sealing the animal into the pit. The excavator even speculated that animal died while serving as a beast of burden during construction of the city wall (Meehl and Goren 1995).

Reconstructing the sequence of events that led to the skeleton's being deposited next to the city wall does underscore the processes by which whole deposits, including bones, get shifted about in tels. Over and above taphonomic aspects of this deposit, there exist interesting cultural questions about it, discussed below. A full interpretation of the donkey burial requires questions of why, when, and how the donkey came to be purposefully redeposited and sealed in this pit sometime after its death. Three possible explanations emerge to explain the secondary donkey burial. The first is a taphonomic one, which sheds light mainly on site formation processes. What is evident about the donkey's anatomical layout, or rather the lack thereof, is that before being collected and buried, its flesh and connective tissues were in large part already gone from the skeleton. Possibly, this is because the carcass lay exposed to the elements for a long period of time, where soft tissues rotted away. The evidence for exposure is not only that the skeletal elements were completely out of anatomical order, but also that the skeleton was obviously in a poor state of preservation even when first exposed. The condition of the equid bones is quite unlike that of bones excavated from neighboring loci, all of which were preserved quite well. Most of the donkey's bones, especially flat elements like the scapulae and the skull which tend to weather faster than others (Behrensmeyer 1978), were cracked and crumbling.

What does this all mean about the excavator's ideas concerning how the ass came to be buried there, and about city refuse disposal? It is clear from the position and condition of the skeleton that the animal could not have died, having collapsed under the weight of its mudbrick loads, during the city wall's construction. The burial's phasing as a stratum VI locus confirms this: the city wall was first built a few decades before, a stratum VII phenomenon which continued to be used later. Thus the donkey burial's stratigraphic position indicates that it was placed into that pit after the stratum VII town had been rebuilt in the succeeding stratum. According to architectural phasing, the burial pit belongs to the second phase (designated 8B) of stratum VI, which dates to the mid-twelfth century BC. A simple solution to the donkey problem is that it is simply what it appears to be: the secondary burial of an animal which died someplace nearby, lay exposed for a period of several months to several years, and was eventually buried in pit 37041/38011 in the mid-twelfth century. That answer, however, raises other questions: if the animal had already decayed on the surface, and only its dry, weathered bones removed and buried next to the wall, then why so carefully bury it, and then cover it over with stones and mudbrick detritus? Why not dump it outside of the city, whose outer boundary was marked by the adjacent city wall?

A further, temporal, problem raised is that equid burials are virtually unknown from Iron Age contexts in the Near East (Wapnish 1997). Addressing the when question of the burial, another possible explanation for the secondary burial is that it is a redeposited Middle or Late Bronze Age donkey internment. Equid burials are a well known phenomenon at Syro-Palestinian Middle Bronze Age, and to a lesser extent Late Bronze Age, sites (Oren 1997:265-266; Stiebing 1971). The practice is actually a widespread one, which evidently began in Early Bronze Age Mesopotamia and spread throughout the ancient Near East (Philip 1995). The Royal Cemetery at Ur is an early and elaborate example of the so-called 'warrior burials', and contained (among treasures and a number of servants who committed suicide to accompany the royal family) eight oxen with two wagons and a chariot (Philip 1995:149; Zettler 1998:33). The heyday of the warrior burial was during the Middle Bronze Age, when the custom involved burying donkeys, or, more rarely, horses, adjacent to the graves of important officials, evidently as an offering and status symbol. Such internments have also been excavated at the Hyksos city of Tel el-Dab'a in the eastern Nile delta, as well as at Tel-el Ajjul in Gaza (Bietak 1996:40-42). The burials contained complete donkey skeletons in anatomical order, which generally were separated from the human burial by some type of built tomb surrounding the latter, leaving the donkey(s) at the tomb entrance. Some of these burials, as with those at Tel-el Ajjul, had had the limbs cut away, presumably for consumption in a funerary feast (Stiebing 1971). None of the bones of the Ekron donkey burial were butchered, but the skeleton's poor preservation made it difficult to know whether the entire skeleton was present.

Stiebing (1971) points out that many, though by no means all, of the Middle Bronze Age sites with donkey burials are geographically southern as well as associated with the Hyksos people who ruled part of Egypt during the Middle Bronze Age. Tel el-Ajjul, located not very distant from the Sinai border, is thought by many to be the ancient city of Sharuhen, the Hyksos stronghold in Palestine which the native Egyptians later besieged in pursuing the evicted Hyksos from Egypt. Another candidate for Sharuhen is the site of Tel Jemmeh, located 12 kilometers south of modern Gaza city. Tel Jemmeh also produced a Middle Bronze Age equid burial (Wapnish 1997). Equid skeletons at Tel Haror in the Negev desert, a site which the excavator believes to have been politically and ethnically associated with the Hyksos, were found buried beneath the courtyard of a temple of Middle Bronze date (Oren 1997:256-257, 265).

Non-southern Palestinian/Egyptian Middle Bronze Age Equid burials have been exhumed at Jericho and Akko in the central and northern portions of Palestine, as well as at a variety of sites in Syria and Mesopotamia (Wapnish 1997:349-358). The practice of burying donkeys with warriors or important officials seems to have been a very standardized practice over the course of the third and especially the second millennia BC. Equid burials from Tel Brak and Tel Banat in Syria, among others, all appear very similar to those of Palestine and Egypt, such that one or more equids were buried just outside the dead person's tomb chamber (Anonymous 1996:28; Clutton-Brock and Davies 1993).

Another, independent, tradition of burying equids with warriors existed in the Aegean world and in Cyprus. There, as in the Near East, usually horses but also donkeys were buried adjacent to the deceased warrior, and sometimes harnessed to chariots. Equid burials on the Aegean mainland date mainly to the Late Bronze Age, but in Crete one slightly earlier horse burial from Archanes, and one somewhat later (Early Iron Age) from Knossos, have been discovered (Kosmetatou 1993; Wall-Crowther 1996). The Archanes burial is intriguing since it defies the usual Aegean as well as Near Eastern burial practices on two grounds: it is associated with the grave of a female and the carcass was chopped up at the time of interment (Kosmetatou 1993:32, 38; Reese 1995). In Cyprus equid burials reflect the same customs as existed in the surrounding ancient world, the Aegean and Near East, with the important difference of date. Whereas all but one of the equid burials in Greece and Cyprus date to the Bronze Age, the Cypriot tombs were built in the eighth and seventh centuries BC (Karageorghis 1965; Kostmetatou 1993).

The relevance of the above survey of the Eastern Mediterranean region's tradition of burying equids with important people is that it gives a context for the alternative interpretation of the equid burial from Ekron, that it may be a redeposited Bronze Age interment. Within the fill of donkey burial 37041 were a number of pottery sherds. The majority of these sherds dated to the Middle Bronze and Late Bronze Ages, though the latest sherds belonged to the Iron Age I. While the Bronze Age sherds may have originated in the mudbrick detritus which sealed the pit, they could also be viewed as evidence arguing for the donkey having been displaced from earlier strata. It is interesting to note that loci adjacent to burial 37041 (fills 37042 and 37043) also contained donkey bones. Some of these could be from the same animal since, by the time of analysis, many of the elements of the donkey burial had crumbled so badly as to no longer be identifiable, and it was not clear whether the entire skeleton was placed in and recovered from the burial pit, or only most of it. Excavation areas adjacent to NE37 and NE38 also produced donkey bones, albeit from earlier strata. In all, 99 donkey bones were found in the general vicinity of burial 37041, having been recovered from the squares excavated on the northeast slope of the mound. Astonishingly, more than half that number, 51, came from square NE36 stratum VII loci. The majority of equid bones were found in Iron Age I contexts along the tel's slope (93), whereas only four were found in Late Bronze Age levels there. Although 20 equid elements were recovered from Iron Age II levels, only two of these were found on the northeast slope (see Appendix for a complete list of equid bones, contexts, and measurements). An additional 34 equid bones were recovered from excavations in the upper portion of Field I, relatively far from the slope, and originated mostly in Iron Age II levels.

The high frequency with which equid bones occur along the northeast slope in Iron Age I levels is curious given that horses and donkeys were very rare finds elsewhere in the site. This odd spatial distribution raises some difficulties in how to interpret that pattern in relation to the donkey burial. Is it possible that not only was the donkey discovered in the pit removed from elsewhere, but as well other burials were unearthed in ancient times along the slope area? Perhaps several donkey burials, interred in the Bronze Age, were encountered during construction of the Iron Age city, but for some reason only one was re-interred. Alternatively, it is possible that animals considered inedible or those which died of disease were disposed of in the city periphery, along the slope.

All of the known Bronze Age donkey burials in the region are associated with human graves, with the exception of those from Tel Brak, Tel Haror and Tel Jemmeh (Wapnish 1997). Therefore it is worth pointing out that a Late Bronze Age human grave was discovered within a few meters of burial 37041, several years earlier. Excavation area NE6, located in the sounding adjacent to the Northeast Slope, produced an articulated human skeleton, found in square NE6, stratum IX. The person was buried with arms folded across the chest and the head pointing westward. With the person were buried a number of grave goods, including pottery vessels and an ivory pendant (Killebrew 1996a:24, 142, Plate 16). Could this grave have once been associated with one or several -- now displaced -- donkey burials? Among the items buried with this person were many Egyptian items, including a scarab from a contemporary dynasty, as well as various stone and pottery vessels (Dothan 1998:150-151).

Thus this second hypothesis for explaining the secondary burial 37041 requires the possible, though rather complicated and perhaps unrealistic, scenario that the builders of the Early Iron Age stratum VI city encountered at least one donkey originally buried sometime in the Bronze Age (perhaps associated with the Late Bronze Age human grave). After encountering and disturbing the donkey burial, the people may have recognized its cultic significance, and then reburied it in a nearby convenient area. In further support of this scenario, it should be noted that excavators speculated that quite a lot of earth was removed from some areas of the former Late Bronze Age settlement for construction purposes in the building of the succeeding Early Iron Age city (MacKay and Arbino 1996:2).

The donkey burials' Iron Age I context and jumbled disposition within the pit renders it anomalous. Although a Late Bronze/Iron Age I equid burial has been reported from the site of Azor in Israel, the find has never been published nor examined by a zooarchaeologist (Wapnish 1997:353). Iron Age II equid burials do exist in the Near East, but are located far away and have been attributed to foreign cultural traditions. That is the case with the late seventh century burials at Gordion in central Anatolia, whose ritual inspiration has been ascribed to either Achaean colonists (Karageorghis 1965:286) or Scythian influences (Young 1956:266). The Near Eastern equid burial ritual all but disappeared after the Middle Bronze Age (Philip 1995) which results in the Ekron burial being something of a chronological problem.

Perhaps the donkey burial, if truly displaced and originally associated with the adjacent human grave or another, as yet undiscovered one, should also be seen as a foreign influence. Reading the hypothesized donkey and human burials as Aegean/Cypriot influences would solve the chronological problem, given that in those regions the practice continued well into the Iron Age, but would raise other issues. Certainly, the idea of Aegean influences in Late Bronze and Early Iron Age Levantine burial practices has been raised before. The Aegean world, which had extensive contacts with the Levant during the Late Bronze Age, still maintained the ritual of equid burial during a period in which it was virtually forgotten in the Levant. Gilmour (1995) has recently reviewed Levantine tomb architecture in light of an Aegean influence hypothesis. He concluded that, although Late Bronze Age Palestine had strong funerary traditions of its own, four anomalous sets of tombs should indeed be ascribed to the diffusion of foreign ideas – Aegean, Egyptian, Cypriot, Syrian, and Mesopotamian – into Canaan.

The human grave in Field I fits neither the classic Middle Bronze Age warrior graves of the Near East, as it lacks weaponry, nor the architecturally elaborate Aegean tombs, since the grave at Ekron was not built but rather was a simple tomb excavated into the mound's slope (Killebrew 1996a; Philip 1995). Further, those equid bones not found in the burial pit, though they cluster in a spatially intriguing manner, do not form one or more nearly complete animals, but instead make up several partial skeletons. This makes it unlikely that there is any connection between either the donkey burial and the scattered equid bones, as well as between the latter and the human grave.

A third possible explanation for the donkey burial at Ekron is that it was intentionally buried in pit 37041/38011 and was neither moved from another burial place nor dumped after lying exposed and neglected on the ground surface. The equid burials at Tel Haror, Tel Brak, and of those found at Tel-el Ajjul differ from the otherwise standard Near Eastern (and Aegean) practice in that their interment was not prompted by the death of a human. Rather, these were dedicatory burials connected with the construction of monumental public buildings. The burial of a baby equid at Tel Jemmeh is an even closer parallel to the situation at Tel Miqne-Ekron. There, excavators encountered the donkey in a pit which cut the foundations of a wall, directly beneath of which the donkey was placed in a reclining position. The animal's architectural context makes it clear that it should be understood as a foundation deposit, as should the others unconnected to human graves, a religious phenomenon well known in the ancient Near East (Wapnish 1997:337-343, 358-359). Also intriguing is the fact that this equid's skeleton, like the equid foundation deposit at Tel-el Ajjul, was missing much of its hind limbs as well as other parts. As Wapnish argues, it is difficult to ascribe the missing elements to either careless excavation, later construction activities, or scavenging by carnivores. Rather, it seems more likely that, although no butchering marks were visible, these parts of the animal were removed and, presumably, eaten as a part of the ritual surrounding the animal's sacrifice (Wapnish 1997:337-343, 359).

The find and interpretation of the baby equid burial at Tel Jemmeh lends a precedent for the situation at Ekron. More than just the find of an equid burial ties the two finds together, since the ass of Ekron, paralleling the provienence of the Tel Jemmeh donkey, was discovered in a pit which cut the foundation levels of the earlier-constructed city wall. Although the entire skeleton of the Ekron donkey was probably present, its disposition as a heap of disarticulated bones rather than an articulated skeleton seems reminiscent of that at Tel Jemmeh, and may as well be explainable in light of this region-wide ritual wherein equids were sacrificed and partially eaten during dedications of public buildings and the funeral rites of important persons. There is a further, curious, similarity between the two burials which is difficult to explain as a dedication ritual. Both burial pits cut into previously built structures. If these were indeed dedications for the associated structures, why were they buried there only some years after the completion of the buildings?

Regardless of which scenario, the straightforward redeposited Iron Age I donkey, the disturbed and re-interred Bronze Age donkey burial, or the ritually eaten and deposited Early Iron Age equid, is the correct one, this example underscores an important taphonomic point concerning how and to what extent human activities move bones and other artifacts around the site. The relatively high number of equid bones found along the northeast slope may have been tossed there as part of entire carcasses, as suggested by the finds of articulating horse bones, which then became scattered or destroyed. Killebrew (1996b) has discussed this area's industrial character during the eleventh and twelfth centuries, when several pottery kilns operated there. The expanse of peripheral slope with industrial installations backed up against the city wall may have offered an attractively isolated area for dumping activities. Lev-Tov (n.d.), in a preliminary study of faunal remains from the northeast slope, found that the industrial area produced twice as many bones as an adjacent domestic area per volume of earth excavated, a characteristic typical of peripheral secondary refuse middens (South 1977:179-182).

By far the most satisfactory explanation of the donkey burial at Tel Miqne-Ekron is the last of the three. This scenario requires only those activities, foundation rituals, which are well documented in both the Near Eastern archaeological and textual records of the Historic periods. As a product of this ritual, this burial fits well into the general world of Eastern Mediterranean religious practice in all aspects except for the temporal one. On the one hand, the Aegean practice of equid burial did continue into even the Iron Age II, but apparently was always associated with human graves and did not exist as a building dedication ritual (Wapnish 1997:357). On the other hand, though equid skeletons are known from foundation deposits in the Near East, they have been dated no later than the Middle Bronze Age II. The Tel Miqne-Ekron donkey burial is therefore best seen as important evidence of the continuation of the Middle Bronze Age Near Eastern practice into at least the Early Iron Age. Although the general equid sacrifice and burial ritual was a widespread Mediterranean phenomenon which is difficult to separate into regionally distinct variations of the same rite (Wapnish 1997:360), it is nevertheless most parsimonious to attribute the burial at Ekron to the Near Eastern tradition. That designation, in turn, has important implications for how we interpret the ethnic make-up of the Iron Age I population of the Philistine cities. The revival or preservation of this rite in an Iron Age I Philistine context may be further evidence of what Bunimovitz (1990) argued, namely, that Philistine material culture is eclectic and contains many elements of typical of preceding Canaanite culture. This in turn implies that the population of Philistia was made up of a heterogeneous population, both immigrants and natives, during the Iron Age I.

Summary

The faunal assemblage of Iron Age I Ekron reveals what in many respects was a unique herding economy for the southern Levant. The Philistines in this period concentrated their agricultural efforts on raising cattle and pigs, rather than the more traditional Mediterranean sheep and goat-focused herding strategies which typified the preceding Late Bronze Age Canaanite town. It is difficult to find one explanation for the somewhat anomalous animal economy adopted in this period. An ethnic argument, popular among a number of archaeologists, is not the most compelling one. One prominent problem with that explanation is that there seems to be little evidence that a pig and cattle herding agricultural economy was characteristic of the Late Bronze Age Aegean. Hesse and Wapnish (1998) have as well demonstrated that the Iron Age I herding economy which is so prominent at both Ekron and Ashkelon, does not consistently appear over all of the territory which the ancient Philistines are thought to have inhabited.

The economic orientation of Philistine Ekron instead appears to reflect both the processes of immigration and adjustment, as well as the region's political organization in that period. Hesse and Wapnish (1998) have argued that the best explanation for the curiously intensive Philistine swineherding economy is that it relates to the needs of an immigrant population in the process of settling in and adjusting to a new homeland. That hypothesis is a very good explanation for the initial appearance of this dramatic dietary shift, given that that shift occurs exactly at the point in time when the Philistines established their cities in the southern Levant. However, another explanation is required to understand why that immigrant adaptation persisted for one and half centuries of Philistine settlement in Canaan, and why over the course of the Iron Age I the importance of cattle and pigs increased, instead of decreasing as succeeding generations grew more and more accustomed to their newfound homeland. Canaan in the twelfth and eleventh centuries BC was a political vacuum after Egypt withdrew its garrisons and busied itself attending to internal affairs. In fact the entire Mediterranean world endured a dark age for the duration of those two centuries, with the cessation of international trade and the seemingly simultaneous collapse of several powerful states (e.g., Frank 1993:389-390, 397-399).

It is against this political backdrop that the maintenance of the anomalous Philistine animal economy must be understood. Not only were cattle and pigs intensively herded by the Philistines in this period, but sheep and goats seem to have been raised as well, according to mortality and metric evidence, with minimal interest in the production of surplus, tradeable, goods. Sheep more than goats are a more useful animal to herd if secondary products are important, and this is visible in the mortality and metric evidence which indicated that rams were slaughtered earlier than ewes. Goats however did not demonstrate such a herding strategy, as both males and females tended to be slaughtered young. Despite that dichotomy in species management, other data indicate that the generation of secondary products was not a primary economic concern. The ratio between sheep and goats in the Iron Age I was 1:1, indicating that no great emphasis was placed on sheep products. Additionally, as Hesse (1986) observed in his initial study sample, dairying was not a local industry during the Early Iron Age.

This information, in addition to the obvious emphasis on pigs and cattle, animals whose primary products – meat and labor – would have been difficult to market as saleable surplus, indicates that trade and interaction with regional or international markets was not an important consideration. The political vacuum and the concomitant collapse of international trade evidently occurred at the same time, and may indeed have been related to massive migrations through parts of the Mediterranean world. Zeder (1998) has tied Diener and Robkin's (1978) hypothesis concerning the link between intensive swineherding and political independence, to certain periods and cities in the ancient Near East. To the data Zeder has used to support that hypothesis can be added the herding economy of Early Iron Age Philistia, which perhaps emerged as an immigrant adaptation, but persisted for 150 years as the agricultural orientation of a people no longer connected to the cosmopolitan but externally controlled political and economic atmosphere of the Late Bronze Age.

Chapter 8: The Animal Economy of Tel Miqne-Ekron in the Iron Age II

Iron Age II: Historical Summary

The Iron Age II period (ca. 1000-586 BC) is best known for being the period during which the Israelite United Monarchy of David and Solomon formed. As such, a major, if problematic, historical source for the period is the Old Testament. The Bible's historical information must be viewed with caution, since it was most likely compiled a few centuries later than the beginning of this period, and at least heavily edited by several authors. Some archaeologists (e.g., Holladay 1995) avoid relying on the Bible's accounts, though others (e.g., Barkay 1992) appear to do so with little hesitation. Non-Biblical historical sources do exist for much of the period, among them Egyptian inscripitions, and Assyrian palace records. In order to establish a very general historical background for the period, however, the Bible is an invaluable source and most scholars feel comfortable using it at least to form a general outline of events or social processes.

According to both the Old Testament and Assyrian records, the united Israelite state did not last terribly long. After Solomon's death, the state divided into two independent, rival, kingdoms -- Israel in the north and Judah in the south. The centralization of political power which occurred among the Israelites can be said to have typified the entire ancient Near East during this period (Holladay 1995:371-372; LaBianca and Younker 1995:406-411; Postgate 1992). Kingdoms were formed on the borders of Israel and beyond, as previously tribal groups centralized political power under strong monarchs of small territorial states or tribal kingdoms. At this time, to Israel's east, the kingdoms of Ammon, Moab, and Edom came into being in Transjordan (Barkay 1992:357-358). To the west, the Philistines, though diminished in power, continued to exist as a political entity (Gitin 1999:274). In the south, Egypt's twenty-first dynasty tried to re-exert her former influence in western Asia: two different pharaohs, Siamun and Sheshonq, conducted military campaigns in Canaan (T. Dothan 1989; Holladay 1995:372; Redford 1992:310-315). Later pharaohs sometimes sent military aid to the small states of Syria and Palestine against the increasing menace of a revitalized Assyrian state, as in the year 701 when Assyrian king

Sennacharib campaigned in Philistia and defeated an Egyptian army there (Oded 1979:244). To Israel's north, the Phoenician cities of the Lebanese littoral became powerful and wealthy mercantile city-states who eventually established trade and mining colonies in distant areas of the Mediterranean world (Frankenstein 1979; Sherratt and Sherratt 1993:364-365). Further away, in north Syria, an Assyrian state had been reborn and was becoming a great empire, steadily expanding in a southern and western direction (Postgate 1992).

The rise of a number of territorial states sharing the relatively small geographic area of southern Syria, Lebanon, Palestine, and Transjordan inevitably led to a number of conflicts between individual states as well as allied coalitions. The Israelites by the end of the tenth century had transformed themselves from a tribal coalition to a unified monarchy which was powerful enough to conquer neighboring states. The Philistines were the Israelites' first victims, when, after a series of military defeats, much of their former territory was annexed to Israel, and taxes levied on the subdued enemy's population. Following the defeat of the Philistines, the Israelites apparently turned toward the east and temporarily subdued the Transjordanian kingdoms (Oded 1979).

Despite the resurgence of Egypt in this period, as suggested by the reoccurrence of military campaigns to the Levant, the major threat to the independence of the new Levantine polities was to eventually come from the north rather than the south. About a thousand years previous to the first millennium BC, the Old Assyrian state had been a powerful player in the Near Eastern political arena of the Early Bronze Age. That state later collapsed and its principal city, Assur, was governed for a long time by a neighboring state, Mitanni, which collapsed by the end of the Late Bronze Age along with other empires. The tenth century was the beginning of the long resurgence and eventual supremacy of the Neo-Assyrian state. Up until the time Neo-Assyrian king Tiglath-Pileser III ascended the throne of Assur around 745 BC, the preceding two centuries of Assyrian kings seem to have been largely content with expanding the city-state of Assur to encompass the ancient boundaries of the Old Assyrian kingdom. The territory surrounding Assur in north Syria had in the meantime become the seat of many Aramean[15] states. These minor states in turn became the objects of conquest of the Middle Assyrian kings, who embarked on a several century long process of expansion to encompass, but not go beyond, their predecessor state's ancient boundaries (Postgate 1992:247-249).

Prior to the time of Tiglath-Pileser III, a number of smaller territorial states fought one another for supremacy in southern Syria and Palestine. After the death of Solomon, the United Kingdom's offspring states, Israel and Judah, became bitter military and economic rivals. Added to this picture were the Transjordanian states, all of which for at least brief periods of time conquered and exacted tribute from neighboring territories, and the Aramean state of Damascus (hereafter referred to as Aram-Damascus), which sought to expand its sphere of influence southward since it was blocked in the opposite direction by the growing power of Assyria. The ninth and eighth centuries were not, however, completely a time of neighbors fighting neighbors. Many of the small states of Levant, including Israel, Aram-Damascus, the Phoenician cities, and the Philistines banded together and successfully blocked the southward expansion of the Assyrians under king Shalmeneser III in 853 (Eph'al 1979:180). Later, an alliance of north Syrian coalition of states led by Tiglath-Pileser III in 738 BC, defeated another such Levantine coalition, and brought much of Lebanon and Syria into his rapidly growing empire. The Assyrian king then turned his attention to the wealthy maritime provinces of the Levantine littoral, setting the stage for what historians label the Neo-Assyrian Empire, with its massive expanse of territory and economic prosperity (Oded 1979:241-242; Postgate 1992:251; Tadmor 1966:87).

Tiglath-Pileser III, deviating from his predecessors, continued this series of successful campaigns beyond the acknowledged western border of Assyria, the Euphrates River, to Syria, Lebanon, and beyond. This series of campaigns ushered in the *pax Assyriaca,* a period of relative political stability and tremendous economic growth (Gitin 1997:77). Succeeding Assyrian kings down to the mid-seventh century carried on the physical and economic expansion of the empire, adding provinces and vassal states

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[15]The collective ethnic label for a number of formerly nomadic West Semitic-speaking tribes which had earlier migrated to Syria and Mesopotamia, setting up dynasties there (Postgate 1992:247-249).

in a previously unheard of expansion ending only with the conquests of Egypt and Elam (Postgate 1992:251). The states conquered by Assyria were expected to bring various forms of tribute to the city of Assur. The amount and kind of goods brought as tribute depended on the location of the conquered region. This system existed both so that the core Assyrian state could economically exploit the natural resources of these lands, and to differentiate between places annexed as Assyrian provinces, and those which retained a degree of autonomy as vassal kingdoms. The tribute which regions under the direct or indirect administration of Assyria paid included both high value/low bulk items like ivory, precious metals, and textiles, as well as low value/high bulk materiel such as grain, livestock, and timber (Postgate 1992: 251-254; 1974:119-120, 154-155).

The Neo-Assyrian Empire, especially after Tiglath-Pileser III's campaigns outside the traditional boundaries of the state, took military aim at economic objectives – the control of seaborne and overland trade which traveled through the seaports of Phoenicia and Philistia and the caravan cities of south Syria and Palestine. The control of trade and the demand for tribute by the Assyrians had a significant impact on those polities within their sphere of influence. One of the best examples of this policy was the Phoenician initiative, in which these seafaring merchants established silver mines as far west as the Mediterranean coast of Spain, a venture necessitated by the Assyrian enterprise to use the precious metal as currency (Frankenstein 1979; Gitin 1997:93).

Tribute demands were not the sole reason for the economic expansion that typified the Iron Age II, however. As Sherratt and Sherratt (1993) have argued, concomitant with the rise of Levantine territorial states and the ever-expanding Neo-Assyrian empire was a trend toward political centralization. That shift in power, from the previous arrangement of Bronze Age empire remnants, migrating tribes, and immigrant populations which characterized the Iron Age I, helped to usher in a period of relative political stability. At the same time, due to the downfall of the Late Bronze Age states with their tightly-controlled palace economies, merchants were more free by the early centuries of the first millennium to pursue trade relationships that enriched both them and the polities from whence they came. The political stability and centralization, along with merchant initiative and tribute demands by Assyria and earlier expansionist states, helped to foster a renewal of international trade at a level which surpassed even the cosmopolitan atmosphere of the Late Bronze Age and can be read as a significant up cycle in the history of the Mediterranean world-system (Frank 1993; Sherratt and Sherratt 1993).

Ekron and the Political Map of the Levant in the Iron Age II

During the first millennium BC, the city of Ekron went through significant changes. At the very beginning of this period, excavated as stratum IV, the city occupied the entire 50 acre expanse of the mound, having enjoyed a rebirth around the start of the twelfth century as a key Philistine city. The Philistine population at this time, despite the prosperity of its cities, was culturally overwhelmed by its neighbors. As well, Ekron was physically overwhelmed when the city of stratum IV was destroyed, possibly by the campaign of Pharaoh Siamun to the region (Dothan 1989:9-11; Gitin 1998:162-163). The succeeding city of stratum III, which spanned the nearly two hundred years between ca. 975 and 800 BC, was much smaller than its Iron Age I predecessor had been. Although Ekron was rebuilt only on the acropolis, the new architectural plan was impressive, with massive stone terraces laid to support a variety of monumental architecture including a new mudbrick city wall faced with ashlar masonry (Gitin 1998:167). Stratum II, the eighth century, continued the preceding stratum's plan, again occupying only the acropolis.

The city's political status shifted quite a bit during the first 300 years of the Iron Age II. Ekron's former status as a powerful independent city of militarily strong but disunified Philistia ended with the (hypothesized) Egyptian destruction of the late Iron Age I city. The attack which may have leveled Ekron at that time could have been inspired by Egypt's discomfort at having the Philistine state occupying Palestine's southern coastal plain, blocking an important trade route formerly controlled by the Egyptian court (Redford 1992:310). At any rate, Philistia and Ekron with it after that attack entered a period where they were subjected to external rule, first perhaps by Egypt and Aram-Damascus as well as a rapid succession of other states (Gitin and Dothan1987:214). With the rise of the United Monarchy, and David's successful wars against the Philistines as a group, the Philistine cities appear to no longer have united and reacted to external crises in unison, but instead each independently sought ways to better their political and economic positions (Oded 1979:236-237). It was evidently not until the subsequent reign of Solomon that the territories of Philistia became subject to rule from Jerusalem, when the latter king succeeded in annexing the kingdom of Ekron. After Solomon's death, the dissolution of the United Monarchy and the concurrent campaign of Sheshonq in Palestine, the Philistine cities evidently reverted to Egyptian rule, and later, after an Egyptian decline, to independence.

Ekron during the eighth century, along with the rest of Philistia, wavered back and forth between being an independent kingdom controlling external territories in Judah, and a Judean tribute-paying vassal, depending upon the strengths and military successes of individual kings. Ultimately, this back and forth power struggle during the first half of the eighth century ended with Ekron under the control of Judahite king Hezekiah, who extended his kingdom all the way to Gaza (Oded 1979:239-240). After that date, during the last third of the eighth century, Ekron became a client kingdom of the Neo-Assyrian Empire. The Neo-Assyrian Empire first reached into the southern Levant with the campaigns of Tiglath-Pileser III in 734, and continued to add more territories with the Levantine conquests of Sargon II in 712, and Sennacharib in 701. By the seventh century BC, Assyria controlled all of Syria, Lebanon, and both Philistia and Judah (Otzen 1979:256; Tadmor 1966:88).

The Assyrians administrated conquered territories in one of two ways. During the original period of the renascent empire, prior to Tiglath-Pileser III, all conquered territories were annexed and reapportioned into Assyrian provinces ruled by a court-appointed governor, usually a member of one of the old, powerful families of Assur. After Tiglath-Pileser's conquests, new territories were annexed which were outside the area the Assyrians viewed as their ancestral homeland (Postgate 1992:251-252). Outside the Assyrian heartland, the empire generally annexed those territories which were either less economically important, or proved repeatedly disloyal after first being allowed a measure of autonomy under a native ruler. Conquered states left as vassals generally displayed the opposite characteristics, and included among them the Phoenician coastal cities, Philistia and Judah (Eph'al 1979; Postgate 1992).

Archaeological confirmation of Ekron's status as a client kingdom rather than province comes from the Assyrian annals. The Assyrians differentiated between native rulers left to govern their own territories after Assyrian conquest, and court-appointed governors who were charged with ruling areas annexed to Assyria (Postgate 1992; Pritchard 1950:287-288). The names of several Philistine rulers were inscribed on a stone block found *in situ* in the Assyrian-style seventh century monumental 'building 650' excavated in field IV at Tel Miqne. The remarkable inscription found there relates that the ruler of Ekron dedicated the temple to a certain goddess[16] (e.g., Gitin *et al* 1997). What is puzzling about the inscription is why the lord of Ekron, *Achish,* who dedicated the temple, refers to himself as *sar* (= ruler) rather than the term meaning 'king', which the Assyrians had used to refer to his predecessors. The political relevance of the inscription is, despite the fact that the author calls himself a ruler rather than a king, perhaps as a sign of humility to his Assyrian masters (Gitin *et al* 1997:11), he dedicated this major temple not to the Assyrian god Assur, but to a local goddess. Assyria's policy in its provinces was clear in its demand that Assur be worshiped as the primary god, though local deities could still be worshiped secondarily (Postgate 1992:251-252). The significance of Ekron's political status in the empire lies in the sorts of tribute it sent to the city of Assur. Provinces contributed to the upkeep of the central temple of the god Assur, by sending "groceries for its daily menu" – foodstuffs earmarked as offerings to the god and his typically Mesopotamian temple bureaucracy of priests and other personnel (Postgate 1974:213-217; 1992:251). By contrast, vassal states were neither required to worship Assur nor to contribute foodstuffs to his temple. Instead, helped by the economic incentives of Assyrian policy, client kingdoms were forced to send tribute in the form of finished products of high value, though they may also have sent livestock and foodstuffs as well (Larsen 1979:97; Postgate 1979:198-199, 1992:254). Tribute demands were not, however, the sole consideration directing economic production in the Empire, and many territories within

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[16]The name of the goddess is disputed. Gitin *et al* (1997) read the name as *Ptygyh* (here transliterated to Latin script), and suggests the previously unknown deity may have been a Philistine or Indo-European goddess. Demsky (1998) suggests the name should be read as *Ptnyh,* preferring to read a difficult letter as a 'nun' rather than a 'gimel'. The latter name appears in various Archaic Greek inscriptions as a determinative meaning 'mistress' or 'lady' and would usually be followed by the name of a specific goddess. See also Sasson (1997) for further commentary on the deity's name.

it benefitted economically when production of goods unrelated to tribute requirements was stimulated by taxation and bureaucratic centralization policies (Frankenstein 1979:267-269).

In the period of Neo-Assyrian control over Ekron, about a century in duration beginning with Tiglath-Pileser's campaign to Gaza in 734, the city underwent unparalleled expansion and enjoyed unprecedented wealth (Gitin 1997:84-85). The economic policies of the empire were such that certain vassal states were targeted for growth, while others were purposefully neglected. Thus the kingdom of Israel was decimated following Tiglath-Pileser's attack, where archaeological surveys have demonstrated that the formerly populous Galilee region was nearly deserted by the seventh century. On the other hand, the Philistine vassal cities were enriched by the positive side of this policy, possibly a conscious decision from the outset by Tiglath-Pileser III, to found an empire in the west as a way of securing commercial interests (Otzen 1979:255). Thus, Ashdod became a pottery production center, Ashkelon a major port and wine-making center, while Ekron turned into an olive oil-producing juggernaut. It was in this period that Ekron expanded from its eighth century size of 10 acres, to stretch over the entire tel and down its slopes, a total size of 85 acres (Gitin 1997:82-84). As Tadmor (1966:92) has eloquently summarized Assyrian policy, "...successful economic endeavors were the crowning achievement of a military victory."

Ekron's growth evidently came at the expense of nearby cities in the shephelah, such as Gezer, Beth Shemesh, and Lachish, which were either abandoned for the duration of Assyrian hegemony, or only partially resettled after having been destroyed in the late eighth century. The idea behind the Assyrians' settlement policies was not simply to punish rebellious cities, but to consciously concentrate production of valuable goods for export both to the Assyrian heartland as well as distant Mediterranean markets. That policy is exemplified well in the case of Ekron and surrounding towns. In the eighth century strata of three major towns in the region, a total of 25 olive oil presses has been identified. When, in the seventh century, those towns were more or less abandoned, oil production concentrated at Ekron. One hundred and fifteen olive oil presses were found in Ekron's seventh century stratum I (Gitin 1997:83-84).

In some ways, the Iron Age II, especially after the ascendancy of the Neo-Assyrian Empire over most of the Near East, resembled the cosmopolitan atmosphere of the Late Bronze Age, after a hiatus of such international trade relations during the Iron Age I. The trend toward political centralization from the tenth century on lent a measure of political stability to the region which must have encouraged trade in all manner of products, and not only the sorts of prestige goods mercantilism which characterized Bronze Age international trade (Artzy 1995:29-31). Ekron exemplified this dualistic economy of both low bulk/high value and high bulk/low value trade. As excavations have revealed, stratum I contained several hoards of silver jewelry and *Hacksilber*, as well as the multitude of oil presses previously discussed (Gitin 1997:84-87, 92-93; Golani and Sass 1998). The question remains to what extent, if any, the agricultural output of Ekron, in particular the livestock economy, was incorporated into or affected by the economic and political changes of this period.

Characteristics of the Iron Age II Faunal Assemblage

The faunal assemblage excavated from the three Iron Age II strata at Tel Miqne-Ekron comprised a total of 2,769 identifiable bones, in addition to several thousand unidentifiable bone fragments (Table 8). Unlike the preceding samples of bones from Iron Age I and Late Bronze Age strata, the entire assemblage of Iron Age II faunal remains was recovered from the upper part of Field I rather than the slope area. The number of species exploited during the Iron Age II, 16, declined from the Iron Age I high of 23, and perhaps reflects a more focused diet and economy, though the sample size is only one third the amount of the Iron Age I assemblage.

In terms of the species present and their relative abundance, the Iron Age II strata continue the trends already visible in the Iron Age I/Iron Age II transitional stratum IV. Essentially, sheep and goats dominated the diets of Ekron's population for the remainder of the city's existence, while cattle and pigs decreased in importance from their abundance in the Iron Age I. These temporal trends and emphases are visible in the contrast between strata III/II, which date from the late tenth through the eighth centuries BC (combined here in order to achieve a larger sample size) and stratum Ic/Ib (seventh century).

Table 8: Species list for Tel Miqne-Ekron during the Iron Age II

Species	**Stratum →**	**Ic/Ib**		**II/III**	
	Common Name	Number	Percent	Number	Percent
Bos taurus	domestic cow	271	25	346	21
Capra hircus	domestic goat	37	3	50	3
Ovis aries	domestic sheep	83	8	79	5
Ovis/Capra	sheep/goat	616	56	1063	64
Equus asinus	domestic donkey	10	1	10	1
Sus scrofa	domestic pig	19	2	80	5
Canidae	dogs and foxes	2	<1	3	<1
Dama dama	fallow deer	3	1	1	<1
Gazella sp.	gazelle	1	<1	2	<1
Hystrix sp.	porcupine	1	<1		
Passeriformes	songbirds	1	<1	2	<1
Phasianidae	pheasant family	6	1		
Lates niloticus	Nile perch	4	<1	2	<1
	fish	38	4	35	2
	crab			1	<1
TOTALS		1094		1675	

Aside from domestic animals, a small number of bones from wild animals indicated that Ekron's population continued their perhaps minimal hunting effort. We can infer from the few bones present from gazelle and fallow deer, as well as one each from a porcupine (*Hystrix* sp.) and a fox, that opportunistic and/or garden hunting landed these animals on the population's dining tables. Porcupines are not a usual hunted animal of the ancient Near East, but this individual clearly met its death at the hands of a hungry Philistine: the bone bears a number of butchering scars (Figure 28). Another minor contributor to the diet, present only in stratum Ic/Ib, were medium-sized birds of the pheasant family. These are possibly domestic chickens, a bird native to Southeast Asia which gradually was introduced into Western Asia: rare but present in Iron Age II sites, but common by the Persian Period (fifth century BC).

Spatial Analysis and Activity Areas: Comparison of Architectural Units

The bone assemblage was taken from an architectural context which included thick monumental-sized walls running parallel to each other in a north-south direction (Figure 29). These walls, at their northern end, intersected an east-west running street. The building and street complex, though parts of them were reused from stratum IV, together comprise a new phase of architecture on the mound's summit. The total Iron Age II architectural complex of field I comprises a series of drains, streets, the three adjoining storage magazines, and a section of city wall with a gate. The storage building was connected to both the street and drain complex as well as the city wall and a city gate, such that these features are essentially different portions of a planned sector (MacKay and Arbino 1996:3-4).

The presence of a storage building in this area suggests that the building may have been related to food redistribution, though its incorporation into the city wall may indicate a more specifically military function. Gitin (1993) has extensively studied Iron Age II ceramics from Ekron, and noted that there is a large corpus of 'scoops' present in the stratum I assemblage, with all coming from the temple complex excavated in the center of the site. Though some archaeologists believe the vessels, which are shallow, elliptically-shaped wide bowls with a handle on either side, to have had a cultic function, Gitin (1993:102-104) asserts that they were used in food distribution, as in scooping grain out from large storage vessels.

Figure 28: The right femur of a porcupine. Note the numerous butchering marks along the posterior side of the diaphysis.

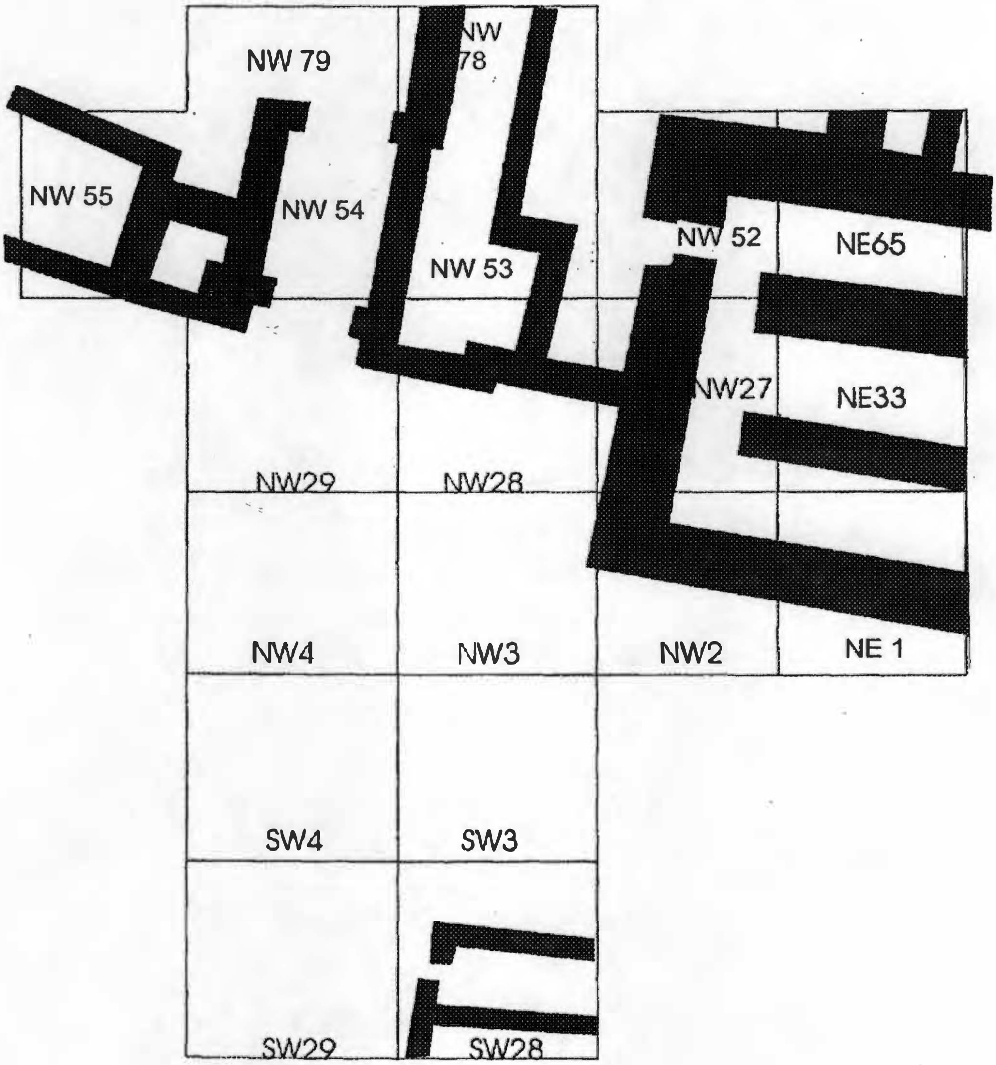

Figure 29: Iron Age II architecture in Field I upper. The building in the upper right corner contains the storage magazines. The storage magazines are linked to the gate complex by the fortification wall. The streets and drains are not shown in this drawing, but were on the same axis as the gate opening.

Those found at Ekron were associated not only with the administrative building, but also with store jars (Gitin 1993:106). Although the functional assessment of the vessels is based mainly on their shape, Gitin does make the case for the scoops being more common at frontier administrative centers than elsewhere (1993:104-106). The relevance of this ceramic discussion to the faunal remains from the storage building is that no scoops were discovered within that structure, suggesting that it was used to store or distribute something other than food.

The identification of the storage building and its location adjacent to a building complex of clearly different function, that is, the city wall and public street, provide the opportunity to examine spatial patterning in faunal remains. Because neither faunal remains nor other categories of artifacts were piece-plotted, the level of spatial analysis possible must remain gross, measured simply as those bones found within or immediately around one structure versus those found in similar positions at another. Such a scale of analysis does not lend itself well to the detection of different activities within building rooms or other small units of space as is common in Paleolithic archaeology. Nevertheless, the approach of room or building comparison is commonly used in and appropriate for the archaeology of complex urban civilizations. These societies left behind them the sort of well-defined architectural remains that lend themselves to such analyses, and not just on a methodological level. Arguably, architectural units represent the spatial segregation of activities, and thus form not only methodologically convenient units of comparison, but culturally relevant ones as well (e.g., Steadman 1996).

To extend Gitin's (1993) analysis of scoops, and to test whether meat was redistributed in a centralized manner during either the earlier part of the Iron Age II (strata II/III) or the Neo-Assyrian period (stratum Ic/Ib), a comparison of faunal remains was conducted, between those found in the storage building, and those found outside it in the drains, street, and around the gate. Both the relative abundance of species (Table 9), and the element distributions of sheep/goats and cattle were compared (Table 10). Visual inspection of the comparison results, confirmed with chi-square tests, indicate that there are no significant differences in the deposition patterns of animal remains in the two areas (see Tables 9 and 10 for chi-square values). There were neither appreciable differences in the abundance of various

Table 9: Comparison of species abundance in the storage building vs. the gate/street complex:

Stratum Ic/Ib	**storage building**		**Stratum Ic/Ib**	**street/gate**
Number	Expected	Species	Number	Expected
58	53.9	Cattle	80	84.1
3	4.7	Goat	9	7.3
14	12.5	Sheep	18	19.5
95	91.1	Sheep/Goat	138	141.9
0	0.8	Equid	2	1.2
4	3.9	Pig	6	6.1
3	2.0	Fallow Deer	2	3.0
1	2.7	Gazelle	0	0.6
2	2.8	Bird	5	4.3
8	16.0	Fish	33	25.0
TOTAL = 188		X = 0.17, p = .05	TOTAL = 293	
Stratum II/III	**storage building**		**Stratum II/III**	**street/gate**
Number	Expected	Species	Number	Expected
35	58.4	Cattle	82	58.6
20	16.5	Goat	13	16.5
42	33.0	Sheep	24	33.0
285	264.7	Sheep/Goat	245	265.3
0	4.0	Equid	8	4.0
4	7.5	Pig	11	7.5
0	1.0	Gazelle	2	1.0
0	0.5	Bird	1	0.5
10	10.5	Fish	11	10.5
TOTAL = 397		X = 1.04, p = .05	TOTAL = 397	

Table 10: Comparison of sheep/goat and cattle element distributions in the storage building vs. the gate/street complex:

Stratum Ic/Ib	**storage building**	**sheep/goat**	**Stratum Ic/Ib**	**street/gate**
Number	Expected	Element Group	Number	Expected
31	26.0	Head	34	39.0
3	4.8	Axial	9	7.2
48	53.5	Limb	86	80.5
31	28.8	Feet	41	43.3
TOTAL = 113		X = .26, p = .05	TOTAL = 170	
Number	Expected	**cattle** Element Group	Number	Expected
9	10.9	Head	17	15.1
3	2.5	Axial	3	3.5
22	26.1	Limb	40	35.9
24	18.5	Feet	20	25.5
TOTAL = 58		X = .20, p = .05	TOTAL = 80	
Stratum II/III	**storage building**	**sheep/goat**	**Stratum II/III**	**street/gate**
Number	Expected	Element Group	Number	Expected
126	129.0	Head	77	78.0
52	39.4	Axial	10	22.6
182	190.7	Limb	118	109.3
83	77.5	Feet	49	44.5
TOTAL = 443		X = .004, p = .05	TOTAL = 254	
Number	Expected	**cattle** Element Group	Number	Expected
10	7.2	Head	14	16.8
2	4.2	Axial	12	9.8
17	15.6	Limb	35	36.4
6	8.1	Feet	21	18.9
TOTAL = 35		X = .24, p = .05	TOTAL = 82	

species, as has been detected within and without other major buildings in the Levant (e.g., Magness-Gardiner and Falconer 1994), nor were there differences in the distribution of carcass parts, as might be expected if animals had been butchered in one area and consumed in another.

These results not only indicate that the storage building in field I was used for something other than meat distribution, but by implication also suggests that animals were marketed in the city alive, and families slaughtered and butchered the animals themselves. The almost total lack of patterned distribution among the faunal remains in field I further demonstrates that the actions which resulted in their deposition were probably myriad, from dumping of waste from meals and butchering, to perhaps concerted cleanup efforts of other areas. There is, however, one difference in species distribution between the two architectural units which is not reflected by the analysis. No equid remains were found in the storage building in either strata II/III or Ic/Ib. This presence/absence pattern does not shed much light on what the storage building may have been used for, but rather indicates that the gate and street areas probably were used as deposition places not only for domestic food debris, but also for other putrid waste, such as dead pack animals.

Diet and Economy

The dietary trend that appeared at Ekron in stratum IV, which represented a reversal of the previous Iron Age I pattern, was one in which sheep and goats increased in importance, relative to the other primary domestic species. That renewed strong emphasis on sheep and goats, characteristic of the Late Bronze Age assemblage at the site, continued throughout the Iron Age II. In stratum III/II, sheep and goats comprised more than two thirds of the assemblage, for the first time in city's history since the thirteenth century. Despite the fact that the relative proportion of sheep and goats decreased slightly in stratum Ic/Ib, perhaps due to a simultaneous increase in the importance of cattle, caprids were by far the most important species in the city's livestock economy.

From the earliest excavated Late Bronze Age strata through the last Iron Age I stratum, sheep and goats were equally numerous in the city's flocks. The ratio of sheep to goats in the Late Bronze Age was 1:1, and this remained the same for the following two centuries of the Iron Age I. However, during the Iron Age II the city's agricultural scheme for some reason was shifted from a generalized livestock production scheme to one which became increasingly specialized as the first millennium progressed. The faunal assemblage from strata III/II demonstrates that during these two centuries the ratio of sheep to goats changed in favor of sheep, which in this period outnumbered goats by a ratio of 1.6:1. In the seventh century, the period of Neo-Assyrian hegemony over Ekron, the economic orientation which favored raising more sheep than goats not only continued but in fact intensified further. Faunal remains from stratum Ic/Ib contexts reveal that there were more than twice as many sheep to goats in the city flocks, as the ratio increased to 2.24:1 in the final occupational stratum. This trend has also been noted in contemporary strata at Tel Jemmeh, a city which may have served as a supply center for the Assyrian army's activities on the border with Egypt (Wapnish 1981:115-116).

What the bias toward sheep suggests is that their major secondary product, wool, must have become a critical part of the city's economy beginning in the late tenth century but becoming even more important during the seventh century. This trend can be further proved and delineated by examining both sheep and goat mortality profiles as well as metric data. Mortality data for sheep and goats based on tooth wear patterning indicates that a new herd management strategy was practiced in this period, one which differed from both the Late Bronze Age and the Iron Age I strategies. The Iron Age II mortality profile demonstrates that very few animals were slaughtered in their first year of life. Rather, a majority of the flock was killed off during their prime ages, between one and three years of age. The thirty percent of the flocks which lived past their prime ages most likely were kept for breeding stock and wool production (Figure 30). This type of slaughtering pattern, emphasizing young adult animals, argues for meat production having been the primary economic benefit of sheep and goat herding.

When mortality profiles were calculated based on epiphyseal fusion data, what emerged was a largely complementary economic picture (Figure 31). These data concur with the information given by tooth wear analysis, again showing that few animals were slaughtered before they had reached at least one year of age. Concomitantly, the graph shows that the collective decision by herders or city bureaucrats

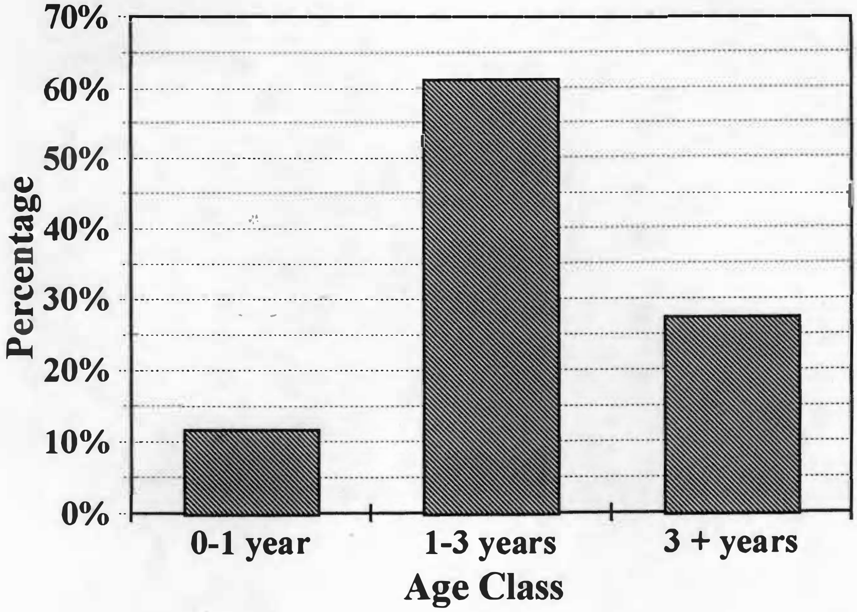

Figure 30: Iron Age II sheep/goat mortality, based on tooth wear patterning.

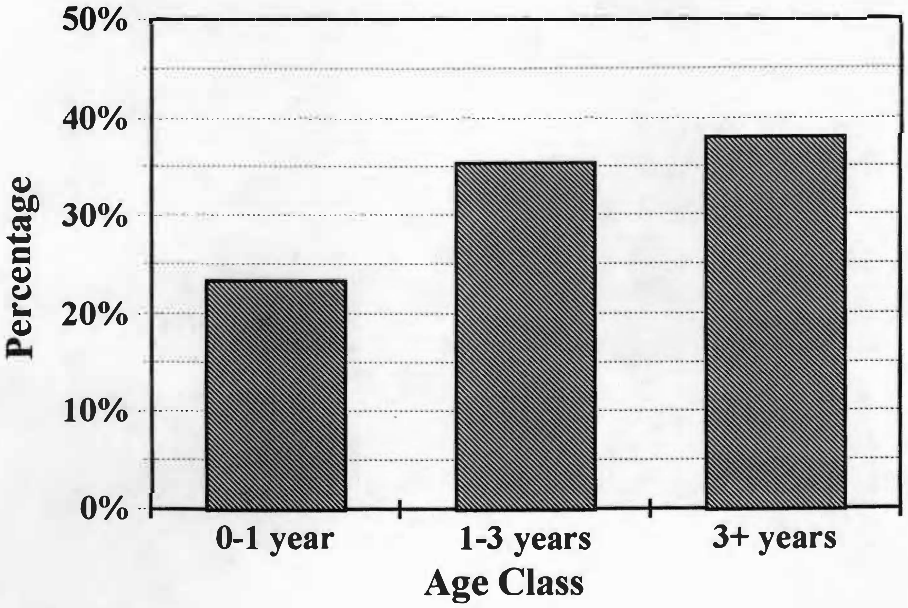

Figure 31: Iron Age II sheep/goat mortality, based on epiphyseal fusion.

was to emphasize flock preservation, demonstrated by the large proportion of animals which died both in their prime ages and in old age. The difference between the two sources of mortality data is really in degree rather than kind. While the tooth wear data exhibit a peak of 1-3 year old animals, the fusion data indicate a more or less even proportion of 1-3 and 3+ year old animals being slaughtered. The favored scenario, produced by joining the two lines of information, favors a large proportion of older animals in the sample, much like the fusion chart, since mandibles of young animals tend to easily be destroyed once deposited, whereas fusion data probably underestimate the number of old animals in a given sample because once a bone has fused we can only assign it a minimum age.

The community of Ekron during the Iron Age II emphasized the long term economic potential of sheep and goats by preserving the flocks and gaining from them secondary products. Of the secondary products which caprids provide, wool seems the more likely commodity, given that sheep were much more common than goats. Where wool is the primary product which herders seek to generate from their sheep, castrated males should make up a large proportion of the flocks since they grow the best quality wool (Payne 1973). Still, this may only be the case in ideal situations, and the simultaneous pressure to produce meat to sell at markets could produce a situation where male animals are slaughtered young rather than kept for wool production (Perevolotsky 1986:295-296).

Metric data can separate out some of the strands of information which are combined in the above mortality profiles, making it possible to examine management of sheep and goats separately, as well as males versus females in each species. The choice of which measurements to use in any discussion of metric trends is largely governed by the number of specimens well enough preserved to enable their calculation. The first phalange of sheep and goats is a useful element for such purposes since it is one of the few elements that can be used to distinguish sheep from goats and fuses at a known age, between 13 and 16 months (Silver 1969). Also, this element was frequent in the Iron Age II sample, such that a reliably large sample of measurements could be taken. The breadth proximal measurement was the first one examined, of the several measurements possible to take on that bone, for evidence of caprid management patterns. Unfortunately, this measurement again proved problematic, as it did in the Iron Age I sample, since it did not produce a bimodal pattern.

Other measurements were, however, more helpful in delineating management trends. The greatest lateral length of the first phalange proved to be a sexually dimorphic measurement, as indicated by the bimodal patterns it produced for both sheep (Figure 32) and goats (Figure 33). The pattern for animals was rather similar, demonstrating a bias toward male sheep as well as goats, as indicated by the fact that the average in both cases (32 millimeters) fell toward the larger end of the samples. Sheep and goat herding practices were evidently strongly oriented toward reaping the maximum possible harvest of secondary products from the caprid flocks. In the case of sheep, that product most likely would have been wool. Some breeds of goats can produce valuable types of hair for textile manufacturing, but in the modern Middle East use of goat hair is restricted to nomadic Bedouin communities, who use it to make tents rather than sell it. It is more likely that the goats were kept for dairying purposes. Measurement of other goat elements, namely the distal humerus (breadth distal) and proximal radius (breadth proximal), showed more of a trend toward smaller individuals than did the phalange measurements (Figure 34). The latter measurements taken on the same elements of sheep produced a more equivocal chart (Figure 35), since nearly equal numbers of animals fell on either side of the mean, producing a unimodal pattern.

Animal bones are not the sole piece of evidence indicating the development of an important textile industry at Ekron during the Iron Age II. Gitin (1997:87-90) reports that over 600 loomweights were excavated from seventh century contexts. This loomweight assemblage dwarfs those of neighboring sites: the highest number, the more than 200 found at Gezer, is only one third the amount found at Ekron. Further, the collections of loomweights found at other sites in the region all date to the eighth century, before the Neo-Assyrian Empire asserted control over the southern Levant. After that time, according to empire policy, production of various goods was centralized. Ekron was apparently chosen as the dual focus of an olive oil and textile industry, which Gitin (1997:90) interprets as complementary industrial activities. Olives can be harvested and pressed only four months out of the year, so that a city specializing

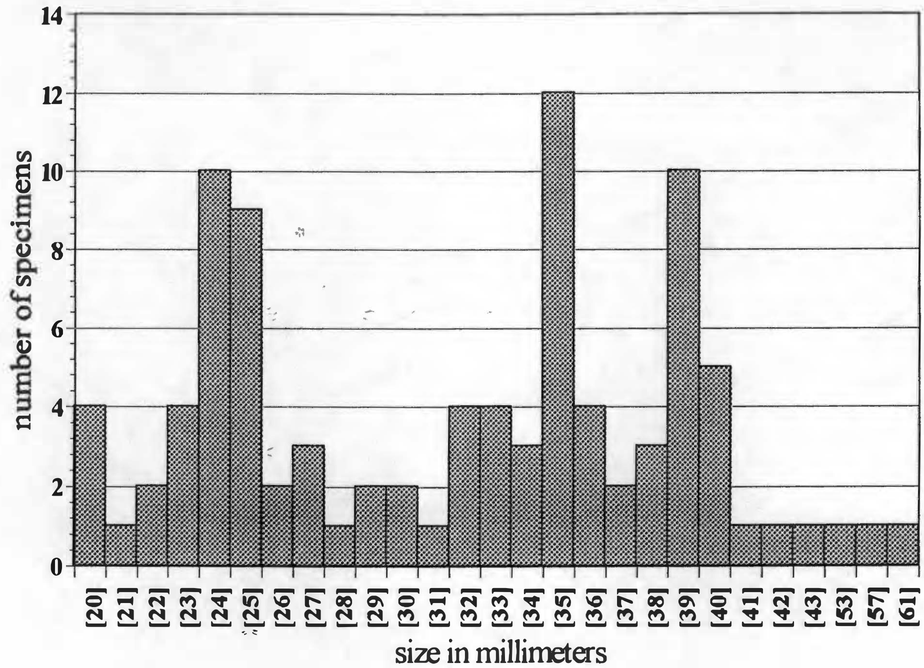

Figure 32: Metric measurement of Iron Age II sheep phalanges 1 and 2. The majority of the sample is larger than the mean of 32.

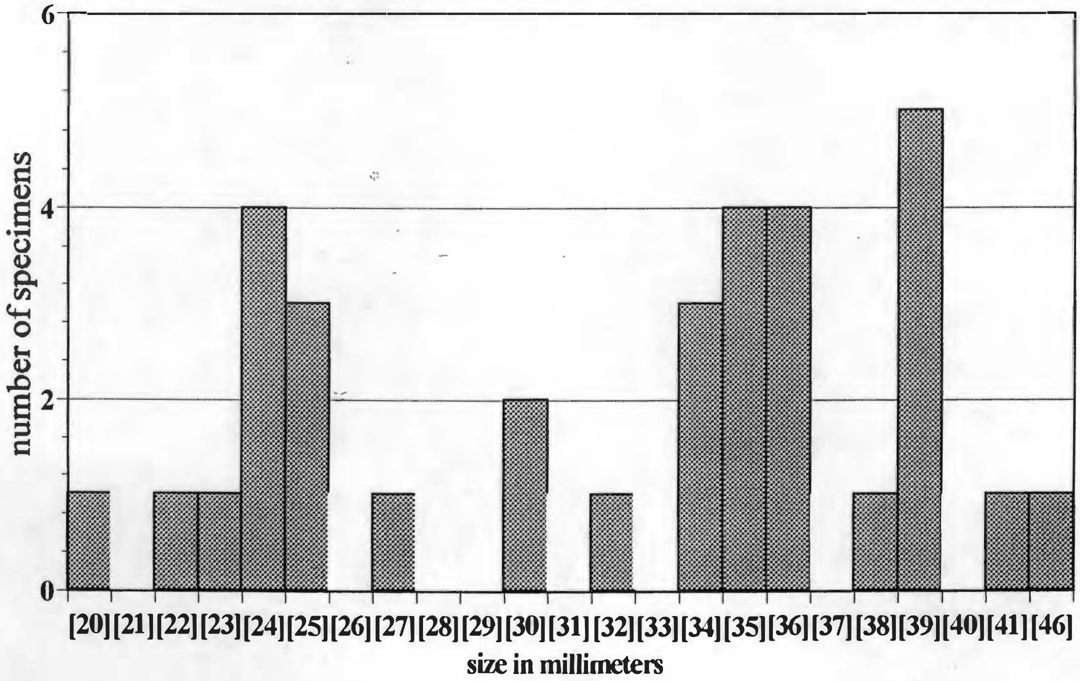

Figure 33: Metric measurement of Iron Age II goat phalanges 1 and 2. Most of the sample falls above the mean of 32.

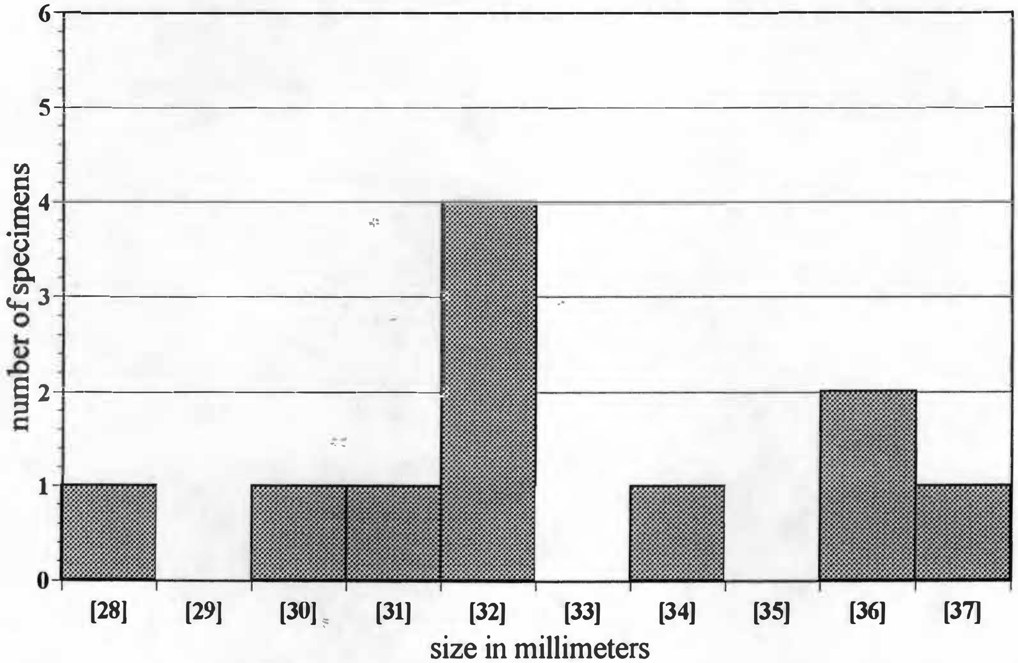

Figure 34: Metric measurement of Iron Age II goat distal humeri and proximal radii. Most of the specimens fall below the mean of 33, indicating a largely female population.

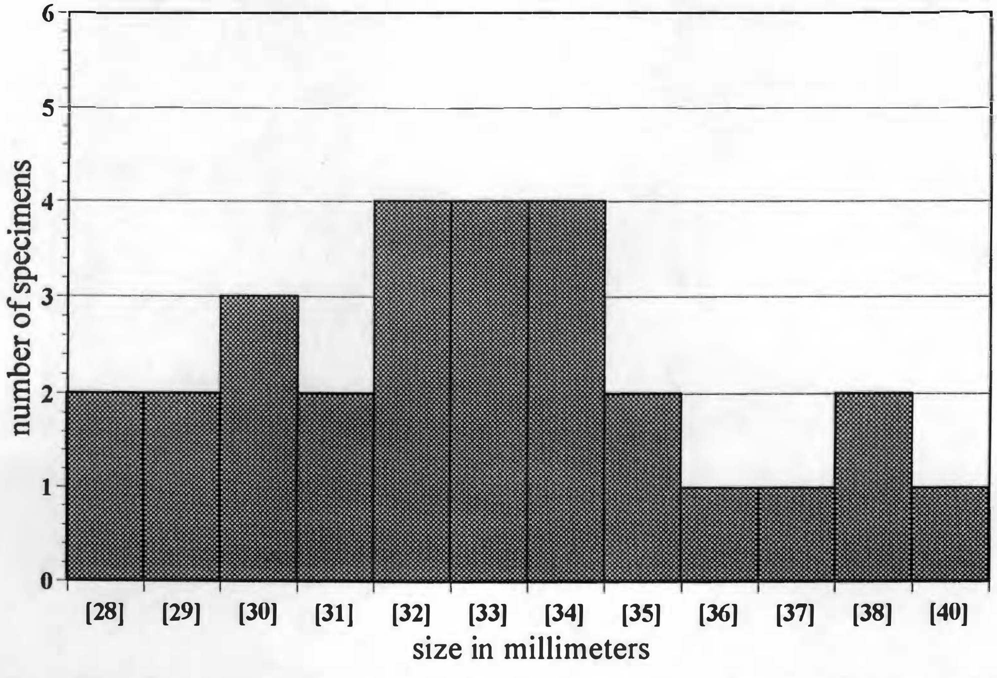

Figure 35: Metric measurement of Iron Age II sheep distal humeri and proximal radii. The sample range divides evenly on either side of the mean of 33.

only in olive oil manufacturing would have idle laborers and industrial facilities for two thirds of the year. Most of the loomweights were in fact found in the olive press buildings, which further cements the connection between the two industries. In terms of seasonal scheduling of activities, the two industries complement each other well: olives are harvested in the fall and early winter, whereas sheep are normally shorn in the spring.

Loomweights can be typed into a variety of categories according to regionally prevalent shapes, as well as sizes relating to the types of cloth produced (Friend 1998:7-8). Those recovered at Ekron were all of a large size, indicating to Gitin (1997:90) that they were used for industrial rather than domestic production of cloth. Friend (1998:9-10) has suggested that loomweights of large sizes were probably used to weave rugs, blankets, wall hangings, and saddle bags. Textiles, both unfinished (but sometimes dyed) wool as well as garments, were products which the Assyrians seem to have been keenly interested in acquiring either through tribute payments, taxation, or trade. Indeed tribute was itself seen by the Assyrians not only as an affirmation of loyalty and homage to the supreme state, but also as a way of encouraging trade to move from the distant parts of the empire toward Assur itself (Frankenstein 1979:270). The Phoenicians were of course famous for their general economic activities, and especially for their production of purple-dyed wool, but Frankenstein (1979:268-269) suggests that the basis for their wealth was specialization in the actual production of luxury items. The Phoenicians evidently declined to support the extensive hinterland necessary for the production of raw materials, and instead preferred to trade for them, thus producing goods in their cities from imported materials.

Possibly, the textile production infrastructure of Ekron was related to the development of this internationally specialized economic system, such that the textiles produced there could have been shipped elsewhere – Phoenicia for instance – for dying and finishing. A large portion of Phoenicia's wealth was derived from their position as the principal economic link between Assyria and Egypt, where merchants from the coastal cities brought luxury goods from Egypt – linen, ivory, gold – to Western Asia (Frankenstein 1979). The Assyrian interest in Egypt apparently dictated their political policies in the southern Levant, including leaving rebellious Judah and the Transjordanian states as vassal buffers against the Egyptians and forming alliances with the nomadic Arab tribes of Sinai (Elat 1978; Otzen 1979:256). Assyrian records of Sargon II from the year 720 detail his empire's captivation with Egypt's produce, as when he boasted of how he opened the sealed markets of Egypt and forced Assyrians and Egyptians to interact and conduct trade (Elat 1978:27). It seems likely that the Philistines also participated in the Assyrian-sponsored trade with Egypt, probably an important reason explaining why Philistia was given vassal rather than province status (Otzen 1979:255).

Ekron was in a unique geographic position to benefit from Assyrian economic policies. Physically, it is located on a major east-west route linking the interior of Palestine with the coastal cities. In addition, the fact that the city had available for industrial development the entire abandoned lower tel made it a logical choice for the Assyrians to construct a manufacturing center. That space, as well as Ekron's setting bordering on an agriculturally rich alluvial valley, allowed for the settlement by the Assyrians of refugees from neighboring areas laid waste during conquests. A large labor pool, such as could have been provided by these refugees, must have been necessary to operate the massive-scale city industries. Of course, the population – which has been estimated at over 6,000 – had to be fed as well, and the area's grain-growing potential must have been an added attraction (Gitin 1989:48-49).

The product which may have been shipped to Egypt, among other places, from Philistia was the olive oil which Ekron produced in abundance – on the order of one million liters per year (Gitin 1989:48-49). If Ekron shipped olive oil to Egypt, then what did she gain in return? Certainly, luxury goods like linen, gold, or ivory must have formed a part of this exchange (Elat 1978:26), although most of the Egyptian luxury objects found at the site postdate the Assyrian occupation (Gitin 1998:174-175). A different benefit of the exchange relationship could have been Egyptian fish. Assyrian documents discovered in Nineveh and Nimrud list items received as (compulsory) annual gifts as well as tribute from perhaps several Philistine cities, though Ashkelon is the one specifically mentioned. The list contains a number of commodities which would not have been the products of Philistia, such as horses, silver, linen fabric, and some type of preserved fish (Elat 1978:30).

Though several Philistine cities including Ashkelon were located on the Mediterranean coast, and could thus have provided saltwater fish as tribute to landlocked Assyria, other contemporary evidence demonstrates that Egyptian freshwater fish were a desired import: an Assyrian wall relief shows what appear to be Nile Perch being unloaded from baskets at a Phoenician city (Lernau 1986/1987:234). Nile Perch is a species of freshwater fish which is native to Egypt and exists today only in the waters of the upper Nile. The fish can attain huge sizes of several meters and therefore is an economically important species (Brewer and Friedman 1993). Bones of this fish have been found archaeologically in at least small numbers throughout the Near East, from Israel to Turkey. Estimated sizes for Nile Perch remains found at other sites range from 30 to 160 centimeters, with most having had body lengths of 60 centimeters and greater (Lernau 1986/1987:228).

Nile Perch have also been found at Ekron, and seem to be the predominant species among the fish bones in the assemblage[17]. In the Ekron faunal assemblage, the relative proportion of fish to all other species stayed constant from the Late Bronze Age through the end of the Iron Age I (Figure 36). However, the amount of fish bones increased during the Early Iron Age II, and doubled in proportion in stratum I. Lernau (1986/1987:234-235) believed, on the basis of size distribution, elements present, and the presence of immature specimens, that the Nile Perch were in fact caught locally and were at one time native to the Levant along with other now extirpated Nilotic species (e.g., Horwitz and Tchernov 1990). Although the fish bones' origin has yet to be tested using scientific techniques such as oxygen isotope analysis, Lernau's idea seems unlikely on ecological grounds: the species generally prefers fast-moving, well-oxygenated freshwater rivto anything resembling the Nile. As well, even if Israel's small rivers could have supported this species, it is ers, though it does occur in lake Nasser as well (Brewer and Friedman 1993:74). Even in ancient times, Israel was not gifted with large fast-flowing perennial rivers comparable doubtful that they could have attained large sizes in these comparatively shallow and narrow bodies of water.

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[17]The fish bones from Tel Miqne-Ekron are currently being analyzed by a fish osteology specialist in Jerusalem.

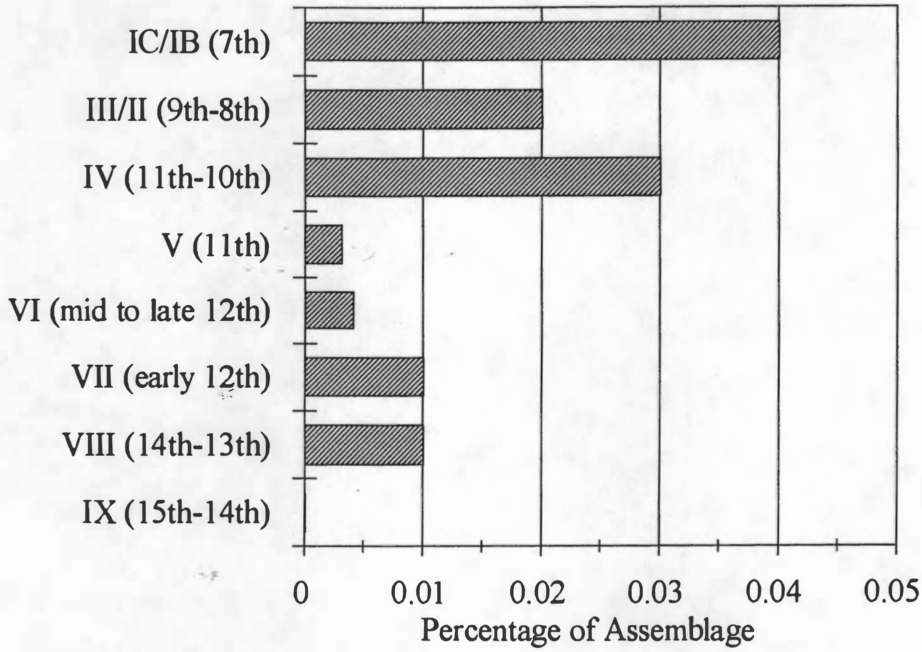

Figure 36: Histogram demonstrating the relative abundance of fish bones over time at Tel Miqne-Ekron*. Clearly, the amount of fish in the bone sample increases significantly from stratum IV onward, especially in stratum Ic/Ib.

*Note that this sample only includes fish bones identified by Lev-Tov. Hesse's fish bone sample was given to Dr. H. Lernau, a fish bone specialist in Jerusalem, to examine.

The timing of the increase in Nile Perch at Ekron is intriguing, especially in light of Assyrian records which record that Sargon II received some type as fish (Nile Perch?) as part of a tribute payment from one of the Philistine cities (Tadmor 1966:93). There seems ample evidence that economic demands made by the Assyrians on their vassals forced such states to look abroad to find markets for domestic products, and return with exotic goods with which to satisfy imperial administrators. The most famous example of this is with the Phoenicians and their silver mines in the far western Mediterranean (e.g., Frankenstein 1979), but perhaps Philistia and an international fish trade may be added to this.

After sheep and goats, the next most important species utilized at Ekron during the Iron Age II was cattle. Although cattle were more numerous in Iron Age I contexts, they did remain important throughout the subsequent period, and even increased in relative abundance after the eighth century. The timing of the cattle resurgence during the seventh century, when their numbers increased slightly from 21 to 25 percent of the assemblage, seems significant and is another economic change whose appearance correlates with the period of Neo-Assyrian control over the city. Mortality patterning of cattle indicates that compared with the same data from the Iron Age I sample, the animals were managed similarly during the first millennium BC. The mortality profile of Iron Age II cattle (Figure 37), based on the ratio of fused to unfused elements within each age class, demonstrates that almost no cattle were slaughtered young, before they had attained one year of age. More than half of the animals, 55 percent, died only after reaching at least three years of age. A somewhat greater portion of the city's cattle herds were slaughtered in their prime ages than had been the case during the Iron Age I, a trend which may be related to the Iron Age II population's demand for meat, as almost no pigs were kept in this period to fulfill such needs.

Metrical analysis of cattle first (breadth distal) and second (breadth proximal) phalanges indicates that the cattle herds of Ekron during the first millennium were comprised of generally larger animals than in preceding periods (Figure 38). Although the sample mean, 26 millimeters, is much the same as during the Late Bronze Age and Iron Age I, the distribution of specimens across the sample range shows a greater proportion as large or larger than the mean. In other words, the metric data demonstrate that more of the cattle at this time were of larger size. The implication here is that cattle, as indicated by

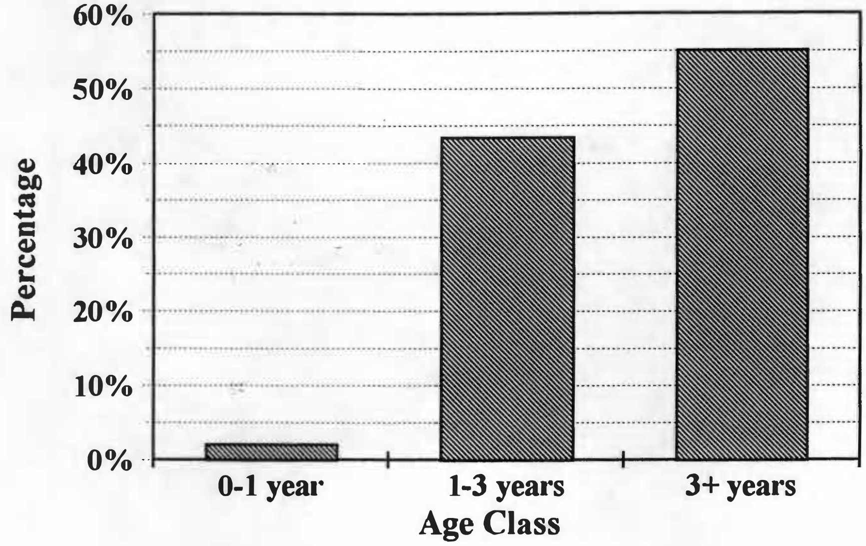

Figure 37: Iron Age II cattle mortality patterning, based on epiphyseal fusion.

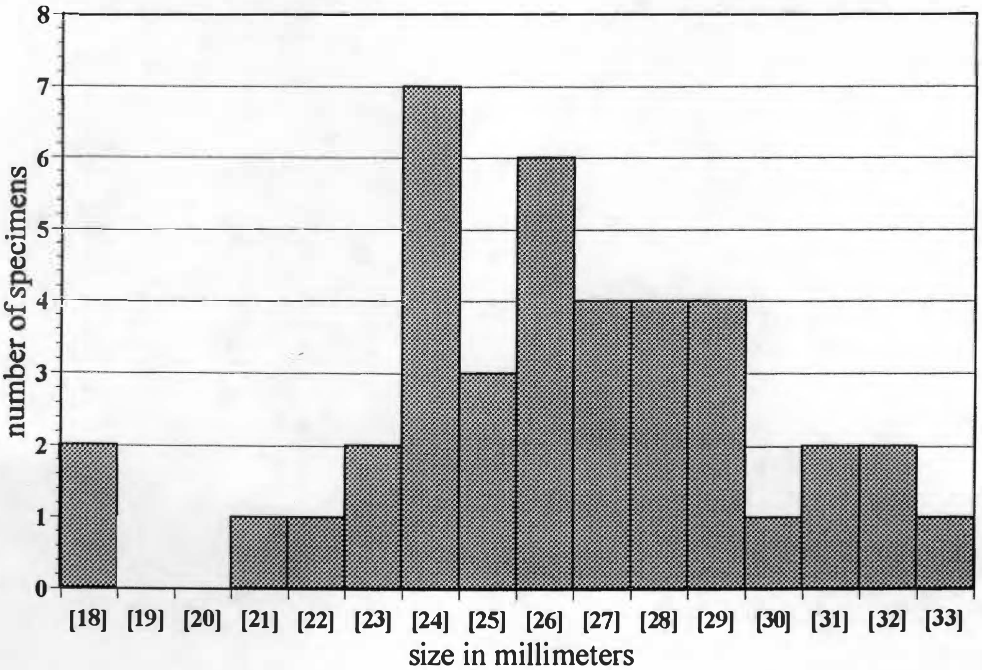

Figure 38: Metric measurement of Iron Age II cattle phalanges 1 and 2. Note the rightward skew of the sample from the mean of 26.

mortality data, lived longer and, according to metric data, may have been selectively bred to produce on average larger animals. Cattle, aside from being useful for dairying as well as being great suppliers of meat, are above all else crucial for their laboring abilities – pulling plows, loaded wagons, and threshing grain. Given the booming economy and expanded population of Ekron during the Iron Age II and especially the seventh century (e.g., Gitin 1997), the population may well have needed more and stronger cattle for a variety of tasks, from putting more fields under plow to feed the population, to pulling olive oil and other commodities to market.

The activities in which cattle were formerly employed can be more directly measured using lines of data other than mortality and metric measurement trends, namely osteoarthritic development (Higham *et al* 1981). Bartosiewicz *et al* (1997) conducted an osteological study of modern European draft cattle, in order to assess the effects such activities have on pathological development in the foot bones. They delineated a positive link between cattle used for plowing and gradual development of a number bone pathologies, depending on the duration and intensity of the cattle's activities. The pathological developments were documented on several foot elements, the metacarpus, metatarsus, and phalanges of the animals. These pathologies ranged from mild to severe cases of osteoarthritic lipping, spreading of the articular surfaces, and in extreme cases, the locking up of joints due to overgrowth of bony spurs. The authors of this study applied their modern research to archaeological, Roman Period, samples to show that such degenerative bone developments affected working cattle in the past as well as the present. Their volume also details sequences of osteoarthritic development on various articular surfaces of the foot bones, so that it can be applied to other samples.

I applied their method to the entire sample of cattle phalanges identified in the faunal assemblage from Ekron, in order to detect diachronic variation in the amount and intensity of osteoarthritis. Through this method, I hoped to assess whether cattle were utilized differently or with varying intensity during each of the three occupational periods of the city. Because their method was originally developed for modern, complete, cattle bones, some adaptations had to be made in order for the procedure to be workable for the archaeological assemblage. The general formula developed by Bartosiewicz *et al* proceeds from, first, scoring each relevant area of the various foot bones according to the intensity of osteoarthritis present, with 1 being slight or no development, 2 and 3 being degrees of moderate development, and 4 being severe. The total scores for each bone are then plugged into the following formula:

Pathological Index Score (hereafter P.I.) = (sum of scores – number of variables) / (maximum possible score – number of variables)

The formula varies somewhat for each element, since not all bones have assigned the same number of areas to check for osteoarthritic development. Those formulas used for the phalanges are as follows:

P.I. formula for phalanges 1 and 2 = (sum of scores – 3) / (12 – 3)

P.I. formula for phalange 3 = (sum of scores – 2) / (8 – 2)

Modifications to the formula were necessary since archaeological specimens are often broken, such that the maximum possible score and maximum number of variables must be lowered to reflect this. Thus, in the case of phalanges 1 and 2, the number of variables present can vary from one (minimum) to three (maximum), depending on whether all or only some of the element is present. For phalange 3, the number of variables can only be either one (minimum) or two (maximum). The maximum scores possible for bones only partially preserved also varies, from 12 (maximum for a complete first or second phalange) to four (minimum possible score for any of the phalanges).

The entire sample of cattle phalanges from Ekron was examined and scored at the same time as a blind test where the stratigraphic origin of the bones was not known until after analysis had been finished. Results of the study accord very well with other trends already observed from other lines of data. The sample of over 200 phalanges showed a great degree of variation in the amount and degree of osteoarthritic development, ranging from none at all to quite severe (Figure 39). Presumably, the amount and degree of pathologies in any period relate to the intensity of cultivation and other draft activities. The study in fact clearly demonstrates an increase over time in the severity and/or amount of pathology, such that the average pathological index score for Late Bronze Age cattle phalanges is 3.20 whereas the score for the Iron Age I sample is 3.84. The highest mean pathological index occurs in the Iron Age II sample, which produced a score of 4.04. Further, a t-test revealed that the differences between these scores are statistically significant ($p < .01$).

Taken together, the three separate lines of data – mortality, metrics, and pathology – present an integrated understanding of how cattle were incorporated into the economy of Iron Age II Ekron not just in terms of their dietary contribution, their end product, but also demonstrate how the animals may have been used while alive. Mortality evidence suggests that most cattle lived several years, metric evidence indicates that many were large animals, and the pathological evidence shows that they were used intensively. What emerges is that cattle during the Iron Age II were selectively slaughtered, bred, and managed for maximum usefulness as laborers. The intensity with which cattle were used can be related to the overall picture of Philistia's economy during the mid-first millennium BC. According to Gitin's (1989:49) estimates, the population of Ekron, as well as other industrialized Philistine cities, swelled at this time and the city's geographical position enabled it to support so many inhabitants not through production of olive oil, but through intensive plowing of the alluvial plain. Cattle as well may have played a role in facilitating exchanges of trade and tribute between Philistia, the Mediterranean port cities, and the inland states.

Clearly the peaceful conditions which generally prevailed in the area governed by Assyria during the seventh century encouraged regional trade and exchange. Gitin (1998:167, 1989:50) has pointed to the tendency in the material culture of seventh century Ekron to contain many foreign elements. Thus the pottery assemblage of the period contains typical vessels from all over the region – Phoenicia, Judah, Assyria, Transjordan, and even East Greek. Further, the architecture of stratum I is largely of limestone,

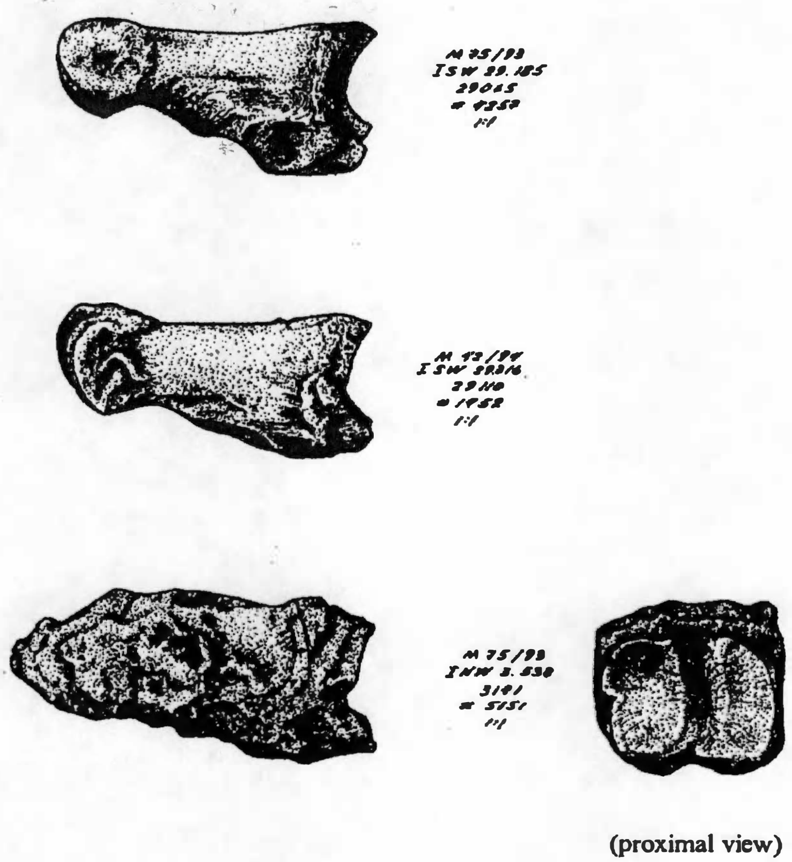

Figure 39: Three examples of cattle phalanges showing varying degrees of osteoarthritic development. The top specimen displays virtually no sign of disease, while the middle specimen has a moderate amount of lipping and development of exostoses. The bottom specimen, unfortunately found out of context in a balk trim, shows severe osteoarthritis, so much so that the element is barely recognizable beneath the diseased bone.

whose nearest source was several kilometers away within the borders of Judah. Not just local and regional trade, but also demands by the Assyrians for tribute to be sent to the city of Assur (Postgate 1974:122-123) must have necessitated the use of cattle carts to transport the materials.

The centralized administration of the Neo-Assyrian Empire both proscribed and facilitated this type of long distance trade and intra-regional exchange. Bureaucratic reforms begun under Tiglath-Pileser III laid the foundations for an extremely well-controlled empire which subsequently became the model for succeeding Babylonian, Persian, and Hellenistic Persian empires. The incorporation of Ekron into a succession of regional powers during the earlier part of the Iron Age II, and its later consolidation into the Neo-Assyrian Empire exposed the city to nearly 400 years of at least intermittent external control and probably the constant pressure or opportunity to be included into a larger political and economic unit than had been the case during the Iron Age I. This arguably affected the city's animal economy in other ways.

It is at the end of the Iron Age I and beginning of the Iron Age II that the relative abundance of pigs in the faunal assemblage declined dramatically, from 24 percent during the first half of the eleventh century, to only seven percent by the end of the Early Iron Age. During the Iron Age II, that trend continued, and pigs were almost totally absent from the populace's diet, as they dropped from five percent in strata III/II to a negligible two percent by the epoch of Neo-Assyrian hegemony. The precipitous decline of pigs obviously coincides with the loss of Philistine military power and independence. While it is tempting to argue that Ekron's population was forced to abandon their pig-eating ways as a result of military losses and political takeover by the United Monarchy first and Judah later, there seems little basis for this supposition. Little if any evidence exists which demonstrates an ancient Israelite tendency to impose monotheism and the laws of Leviticus and Deuteronomy over foreign peoples dwelling outside of Israelite territory[18].

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[18]The practice within Israelite territory was different. 2 Kings 17.24 relates how foreigners settled in Samaria by Assyria came to worship YHWH after their population was attacked by lions sent by the Israelite god (e.g., Cogan 1974:105-106).

A large assemblage of four-horned carved stone altars, typical of ancient Israel earlier in the Iron Age II, was excavated in the seventh century stratum of Ekron. However, cult practices at Ekron were rather eclectic: other religious paraphernalia found there includes Judean and Phoenician figurines, as well as Egyptian and Assyrian cultic artifacts (Gitin 1995:72). In actuality, the pendulum of influence usually seems to have swung in the opposite direction, with the Israelite states absorbing many pagan religious practices and making use of foreign cult objects (e.g., Cogan 1974:116-117). As for an Assyrian religious imposition to abstain from pig-eating, both the timing of the shift's beginning during the tenth century, as well as Assyria's policy to let vassals worship what cults they wished (Cogan 1974) argue against this.

To return to the discussion of the Iron Age II pig decline, it is apparent that hypotheses other than religious domination must be marshaled to explain the phenomenon. Given the timing of the decline which is simultaneous with Ekron's and Philistia's incorporation into larger bureaucratic and trading entities, a political-economic explanation would seem logical. It was Ekron's incorporation into a trade and tributary mode, producing goods destined for destinations outside the plain of Philistia, that may have rendered a pig-raising economy disadvantageous and even unprofitable. As Hesse and Wapnish (1997) have discussed, much of the ancient Near East was of a pig-hating, or at least pig-indifferent, mind set, such that there may have been few markets where pigs or pork would have been a commodity of interest. From an ecological/ethological point of view, pigs are difficult to drive long distances, both because of their stubborn behavior and because of local climatic conditions in the Near East where water can be hard to come by (Zeder 1996:298, 301).

Still, the disadvantages of pig herding in the Near East should not be overemphasized. Wild pigs were abundant all over Palestine only a century ago (Tristram 1998), and were evidently local during the Iron Age II, since one unfused pig femur from an eighth century context appears from its huge size to have been from a wild boar (Figure 40). Yet even admitting that pig drives were possible, Ekron's submersion into a political system demanding regular supplies of trade and tribute in the form of finished goods sent over longer and longer distances should have diminished much the former iconoclastic *cachet*

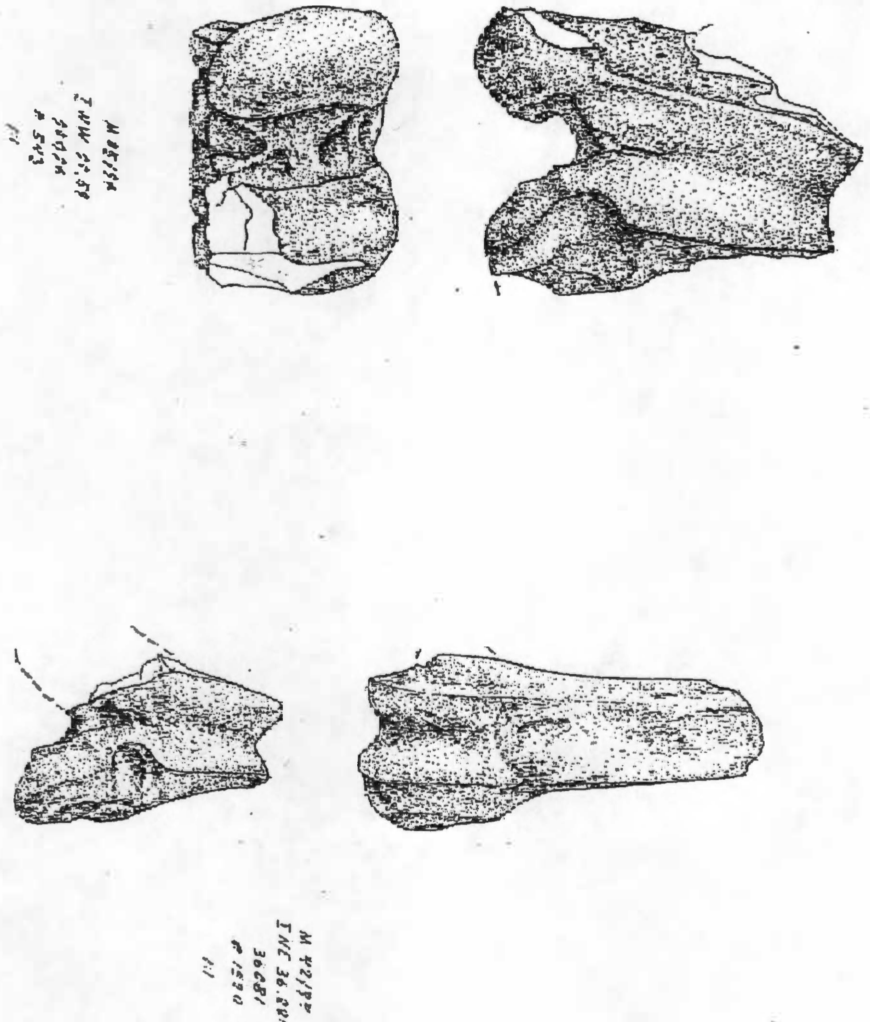

Figure 40: Comparison between Iron Age pig femora. A wild boar from an Iron Age II context (top), and an Iron Age I domestic pig (bottom).

of swine agriculture, even for the anomalously pig-loving Philistines.

Both because pigs are difficult to drive long distances, and because they are easily raised on urban houselots, thriving on domestic garbage or agricultural waste, they are usually kept for local consumption. Pigs are easy to raise on a large scale when they are left to free range and feed themselves on forest mast or whatever else they find (Zeder 1996:300-302). Yet these animals can also be very destructive to crops and, in a period when more fields were coming under plow to feed Ekron's large population, such a situation would have presented an unacceptable risk to the city's crops. Of course, pigs could have been herded well away from the fields, in some of hillier areas nearby which would not have been plowed. But such areas were probably needed for planting the olive trees on which the city's economy depended. It is interesting that, at the same time that pigs begin to decline in numbers, so do goats. Both animals forage best as scrub browsers, but goats as well as pigs are destructive to crops as well as trees.

Redding (1991:23-25) concurs that pigs are negatively correlated with intensive agriculture, but argues that goats in fact are positively correlated with it. That is, because sheep and cattle have similar dietary requirements, they tend to compete for the same foods. Goats, however, can browse on those lands not suitable for cultivation. The animal economy of Ekron during the Iron Age II does not conform to Redding's model, since sheep and cattle were the two most important livestock species in this era. Although in many circumstances Redding's scenario would be correct, the situation of Ekron during the latter part of the Iron Age II was different. The city's missions were evidently olive oil and textile production. The former required extensive groves of olive trees, while the latter necessitated large flocks of sheep. With both arable and non-arable land being intensively utilized to manufacture the city's two most important products, few areas would have been left in which pigs and goats could have harmlessly browsed.

The overarching theory most useful to explain the decline in pigs during the Iron Age II is that which Zeder (1996, 1998) has presented in explaining cyclical pig use in southern Israel and Mesopotamia. This theory requires the assumption that, in times of greater centralized control and regional integration, pig-raising will be discouraged by bureaucrats who view this type of agriculture as subversive in that it fosters self-sufficient economies. Certainly Ekron's history, as well as much of the Near East's, beginning in the tenth century can be read as a time where the city was constantly and increasingly brought into more centralized forms of political control and regional integration of trade. These processes culminated in the period of Assyrian hegemony over the entire southern Levant after 734 BC, when the relative abundance of pigs at Ekron reached a new low. The link between the perhaps unintended effects of local imperial economic reforms as in encouraging the concentration of populations into industrial production centers, and the impact of grand bureaucratic policies seeking to unite disparate peoples and provinces into a network of mutual dependency seems very strong indeed. Whether pigs were the unintended victims of the former, local, policies or the latter empire-wide schemes matters little.

A number of scholars (e.g. Frank 1993; Frankenstein 1979; Postgate 1992; Sherratt and Sherratt 1993) have pointed out the extensive economic changes to the region brought by the Neo-Assyrian Empire's conscious development of political policies which encouraged trade, as well as the cyclical nature of internationalism and trade in the ancient Mediterranean world. In Knapp's (1992:84) terms, this is about "the correlative relationship between short-term event and long-term structure...." Pigs at this particular site, beyond any local importance they may or may not have had for delineating ancient ethnic boundaries, reflect the cyclical periods of integration and isolation perhaps better than any other single category of data.

Summary

The faunal assemblage from the Iron Age II strata generally demonstrates a remarkably different and more specialized economy than previously existed at Ekron. Neither in the Late Bronze Age nor the Iron Age I was there such a demonstrable orientation toward specialized production as existed in the first millennium BC. This economy, which emphasized animal products other than meat – wool and perhaps hair in the case of sheep and goats, labor in the case of cattle – appears to have developed synchronously with the crystallization of neighboring Iron Age II states and should be considered a related development.

Several trends visible in the faunal assemblage, beginning in stratum IV and continuing through to the end of the city with the Neo-Babylonian campaign of Nebuchadnezzar in 603 BC, point toward a regionally-integrated economy which was shaped by market demands. Foremost of these indicators is the sudden decline of pigs after the eleventh century, just as Ekron and Philistia's political and military dominance was being destroyed by a succession of new states in the region. As previously discussed, declines in pig herding often accompany periods of higher regional political integration, at least in the ancient Near East.

At the same time that pig use was in decline, sheep and goats became somewhat more important to the city's livestock economy. Previous to the Iron Age II, sheep and goats had been emphasized equally, indicating that although secondary products may have been important to city residents, there was no special emphasis on any one product – most likely wool and/or dairy manufacture was household-produced, with surplus being marketed only locally. In support of that idea, it is possible to draw on architectural data, which demonstrates that, although the city was laid out into functionally distinct areas as early as the twelfth century (Dothan 1997:99), no spatially segregated industrial facilities except pottery kilns (e.g., Killebrew 1996b) existed prior to the late Iron Age II (Gitin 1989:28). Historical information for the period also at least suggests such a scenario: The Late Bronze Age southern Levant, though rife with long distance exchanges, does not appear to have been a period of integrated regional economies. Egypt's nominal domination of Canaan, in contrast to Assyria's 800 years later, seems mainly to have been inspired both by efforts to control trade routes which passed through it and as a military buffer or staging ground for conflicts with the Hittite Empire (Ahituv 1978; Weinstein 1981), rather than primarily to open markets and organize production.

Another facet visible in the Iron Age II animal economy, which developed only in the Neo-Assyrian period, is the increase in fish, probably Nile Perch. The fish are symbolic of the trade relations which existed in the seventh century. The Neo-Assyrian Empire's penetration of its conquered lands was clearly so deep that they were able to reorganize and redirect the production and trade of not only high value/low bulk craft items like pottery or ivory, but also low value/high bulk staples like woollen textiles and olive oil (Gitin 1997). The fish, likely originating in Egypt, represent the other side of the international trade, a low value/high bulk item which was sent back toward Assyria in exchange, perhaps, for olive oil or other Levantine commodities.

Other aspects of the Iron Age II faunal assemblage appear to be gradual developments growing out of the preceding Late Bronze and Iron Age I periods, rather than sudden market-related shifts appearing in response to new political conditions. Certainly the trend demonstrated by the mortality data of sheep and goats, which emphasizes older animals in both the Iron Age I and Iron Age II, can be understood in terms of a gradual and increasing interest in secondary product production, first at a household and much later at an industrial level. The mortality data for cattle, as well as intensification of work-related disease, also are trends which develop over time. In both Iron Ages, few young cattle were slaughtered, and instead kept to do work in the fields or elsewhere. Pathological trends also display a gradual development, increasing in prevalence or intensity significantly with each period, but not appearing as a new phenomenon during the Iron Age II. In fact, both the gradual increase in cattle pathologies, as well as the somewhat increased mortality of prime-aged cattle during the Iron Age II can be understood not only as the byproduct of new, regional markets and concomitant production pressures, but also as a reflection of a growing city.

In the time span of a millennium, Ekron grew, with some setbacks in between, from a small Late Bronze Age village, to an Iron Age I military power, to a sprawling industrialized metropolis by the seventh century BC. The expanded city of course needed to feed its enlarged population, accomplished in part by putting more fields under plow probably by the beginning of the Iron Age I (Gitin and Dothan 1987:216). Also during the Iron Age I, the population relied on a number of livestock species for their meat, most prominently pigs, an option not pursued by the Iron Age II inhabitants. Instead, as mortality evidence seems to suggest, the people of Iron Age II Ekron consumed more sheep, goats, and cattle. That virtually pig-less diet, in turn, may have been the product of market forces which favored other animals, and so forced the population into the difficult position of having to, in the long run, eat the animals on which they based their commodity production.

Chapter 9: Synthesis -- Ancient Near Eastern World-Systems and Ekron's Animal Economy

It is clear from the preceding summaries of the Levant's history from the Late Bronze Age through the Iron Age II that the region went through cyclical phases of incorporation and isolation, of international trade and interregional economies to insular economies and local trade. Political entities – Egypt's Levantine empire, renascent Iron Age II states, Assyria – emerged in or expanded into the Levant and, in doing so, affected the local economies in demonstrable ways. The city of Ekron was intimately caught up in the larger Near Eastern world of shifting borders, influences, and polities, as its own municipal borders contracted and expanded repeatedly over time.

Perhaps the single clearest category of evidence at Ekron which generally mimics these fluctuations is in the ceramic corpus. The Late Bronze Age ceramic assemblage reflects the cosmopolitan atmosphere of the period. Despite the fact that Tel Miqne was only a small village at that time, the ceramic assemblage includes not only locally-produced wares, but also a range of imports probably manufactured in the Aegean or Cyprus (Dothan 1995:42). Besides pottery from the west, the Late Bronze Age strata also produced Egyptian objects and Anatolian earthenware (Allen 1994; Dothan 1995:42). The ceramic corpus of the Iron Age I is, however, quite different. Imported ceramics no longer form a part of the assemblage, evidently a consequence of the Mediterranean crisis/down cycle which occurred at the end of the Late Bronze Age, when the formerly busy international trading networks, and several of the states it supplied, broke down. Instead, the Iron Age I ceramic assemblage consisted of local imitations, both in vessel styles and decorative motifs, of Mycenaean ceramics (Dothan 1998:152-154, 1989:2-4; Gunnewug *et al* 1986). This change is usually discussed as an ethnic argument, that is, the new pottery style is used as evidence for the arrival of a new people, the Philistines, fleeing from an Aegean homeland (Dothan 1995:42). However, one can also turn the phenomenon into an economic thesis, that the population of Canaan – regardless of where they came from or when they arrived – were forced to produce pottery similar to that which they used to import when the Late Bronze Age world-economy disintegrated. The Iron Age II ceramic assemblage does not contain the same distinctive Philistine vessels and decorations as characterized the earlier corpus, but instead features both imports from neighboring states as well as traded pottery from more distant Mediterranean lands (Gitin 1998:167).

What this evidence demonstrates, then, is precisely the type of cyclical world-system which Frank (1993) has characterized as a series of 'A-phases' and 'B-phases', where the former are times of integrated political economies and characterized by high amounts of international trade, while the latter represent periods of decline, political fragmentation, and cessations or dramatic decreases in long-distance trade. The Late Bronze Age and the Iron Age II have been characterized as largely A-phase periods, separated by the B-phase of the Iron Age I (Frank 1993; Sherrat and Sherratt 1993). A question worth exploring here, utilizing primarily changes over time in species ratios (Figure 41) as well as other data previously presented, is how to interpret the role of Ekron's agricultural economy in the cyclical ancient Near Eastern world-system. Beyond the city of Ekron and the piles of animal bones excavations there produced, what implications does these data have for understanding the role played by staple finance in the Mediterranean world-system of the fifteenth through seventh centuries BC?

Turning first to the archaeological record of the Late Bronze Age at Tel Miqne-Ekron, it seems that the settlement was small and – like many major and minor towns of the period – unfortified. Despite these characteristics, a number of imported objects found in those strata testify to the involvement of the town with the international trade and indeed world-economy. The faunal assemblage dating to that period is characterized by species ratios, age profiles, and other figures which suggest an unspecialized economy. One feature, the relative rarity of pigs, may relate to the political atmosphere of the period, when Egypt exercised increasing interest and control over Canaan. As has already been noted, it seems that pig economies of the ancient Near East fluctuated according to, among other factors, the degree of centralized political control in a given area (Zeder 1998). Pig bones are generally more common at sites dating to the Middle Bronze Age, a period of a weak and divided Egypt but strong Canaanite petty kingdoms (Hesse 1990; Kempinski 1992).

The evidence of pigs as well as imported objects at Late Bronze Age Tel Miqne-Ekron establishes that the town, though in size only a village, was nevertheless connected with interregional trade and may

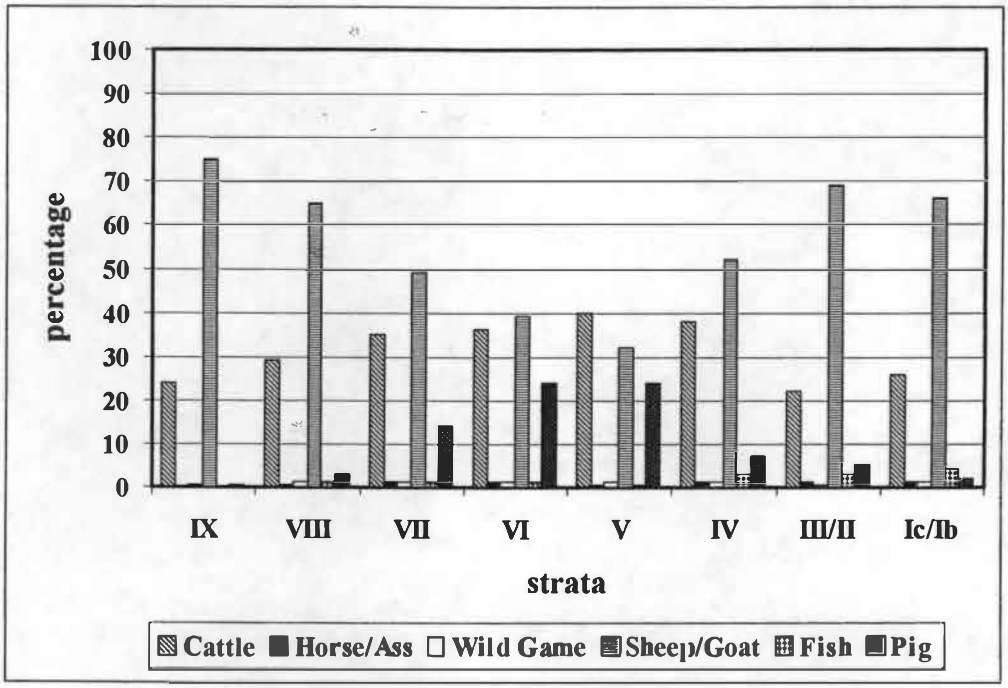

Figure 41: Histogram displaying the variation in species abundance over time. The entire excavated sequence is displayed, from the earliest Late Bronze Age stratum IX (left), to the latest Iron Age II stratum Ic/Ib (right).

have been under the watchful eyes of Egyptian administrators as well, if the lack of pigs can be interpreted in such a way. Aside from the pig evidence, an argument based on absence or at least scarcity, there is little in the faunal record to suggest that trade and market demands in the fifteenth to thirteenth centuries penetrated the hinterlands to such an extent that they affected the orientation of agricultural production. Sheep and goats were herded in equal numbers, and their mortality patterns indicate that dairy as well as other products were important.

Cattle, though clearly managed in such a way as to maximize their labor potential, were not so intensively used for schlepping activities as they were in later periods – a development discernable from the pathological analysis of the toe elements. The relative lack of pathological development on cattle bones may simply reflect the settlement's small size during the Late Bronze Age, and the fact that agriculture did not have to support as large a population as was necessary later. Yet the settlement's size is arguably an indirect product of the political economics in operation there. Many settlements, not only Tel Miqne-Ekron, had shrunk in size by the Late Bronze Age after achieving an apogee of urbanism during the Middle Bronze Age (Bunimovitz 1995; Gonen 1992). Other Levantine cities, especially those along the coast such as Ugarit, continued to support large populations in a prosperous atmosphere of cosmopolitan trade and political connections (Astour 1981).

What seems to be the case here, if Tel Miqne-Ekron is typical of inland Late Bronze Age sites in the southern Levant, is that the core powers of that period, most notably the Egyptians and the Hittites, either were not capable of, or were not interested in, exploiting the rich agricultural hinterland periphery of Syria and Palestine. Rather, the great powers preferred to use the Levantine provinces as political pawns, influencing the petty states to shift allegiance and alliances for their (Egypt and Hatti's) own political and military benefit (Merrillees 1996:44). These regions certainly were incorporated into the world-system of that period, as the presence of abundant imported goods attests. The presence of imported luxury goods, pottery and the like, in strata VIII and IX at Tel Miqne-Ekron make it clear that town's elites were able to get hold of exotic material culture items in some way. Whether the imported artifacts made their way through down the line trade or direct exchange is impossible to guess, but the difference in acquisition modes is merely a nominal one: either way, the town was incorporated into the world-system.

The world-system of the Late Bronze Age, however, may have been quite different from its later, Iron Age, incarnations. What we see at Tel Miqne-Ekron is purely a wealth finance economy in operation. To be sure, wealth economy was crucial to ancient societies: more than supplying (presumably) elites with pretty and exotic items, those goods supplied them with the legitimacy and therefore power to rule over their subjects. That is, due to the limited supply of imported luxury goods, rulers had the power to restrict peoples' access to them, and could therefore use them as displays of wealth and power (Wolf 1982:84). The other side of this exchange, however, is that local vassal rulers were in turn beholden to the courts of the great imperial powers of the day – Egypt in this case – which controlled the production and distribution of wealth goods, a phenomenon observed in many other imperial situations (e.g. Earle 1996:179-180; McGuire 1989:49). In other words, Egypt held the purse-strings to the power and legitimacy of the Canaanite elite through control over wealth, which in turn helped the Egyptians maintain order in Canaan (Baines and Yoffee 1998:212-213).

Egypt probably was not in need of the type of agricultural products which the Levantine lands could produce. Though they did import olive oil from Western Asia, this was most likely supplied by Ugarit during the Late Bronze Age (Ahituv 1978:98-99; Linder 1981:33-34). Other than olives, the Nile Valley could grow all the staples necessary for life. The Nile Valley's fertility may in fact explain the lack of bulk goods trade which is evident from the faunal record of Late Bronze Age Tel Miqne-Ekron. As well, textual sources from the period indicate that Canaanite grain contributions to the temple of Ptah in Memphis were nominal in amount and probably symbolic in nature (Ahituv 1978:96). Egyptian records of tribute received from Canaan include livestock, and indicate that sheep were much more commonly sent than goats. Ahituv (1978) believes that these contributions were also rather light. The total of 11 years of livestock tribute adds up to the same amount seized as plunder from the Canaanite city of Megiddo alone (Ahituv 1978:99). But if Egypt imbued the Canaanite princes with the trappings of royal authority, and this elite had access to exotic trade goods, then what did the Egyptians and merchant traders gain in return? The tribute lists suggest that Egypt did not materially benefit to any great extent from the levy of taxes and tribute on Canaan.

The latter question, which concerns the very nature and evolution of the ancient world-system, is an important one and goes back to the issue of the Egyptian motivation for establishing an empire in Canaan. If, as some have posited, the Egyptian interest in Canaan was merely as a means of controlling trade and trade routes which had their origins in Syria and Anatolia (Ahituv 1978:104-105), perhaps Egypt sought to essentially buy the local elites' cooperation and thus save the expense of constant military campaigns quelling rebellions, though punitive raids were carried out by some of the period's pharaohs (Merrillees 1996:47). The thesis that prestige goods, brought by the international trade of the Late Bronze Age to the lands of the eastern Mediterranean, supported elites' claims to power is best illustrated by the down cycle which the world-economy suffered at the end of the Late Bronze Age. No doubt the collapse of most of the political entities of the eastern Mediterranean around 1200 BC was due to a number of reasons, perhaps including mass migrations, ecological disasters, changes in warfare tactics, etc. Yet the collapse was probably speeded and intensified due to one of the collapse's consequences, the cessation of international trade.

Hall (1999:11-12) has pointed out that, where prestige goods are used by local elites to legitimize their positions, the loss of access to such material undermines their authority. The cessation of imported pottery and other objects at Tel Miqne-Ekron is one example of this phenomenon. The cessation of imports has been repeatedly observed in so many sites with continuous Late Bronze Age through Iron Age I occupation that a lack of imported wares has become one of the hallmarks of the Early Iron Age (Mazar 1992:300). Thus the southern Levant at the end of the Late Bronze Age was entering a period of loosened incorporation within the world-system, a time of transition which set the course for a very different period to follow, in the Early Iron Age.

Times of loosened incorporation, perhaps even more than those featuring tightened regional integration, can produce radically different societal effects. One of these effects, arguably, was the heightening of previously suppressed ethnic identities, a phenomenon which Hall connects with increased political centralization, though he does not deny that it can occur in the opposite situation (Hall 1999:11-12). Though the traditional argument for the appearance of what has been labeled Philistine material culture is a massive immigration (T. Dothan 1982), more recent opinions hold that the Philistines actually were a combination of population elements, immigrants as well as native merchants who forged a new type of economy when the Late Bronze Age palace-controlled trade and production monopolies collapsed (Bauer 1998:150-151, 160-161; Sherratt and Sherratt 1993:361-363). Even the more traditional archaeologists, who favor the immigration hypothesis, more recently have at least partially accepted the opposition's thesis (Bunimovitz 1990), that Philistine material culture, though distinctive, does contain an eclectic mixture of new and native elements (Mazar 1992:266-270).

The faunal assemblage of Ekron in the Iron Age I to a large degree reflects this period of relative isolation and unincorporation. Above all, the remarkably high occurrence of pig bones in the collection may relate to a lack of regional political integration and trade (Zeder 1998). The pig bones may indeed be the artifact of several social and economic processes which are not necessarily mutually exclusive. The pig economy of Ekron may reflect an adaptive strategy adopted by immigrant Philistines, as Hesse and Wapnish (1998) have argued, that persisted for about a dozen generations due to the political atmosphere in the period. While this foodway does not seem particularly Aegean, with its dual concentration on both pigs and cattle, it was unique for its period in Palestine. This dietary regimen as well as other aspects of the Philistines' material culture (e.g., T. Dothan 1995) has produced the archaeological signature of a distinct population.

The dietary strategy pursued by the Philistines during the Iron Age I also, like the preceding Late Bronze Age one, showed little evidence of interregional trade in agricultural products. In this period sheep and goats actually declined in relative abundance, and the two species were emphasized equally, the ratio of sheep to goats being 1:1. Mortality and metric evidence does indicate that secondary products like wool did become important to the economy of Ekron during the Iron Age I. However, the fact that sheep did not outnumber goats until the end of the Iron Age I indicates that the textile industry, whose presence is confirmed by loomweights (T. Dothan 1995:46-47), was household rather than trade-oriented. Despite the localized nature of agricultural and other aspects of the Iron Age I economy, the Iron Age I should not be taken as a period of decline. The Philistine cities in general and Ekron in particular seem large (Ekron's walls surrounded some 40 acres at this time) and rich in terms of architecture and craft production – most notably the characteristic and ubiquitous bichrome pottery (T. Dothan 1995:53; Muhly 1989:16, 19-20).

Faunal remains from Ekron dating to the Iron Age I generally complement the overall picture of a relatively insular but prosperous culture. The unique constellation of dietary components, in terms of species relative abundance, demonstrates that the Philistines maintained a cultural identity separate and largely distinct from their neighbors. From Braudel's (1966) *longue durée* perspective, this represents a cyclical period of loosened incorporation, a period when the formerly pervasive trans-regional polities and market systems contracted. It is interesting to note a pattern recognized by T. Dothan (1995 and elsewhere), that the material culture of the Philistines in the Iron Age I is largely made up of locally-produced emulations of foreign styles, as opposed to Late Bronze Age artifacts which not only resembled foreign styles, but were actually manufactured elsewhere as well. This is the sort of political situation, a halt in internationalism and breakdown of centralized power, in which groups are likely to generate and display heightened senses of ethnic identity (Baines and Yoffee 1998:222). A well known phenomenon in world political history (e.g., Farnsworth 1989:192), the emergence of suppressed cultural identities when centralized political powers seeking to unite disparate cultural elements ebb, seems applicable to Ekron at this time[19]. The view of Iron Age I ethnic identity taken here, a phenomenon connected to the disintegration of the Bronze Age political economy, appears supported by later historical trends as well as changes in Philistine material culture.

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[19]Arguably, a parallel modern example is the disintegration of Yugoslavia after the break-up of USSR and especially the death of Tito. Tito, with Soviet backing, forcibly created a multiethnic state and attempted to popularize ideology and history which promoted the unity of disparate and often mutually antagonistic ethnic groups. After the collapse of the Yugoslav dictatorship, the provinces quickly declared their independence, divided along perceived ethnic boundaries, and proceeded to wage war against one another (Danopoulos and Messas 1997).

T. Dothan (1995:53) made an important point when she stated that "Philistine material culture lost its uniqueness when the Philistines reached the peak of their prosperity and their political and military power at the end of the 11th century B.C.E." It is just after this point in time, equivalent to stratum IV at Ekron, that sudden and parallel changes are visible in architecture and ceramics (T. Dothan 1998:158), not to mention livestock herding strategies. These changes signal the re-emergence of the world-economy, when new political entities emerged and renewed long-distance trading economies. Gitin (1998:162) alluded to this new cycle in the ancient world-economy when he stated that in the tenth century, Philistia and Ekron were "physically overwhelmed by [their] neighbors and became vulnerable to the influence of Phoenicia and Judah". What is clear is that, as early as the tenth century, Ekron was reconnected to foreign markets, and became flooded with imported products from neighboring regions. The city was not only commercially unified with foreign polities: the tenth century stratum IV city was destroyed, presumably by a foreign power and perhaps by an Egyptian campaign. That event underlines Ekron's changed political status during the Iron Age II, when it became a pawn in the geopolitical power struggles between Judah, Egypt, and Assyria (Gitin 1989:41-43).

The changes in the world-economy and regional political situation which came quickly in the Early Iron Age II dramatically affected Ekron's economy. Formerly, in the Iron Age I, Philistia seemingly was the first among equals, the greater military power among a group of small, weakened Levantine states. These states, largely bereft of the heavy influences of the traditional superpowers in Egypt and northern Syria, engaged one another in something resembling what Renfrew and Cherry (1986) have called 'peer polity interaction'. That is, a type of core-core relationship where developments in complexity or accumulations of wealth and power are emulated by other polities in the region, such that a rough political balance is maintained (Renfrew 1986:8-11). Ekron's agricultural output as well as craft production during the Iron Age I may have been kin-based, and production on the household level. It appears that little regional exchange occurred in either low bulk/high value or high bulk/low value goods during the majority of the Iron Age I, to judge from both the faunal profile and remarks made by ceramics experts concerning the origins of excavated pottery (T. Dothan 1998:154).

With the advent of the Iron Age II and the concomitant rise in international trade, Ekron became enmeshed in a series of core-periphery politico-economic relationships which culminated in its transformation into an Assyrian vassal after the year 734. Ekron's new political status as a vassal of, in turn, Egypt, the United Monarchy, Aram-Damascus, Judah, Assyria, and, for the last 20-30 years of the city's existence, Egypt once again, diverted the economy toward a tributary mode of production. The tributary production mode is one where surpluses are extracted from the primary producers by military or political means (Wolf 1982:79-80). Renascent states which took turns occupying Ekron and other cities undoubtedly directed much of the tribute toward their own centers, as Assyria did (Postgate 1992:259), but also may have encouraged the general production of surplus for trade in the expanding markets of the period (Sherratt and Sherratt 1993:364-365).

The argument has often been made that ancient trade in staples was small in volume, based on certain economic texts as well as both the difficulty of bulk goods transportation and the view that most ancient Near Eastern states were agriculturally self-sufficient (see Larsen 1987:51-53 for such an opinion concerning the Early Bronze Age). Whether or not trade in staples was normal and regular, both historical reasons and archaeological evidence can be found to suggest its existence during the first millennium BC. The rise in demand for Phoenician goods at this time gave their cities the opportunity to transform their economies to emphasize production of high value/low bulk craft goods of various kinds, which seem to have been traded for agricultural staples (Revere 1957:55-56). It is interesting to note in this context, as T. Dothan (1995:53) and Gitin (1998:162, 167) have, that beginning in the tenth century and continuing to some extent for the duration of the Iron Age II (Gitin 1999:284), Phoenicia was one of the major material culture influences visible at Ekron. The agriculturally-rich plains of Philistia could have supplied Phoenicia with such produce in turn for the type of craft goods which in fact appear at Ekron and elsewhere. Thus trade in staple goods need not have required difficult transport – water routes were the logical means of getting to Phoenicia – and does not necessarily imply that the Phoenicians were incapable of producing their own food. Rather, it may have been the case that the Phoenicians chose to emphasize trade and employ their population in craft production instead.

Faunal evidence for the reorientation of Ekron's agricultural economy from the onset of the Iron Age II is supplied by several lines of data. First and foremost, there are the swelled flocks of sheep and goats which, beginning in stratum IV and increasingly through to stratum I, dominated the diets of Ekron's population. This adjustment in dietary habits probably reflects both the near disappearance of pigs as well as the growing importance of wool to the city's economy. Indicators of wool production include the divergence between the number of sheep as opposed to goats. Formerly an even one to one ratio, in the early centuries of the Iron Age II (stratum III/II) this changed to favor sheep by approximately one and a half to one, and then increased again by the seventh century (stratum Ic/Ib), becoming more than two to one. Furthermore, mortality and metric evidence of caprids indicates that most were killed only after attaining a few years of age, presumably to maximize the animals' productivity in supplying several shearings. Metric data provide another source of evidence, such that sheep tended to be large and goats (at least according to some of the measurement trends) smaller, possibly caused by male sheep selection for wool, and female goat selection for dairying.

Wool production has a long history in the ancient Near East and, despite the fact that many areas were evidently capable of producing it, textiles formed a major export product of only certain regions. In the Early Bronze Age, southern Mesopotamia shipped great quantities of cloth to Anatolia despite the fact that such trade must have duplicated, and therefore been in competition with, locally spun and woven wool (Larsen 1987:51). From the faunal data alone, namely the abundance of sheep, it would be difficult to exclude the possibility that the animals were being raised in large numbers to be given as tribute to Assyria, rather than to support a local textile industry. In fact Assyrian annals frequently list flocks of sheep received as payment of various kinds of tribute (Postgate 1974:129, 155). However, the evidence for a textile industry at Ekron comes not only from the faunal data, but also the tremendous seventh century loomweight assemblage (Gitin 1997:87). The Assyrians, though they presumably possessed the means to produce woollen cloth in the hinterlands of the capital city of Assur itself, nevertheless clearly encouraged the development of a textile industry at Ekron as a way to profitably employ oil producers when the olives were still ripening on the trees (Gitin 1997:90). Since the Assyrians generally did not require vassal states to contribute bulk goods, textiles produced at Ekron may have been intended as tradeable items destined for other places in or beyond the empire (Postgate 1992:254).

The Neo-Assyrian Period generally brought Ekron great prosperity and linked it to a range of potential markets. Wealth was brought to Ekron through its forced urbanization into an industrial power, a policy which Assyria imposed on several regions it conquered (Oppenheim 1957:36). The population which the newly urbanized city of Ekron needed to operate its industrial base had to be fed of course, and thus must have required quite intensive plow agriculture to grow sufficient amounts of grain. It is again possible to see the effects of this Assyrian policy in the faunal remains, most prominently in pathological and other evidence gleaned from the cattle bone assemblage, but as well from the relative scarcity of pigs and goats. Turning to the cattle evidence first, the trend toward increased schlepping-related pathologies over time in the animals' foot bones underscores their role in the industrialized economy of Ekron in the later part of the Iron Age II. Mortality evidence indicates largely the same trend as observed in earlier periods, that cattle were slaughtered only after one year of age or older, with about 55 percent surviving until at least three years of age. Similarly, metric measurement trends indicate that cattle were on average larger in this period, perhaps reflecting the use of oxen for plowing and other labor-intensive activities.

Declines in the relative abundance of pigs, as previously argued, can be read as an economic harbinger of the integrated regional markets to which the city was linked after military weakening and subsequent vassalage to neighboring polities. Historians point out that in the Biblical accounts of David's defeat of the Philistines there is no mention of occupation or payment of tribute (Ehrlich 1996:35), and the above model does not assume this. Instead, I am merely suggesting that their military defeats had minimally the consequence of exposing their population to the perils and possibilities of foreign production and demands. This scenario could have occurred as early as the tenth century BC, when the United Monarchy and other states successively placed greater and greater portions of the Levant under a single political banner.

The simultaneous dwindling of goat flocks, actually occurring primarily in the seventh century, may be a product of Ekron's dramatic expansion. Although Ekron was urbanized to support a population of industrial workers, these workers produced goods – olive oil and woollen textiles – based on an extensive agricultural hinterland. The circa 8,000 residents of seventh century Ekron must have plowed the surrounding fields to supply their grain, while less arable land was planted with olive trees or grazed by sheep. In such a situation there may have been little browsing room or tolerance for destructive goats.

The prosperity of Ekron during the Iron Age II was certainly agriculturally-based. The city grew very prosperous during the century-long hegemony of the Neo-Assyrian Empire. Yet there is also some evidence which demonstrates that, possibly as early as the tenth century, the then small town began to thrive and did not necessarily decline and enter a dark age (Ehrlich 1996:56). Not only is the material culture of these strata flooded with imported pottery and other craft items, but the city wall was also renewed at this time. Viewed from a zooarchaeological perspective, the uneven ratio of sheep to goats signifies a nascent agricultural export-based economy.

Agriculture was obviously the basis for Ekron's economy especially after becoming an Assyrian vassal, yet at the same time artifacts other than faunal remains provide evidence of an increasingly important prestige goods economy there. The Assyrians, apparently in order to encourage commerce and the exchange of goods, began to use silver as a currency exchangeable for any produced goods, including foods and animal products (Postgate 1974:109-110). Reflecting this economic development, five caches of cut silver pieces and silver jewelry were discovered in stratum Ic/Ib at Ekron, which Gitin (1997:92-93) believes city residents may have received in exchange for their olive oil and textiles. Other evidence from seventh century contexts demonstrates that silver currency had not yet fully replaced other, older, forms of exchange. Barter or in-kind exchanges are possibly represented by the relatively high number of Nile Perch bones discovered in stratum Ic/Ib, perhaps derived from trade of olive oil to Egypt. If such forms exchange indeed existed alongside currency transactions, it argues for a partially 'primitive' economy in the sense Polanyi (1957) used it, marketless trading without fixed prices.

Another form of primitive trade which also existed in the seventh century was the prestige goods economy, defined by Pearson (1957:338) as "the accumulation of symbolic wealth...[and] function[ing] indirectly as a mobilizer of large quantities of material means as well as human services...." Prestige objects were items of the high value/low bulk category which circulated among the elites of the Neo-Assyrian Empire. Aside from rare imported East Greek pottery found in the temple complex at Ekron, there was as well discovered a silver amulet depicting the Assyrian motif of the goddess Ishtar standing on a lion and surrounded by the seven stars of the Pleiades as well as the sun and the moon (Gitin 1997:92-93). If trade in and accumulation of prestige objects in general helps to legitimize the rule of the elite, then the amulet described above is particularly intriguing. Engraved with the clearly Assyrian religious motifs, the amulet may have at once legitimized the social position of the elite owner in Ekron and at the same time visibly bound him (or her, perhaps) to Assyria for this power. From the final phase of the city, in the large temple complex, came a remarkable collection of Egyptian material culture items, including carved ivories and a gold cobra (Gitin 1998:174-175). Prestige objects were more than just displays of wealth and conspicuous consumption, as they created loyalties out of dependence between vassals and overlords (McGuire 1989:49). If trade in staples physically supported the populations in far corners of the Assyrian Empire, then it was the trade in wealth goods which maintained the social order necessary for governance.

The industrialization of Ekron by the Assyrians produced an opportunity for the Philistines to gain wealth through mass market production of olive oil. Yet this same shift from a subsistence level of production to a surplus mode also exposed the economy to risks. Specialized production of goods narrows the economic focus and encourages agricultural workers, as at Ekron with the textile industry, to take up craft production in the off-season in order to sustain themselves (Scott 1976:10-13). Wealth is maintained so long as no ecological disasters or unforseen sags in market demands occur. But when such events do occur, there is little to fall back upon when agriculture has become so specialized. It is a characteristic of market economies that they at once expose peasants to opportunities for profit and great risks of failure – both with more intensity than possible in subsistence agriculture (Scott 1976:57). Such a crisis may have been developing at Ekron late in the seventh century after the retreat of the Assyrian empire around 630 BC. At this time Egypt reasserted its control over Philistia. The stratum I faunal assemblage cannot be separated into pre- and post-630 BC components, but architectural evidence provides some indication of an economic downturn. A number olive oil installations fell out of use during the brief resumption of Egyptian rule before Ekron was forever destroyed by a Neo-Babylonian campaign in 603 BC (Gitin 1997:98-101). Gitin (1997:100) believes the diminution in olive oil production to have been a consequence of the Neo-Assyrian Empire's rapid disintegration whose result was an "upset in the Assyrian/Phoenician market trading systems".

The faunal remains especially, but other artifacts as well, portray an interesting economic picture of Ekron over a millennium-long period of time. Visible in changing species relative abundances, mortality profiles, metric trends, and increasing pathological deterioration is the close connection between the ancient Near East's shifting political economy and agricultural production. Cyclical propensities toward pig abstinence, pig preponderance, and pig abstinence again are a part of a much older agricultural pattern in the ancient Near East (e.g., Hesse 1990). This pig production eclecticism coincides with the expanding and contracting provincial polities which sometimes incorporated Ekron into regional markets, and at other times did not. The ultimate penetration of the world-economy into agricultural hinterlands, as opposed to the long-favored coastal entrepots (Revere 1957) is the outcome of a developing world-system where the core was increasingly able to affect deeper and deeper economic changes in, and indeed exploit, the periphery far away (Sherratt and Sherratt 1993:362-363). The point is not just that there were cycles of incorporation into ancient world-systems as Frank (1993) has outlined, but that these cycles over time increasingly intensified both the extent of trade and the intensity of production in that enlarged space (Sherratt and Sherratt 1993:374-375).

The temporary collapse of the ancient world-economy at the end of the Late Bronze Age engendered many changes in the Mediterranean world. Possibly, according to traditional interpretations of the period (*contra* Muhly 1989), palaces and cities were sacked, international trade disrupted, and waves of immigrants left their homelands (e.g., Stager 1995). In an academic atmosphere where any and all evidence relatable to the prevalent migration theories is emphasized, the oft-reported dietary shifts at Ekron, when pork and beef became important, have been widely reported and great importance accorded to them (e.g. Finkelstein 1997:230). While the interpretation outlined above casts these dietary changes in a long-term and economic perspective, they are certainly as important as commentators like Finkelstein suggest. Rather than speaking volumes about immigrants and foreign culinary habits however, they may be more easily understandable in light of political and economic changes which occurred in the Near East during those centuries. Other aspects of Ekron's animal economy did not change during the period, a fact mostly overlooked by those interested in the Iron Age I pig and cattle phenomenon. Production, as in the Late Bronze Age, continued to be unspecialized and locally consumed. The generalized agricultural system and insular production orientation, as suggested by even ratios of sheep and goats as well as the high number of pigs, is hardly surprising in a period characterized by a general lack of long distance trade and far flung military conquest campaigns.

High levels of international trade, empires, and even distribution of staple goods all existed in the Late Bronze Age, but the faunal evidence from Ekron indicates that this system did not penetrate to the extent and depth with which the economy of Iron Age II, especially the seventh century, did. Significant changes in livestock herding schemes are clearly reflected by faunal patterning, most prominently increased numbers of sheep, labor-related stress in cattle, new highs in imported fish, and of course the declines in pigs and goats. These developments coincide with the tribute economy forced upon Ekron by the Assyrians. Their demands for gift payment and production of tradeable surpluses produced an industrialized city whose *raison d'atre* was the year round carefully scheduled intensive production of olive oil and textiles for external markets (Costin 1991:16-17; Gitin 1997:84). In the Iron Age II the world economic system of the ancient Mediterranean developed in such a way as to exploit the manufacturing of high value/low bulk prestige goods in the periphery. This ensured the social reproduction of the elite. Yet this statement, while there is abundant seventh century evidence from Ekron and elsewhere to support it, is hardly news. Such a system had existed at least in the qualitative sense since at least the Early Bronze Age (Ekholm and Friedman 1993), but the production of staple goods in peripheral hinterlands does not appear to have been significantly affected by core demands until much later – in the case of Ekron not until the seventh century (Gitin 1999:276-278).

Chapter 10: Summary and Conclusions

This study has explored a number of different lines of data in order to gain a sense of, on one level, what species in which proportions were eaten by Ekron's population during the millennium of time beginning in the mid-sixteenth century and ending in 603 BC. On another level, this study is something of an experiment, because it attempts to raise the level of inference derivable from animal bones beyond strict discussions of diet and related social themes. In pursuit of this goal, dietary remains – an archaeological assemblage of animal bones – have been discussed in terms of how they reflect the city's changing agricultural goals in relation to regional political and economic factors.

Although other animal bone studies have certainly discussed livestock production goals with reference to economic scenarios or social evolution (e.g. Galvin 1987; Wapnish and Hesse 1988; Zeder 1990), few or none have discussed such evidence in terms of trade, tribute, and ancient world systems. Other categories of agriculturally-related data, such as olive oil pressing installations and loomweights, have already been integrated by others into broad economic discussions of trade and even imperial ideological goals (e.g. Gitin 1997, 1999:276-278); perhaps the time has come for zooarchaeological data. In fact the zooarchaeological data from Tel Miqne-Ekron lead to a variety of intriguing conclusions about each of the periods in singularity, as well as the entire stratigraphic sequence viewed diachronically. Offered below is a summary of these conclusions, which are then linked together to demonstrate the utility of an economic, world-systems theory approach.

Late Bronze Age

Conclusions drawn from the Late Bronze Age assemblage point to a town whose agricultural economy was not affected by the presence of the imperial power of Egypt in Canaan. Data concerning slaughtering sequences and metric measurements of sheep and goats presents the profile of a very generalized economy, where neither meat production nor secondary products were emphasized more than the other. That generalized subsistence orientation is also noticeable in that the two caprid species were herded in even numbers, indicating household rather than surplus production of wool and dairy products.

The use of cattle in the Late Bronze Age reflected the animal's dual importance as a meat provider as well as a labor source. Metric evidence suggested that bulls were more prevalent than cows, perhaps for their utility in hauling loads and vehicles, though mortality data showed that a significant portion of the herd was slaughtered young to provide meat. In general the data displays a mixed herding economy, where a variety of subsistence goals had to be fulfilled by the same herds and flocks. These somewhat contrary goals, meat production and labor, is to some extent a product of the common Canaanite Late Bronze Age herding strategy seen at a number of sites in the region (see Hesse 1990), where bovids were herded to the near exclusion of pigs.

The relatively low abundance of pigs in the Late Bronze Age assemblage may be the sole agricultural phenomenon related to the political situation of the period, where Canaan was under the rule or at least strong influence of New Kingdom Egypt. As Zeder (1998) has observed with faunal data from elsewhere in the Near East, the importance of pig husbandry often fluctuates with the extent of regional political integration. It is the low amount of pig bones in Late Bronze Age levels at Tel Miqne-Ekron, in comparison to later strata at the same site, which comprises the only visible impact of Egypt on the town's agricultural economy. The lack of spatially differentiated patterning in animal bone deposits may also imply that there was little or no town economic specialization in meat redistribution or slaughtering activities. Such specialized activity areas have been hypothesized for sites in Iran from the Early Bronze Age (Zeder 1991), so that their apparent absence here may be related to the overall subsistence-level organization of agriculture in the town.

Indeed, aside from the low amount of pigs, all other aspects of the faunal assemblage can be said to show no evidence for an Egyptian interest in or ability to control the Canaanite agricultural hinterland. Yet Tel Miqne-Ekron in the Late Bronze Age was clearly not isolated and cut-off from the cosmopolitan international palace trade atmosphere which was a characteristic of the era. Certainly, there is much evidence, in the form of imported pottery and ivory objects, that the town did have contact with traders in addition, perhaps, to official emissaries of Egypt. So to be sure, the town was involved in the prestige goods economy of the era. The near lack of complementary agricultural evidence for imperial economic effects may be evidence that there had not developed by this time the sort of deeply penetrating type of trade capable of transferring low value/high bulk goods from peripheral agricultural areas to far away core centers.

Iron Age I

The Iron Age I faunal assemblage is markedly different from the preceding Late Bronze Age one, a fact which a number of archaeologists (e.g., Finkelstein 1997; Stager 1995) have commented upon. As many researchers have noted, pigs suddenly became an important economic resource for the population of Ekron beginning in stratum VII, the first quarter of the twelfth century BC. That phenomenon has usually been interpreted as an expression of ethnicity, a dietary preference which the invading Philistines brought with them, apparently from the Aegean. Yet the pig percentages on which the latter hypothesis is based has been considered in isolation from other data possible to extract from as large a faunal assemblage as this. When considered in relation to other faunal data, there emerge a number of problems with the pig/ethnicity paradigm. As well, a better interpretation of the assemblage, summarized below, possesses the explanatory power to place the agricultural economy as a whole into the Iron Age I's political and economic context.

Pigs in the Iron Age I do become prominent at the time of Philistine settlement of Canaan. The relative abundance of pigs increases throughout most of the Iron Age I, from 15 percent in stratum VII, to 24 percent in stratum V. Paralleling the intensification of pig husbandry, cattle rise in importance at the same time, also reaching their zenith in stratum V. It is tempting to view the dual trends as clear ethnic markers, signaling the immigration of a people who, much like modern Americans, preferred beef and pork to the meat of sheep and goats. Nevertheless, such an agricultural orientation is much more parsimoniously interpreted as a consequence of urbanization. The city of Ekron in the Early Iron Age expanded to a size of 50 acres, a concentration of population which occurred at that time all over the southern coastal plain, when many small rural settlements were abandoned in favor of cities and towns (Finkelstein 1996).

Pathological analysis of the collection of Iron Age I cattle foot bones demonstrates the consequences of urbanization – intensification of agricultural production – given mortality data illustrating that 60 percent of the herd lived past three years of age. These older cattle may have been kept for labor, pulling plows through the presumably expanded fields used to feed a larger population. Herding strategies for sheep and goats also appear to have changed in this period. An emphasis was placed on keeping a larger portion of the flocks alive past prime slaughtering ages, in order to gain secondary products. Metric data indicate that the two species were managed differently, with goats probably producing milk as well as meat, whereas sheep were exploited for meat and wool.

The agricultural economy of the Iron Age I was thus more specialized than in the preceding era, perhaps in part due to fact that the abundant herds of swine could be replied upon to supply much of the city's meat. In fact, the pig abundance of the period best understood in economic rather than ethnic terms. When Aegean Late Bronze Age faunal data is scrutinized and compared to that from Ekron, there appear to be only superficial similarities, in that pigs were plentiful in both places. That is not strong evidence, since pigs were herded in large numbers over huge expanses of Bronze Age Europe and elsewhere. There is even less evidence to suggest a link to the Aegean based on the dual cattle-pig dietary regime, given that cattle in that region were uncommon except in the far north (Trantalidou 1990). In actuality, the abundance of pigs at Ekron need not be explained by appeals to adjacent, pig-populous, lands. Hesse (1990) has demonstrated that pig herding in the southern Levant was a cyclical phenomenon, reaching highs in the Middle Bronze Age, among other periods.

Two hypotheses have been offered to replace the paradigm of pigs as the preferred meat of Aegean immigrants theory. Hesse and Wapnish (1998) proposed that the pig popularity present from the earliest stratum of the Iron Age I was related to the animal's utility for an immigrant population. Yet that theory is problematic, given that the Philistines' agricultural economy relied increasingly upon pigs for something like 150 years, an extremely long period of adaptation. If we instead adopt the view that the upswing in pig herding was linked to the surrounding political character of the period, then the agricultural strategy accords better with non-faunal evidence. The Iron Age I was the era immediately following the collapse of the great Bronze Age powers of the Near East, one in which new Levantine polities emerged independent from the former long arm of Egypt. With political independence may also have come opportunities for the emergent states to pursue their own, localized, economic goals. Zeder's (1998) adaptation of Diener and Robkin's (1978) explanation for cyclical ups and downs in ancient pig herding works not only for the pig zenith of the Iron Age I, an era of low regional incorporation, but also for the Late Bronze Age, where the opposite arrangement of pigs and polities existed.

The donkey burial uncovered on the northeast slope of the tel also has some bearing on the issue of ethnicity and faunal remains. Three hypotheses were evaluated to explain the 'how', 'when', and 'why' questions surrounding the skeleton's stratigraphic position and jumbled appearance. These hypotheses comprised the following explanations: a secondary burial of a pack animal which died and lay exposed for a time, a Bronze Age burial which had been disturbed during later construction activities and then reburied, and a burial meant as a foundation deposit for the Iron Age I city wall. Of these, the last makes the most sense, given both the close parallel at Tell Jemmeh (Wapnish 1997), and the lack of redeposition episodes needed to accommodate it. Acceptance of that hypothesis does however require a large degree of continuity in dedication rituals, something that we perhaps might not expect if Ekron was a homogenous, ethnic Philistine city in the Early Iron Age. But the 'donkey burial as ritual continuity' hypothesis would make sense if the population of Ekron in the Iron Age I was a heterogenous mixture of Canaanite and other population elements.

On a general level, the Iron Age I patterning in livestock use seems to have as much to do with the period's political economy – the lack of political centralization – as it does with a cuisine brought from another part of the Mediterranean world. The faunal assemblage of Tel Miqne-Ekron should first and foremost be interpreted as a rich source of economic data. It is difficult to turn the pork and beef-centered Philistine diet into an *fossil directeur* of Aegean ethnicity, both for the pig principles which Hesse and Wapnish (1998) have recently outlined, and since no real parallels for such a faunal profile exist in that region (e.g., Trantalidou 1990). The livestock economy of the Philistines in the Iron Age I is only a material correlate of ethnic identity in the broadest possible sense. Only they pursued a herding strategy which made use of sheep, goats, cattle, and pigs, such that one can map out an 'ethnic' boundary between Philistia and neighboring areas. Nevertheless, the uniqueness of the Philistines' livestock economy does not by itself make it an ethnic marker. There is no evidence that their diet was particularly similar to Aegean fare, leaving us with a foodway which has no link to a common group origin. What we have, then, is a generalized herding strategy utilizing all the region's domestic mammals, versus more specialized animal economies elsewhere in the Near East. That is an economic, rather than ethnic, difference.

In fact, the general material culture phenomenon seen at Philistine sites, which Dothan (1995) and others have interpreted in an ethnic Aegean light, can actually be incorporated into a larger picture. Viewed from *la longue dureé*, the flourish of identity-signaling material culture corpuses in this period is understandable in ways other than a migration paradigm, in fact a theory which may say more about scholars than Philistines (e.g., Silberman 1998). When the Near East in this period is viewed as a whole, one sees the emergence at this time of new settlement strategies and concentrations of settlements, which set the stage for the emergence of several territorial states in the tenth century (Finkelstein 1995b). The division of the formerly homogeneous Canaanite population into different polities, perhaps with the addition of various immigrant groups, is the larger process in the midst of which the Philistines emerged. It is precisely in such periods of political decentralization, as occurred in the Levant after the withdrawal of Egypt, where we expect – and do – see the flourishing of separate cultural identities.

Iron Age II

The political situation of the Philistines and neighboring polities had changed greatly by the tenth century BC, and would change even more as the Iron Age II progressed. The city itself changed a bit earlier, during the last years of what we label the Iron Age I, when, in stratum IV, it was destroyed. In the tenth century Ekron entered into a long period where the city became an object to be exploited by bordering expansionist states, several of whom each briefly incorporated the city into their spheres of control. The Philistines' loss of military supremacy is reflected in ceramic assemblages of stratum IV, when the formerly distinctive Philistine bichrome pottery was replaced by wares common all over the southern Levant (Dothan 1989:12). The faunal assemblage of Ekron dating to the Iron Age II is also quite different from that of the Iron Age I. Trends visible in the Iron Age II faunal assemblage, as with the ceramics, actually start in the end of the Iron Age I, stratum IV, when – most prominently – pigs rather suddenly and dramatically decline from the high reached in stratum V.

The trend toward decreasing use of pigs continued throughout the Iron Age II. By the seventh century BC, pigs formed only two percent of that stratum's collection of bones. Previous explanations for the rapid decrease in pig abundance at Ekron have taken as their starting point the ethnic explanation for the animal's former abundance. When the Philistines were strong, they consumed a lot of pork, defying their pig-hating neighbors. Conversely, as Philistine military supremacy waned, their culture became susceptible to the outside influences of neighboring cultures, who foisted upon them a relatively pork-less diet. This view is hampered by a number of problems, among them a simplistic and unrealistic view of cultural border zones as areas through which foreign ideas flow when the culture on one side is militarily weak, and when strong prevent such information exchanges (Gitin 1989:endnote 11; *contra* Lightfoot and Martinez 1995).

Transformation of Ekron's animal economy during the Iron Age II actually fits much better a model linking it to the political economy of the time. When the city was incorporated into larger political and economic structures beginning in the late eleventh century, their economy changed from a subsistence orientation to a trade and tribute mode of production, sending marketable goods throughout the expanded polity. The need to produce marketable goods may have caused Philistine swine agriculture to become disadvantageous in two ways. Pig ethology and ecology make it a difficult animal to herd long distances, and neighboring populations evidently avoided pork, factors which combined to make swine unprofitable to raise in an export and profit type of economy.

Yet the population of Ekron could have continued to raise pigs for local consumption, as they had during the twelfth and eleventh centuries. While local pig farming may have continued at a small scale, increasingly swine would have competed with other, marketable, animals and crops raised by the Philistines. Goats suffered a decline similar to pigs, and arguably for similar market force reasons. Goats as well as pigs are destructive browsers. When forced to compete for grazing land with cattle and sheep plus leaving room for olive groves, the latter two animals would have become a problem. Formerly, during the Late Bronze Age and Iron Age I, sheep and goats were herded at 1:1 ratios. That changed in the beginning of the Iron Age II and intensified during the seventh century, as sheep eventually outnumbered goats by more than 2:1. Mortality and metric data further outline economic developments after the tenth century, when a relatively large proportion of the sheep and goat flocks (30 percent) lived past three years of age. Meat production was clearly important to the population, but given that one third of the flocks was allowed to reach older ages, secondary products must have also been vital.

Those secondary products manufactured were probably milk from goats and wool from sheep, a conclusion supported by metric measurement trends. Information derived from faunal remains can be supplanted by other lines of data, in this case the 600 or so loomweights discovered within the seventh century olive oil press installations. That enormous loomweight corpus underscores the efforts of the population to produce textiles in amounts well in excess of that needed for local consumption. The political situation of the period, with Ekron a vassal city of Assyria, no doubt caused an emphasis to be placed on market-level production of certain goods. Because Ekron could not produce the types of prestige items traded between Near Eastern polities for millennia, the city turned to its agricultural hinterland for economic survival. Gitin (1998 and elsewhere) has written extensively about the olive oil industry developed by the Assyrians as an export industry. The wool textile economy, however, must have been the driving force of the city's economy, given that olive oil can only be produced three to four months of the year.

Another aspect of Iron Age II trade in animal products is the case of the Nile Perch, fish imported from Egypt for millennia and over a wide geographic range. These fish, though present in pre-

Iron Age II contexts at Tel Miqne-Ekron, became much more abundant during the Iron Age II. That phenomenon is relatable not only to the general atmosphere of international trade which pervaded the period, but specifically to reciprocal exchange with Egypt, which possibly imported olive oil in exchange for, among other things, fish. These products must have been brought to market literally on the backs of cattle. Iron Age II cattle were on average somewhat larger than their Iron Age I predecessors, but as in that preceding period, more than half the animals lived more than three years, no doubt to provide labor in the fields and to bring the city's high bulk/low value goods to markets. The extent to which cattle were put to use for their hauling capabilities is underscored by the development of a greater intensity of work-related degenerative bone disease in their feet. Pathology scores on foot bones were in fact significantly higher for the Iron Age II sample than either the Late Bronze or Early Iron Age samples.

The agricultural economy of Ekron during the Iron Age II may be firmly placed within the political context of the time. From the decline of pigs to the rise of sheep and evidence of overworked cattle, each of what are on the surface dietary trends can actually be related to economic changes brought on by political events in the region. The Iron Age II agricultural economy of Ekron was clearly and deeply affected by the market opportunities and risks which arose in the period. Previously, in the Iron Age I, it had been a prosperous and independent city, free to pursue subsistence agriculture in response to only local demand. In the Iron Age II, Ekron became an international producer of olive oil and textiles, changing to a trade and tribute economy in response to the pressures and opportunities brought by the Neo-Assyrian Empire.

Mediterranean Economic Cycles and Tel Miqne-Ekron from circa 1600 to 603 BC

It is both possible and profitable to view the economy of Tel Miqne-Ekron from the *Annales* perspective of *la longue dureé* (Wallerstein 1974), such that the city's economy in each period can be understood not only as a response to the political economy of the era, but moreover as a part of the larger 'A' and 'B' cycles of Mediterranean prehistory (Frank 1993). The cosmopolitan atmosphere which characterized the Late Bronze Age Mediterranean region, an A cycle in Frank's (1993) terms, certainly enveloped even the comparatively small town at Tel Miqne. Though the agricultural economy of that period showed no evidence of production for external markets, the presence of a sizeable amount of imported goods from a variety of places indicates that town residents were in fact connected with neighboring regions.

This wealth economy helped to bring in valued goods which legitimized the power of local elites. The existence of that wealth economy contrasts with the absence of a correspondingly regional or international program of marketing agricultural goods. In the Late Bronze Age there evidently existed an uneven development of wealth and staple economies. This may reflect the limits of communication and bureaucracy at that time, such that the Egyptians could not exploit their peripheral province in Canaan so as to mobilize massive amounts of high bulk/low value goods from agricultural hinterlands. In later A cycles of the Mediterranean region, that economic dichotomy would disappear.

If the Late Bronze Age was an era of international connections and trade, then the Iron Age I was a B cycle of collapsed palace economies and a general lack of such long distance trade (Frank 1993). It is in this atmosphere of loosened regional incorporation that the Philistine culture emerged. A distinctive agricultural economy, with an unusually high investment in swine- and cattle-raising, was identified by Hesse (1986) and reconfirmed in the present study. This faunal profile, especially the high amount of pig bones, reflects the lack of regional incorporation which typified the two hundred year period. Rather than the Iron Age I agricultural strategy being related to a Philistine Aegean homeland, the livestock ratios are better explained as that of an independent polity needing to support a suddenly expanded population. Whatever degree of uniqueness Philistine diet and material culture display is only indirectly attributable to ethnicity. That is, the material culture's group identity-signaling characteristics need not necessarily be read as a memory of an Aegean homeland, but instead as the necessary response to a crisis situation. The now unavailable imported prestige goods which formerly propped up the social order had to be replaced by locally manufactured imitations.

The re-emergence of the Mediterranean world-system, the next A phase, occurred around the beginning of the Iron Age II (Frank 1993). Slightly before this time, that politico-economic shift can be seen at Tel Miqne-Ekron, when, in stratum IV, the city was destroyed by an Egyptian pharaoh seeking to reestablish that country's influence in Canaan. Arguably, Ekron was forcibly reconnected to the resurgent world-system through Philistia's political fragmentation and resultant loss of military might, which led to a series of conquests by emerging territorial states of the region. These political events set the stage for the locking of Ekron's economy into a core-periphery relationship which lasted for the duration of the city's existence.

Not only did a prestige goods economy return to the city elites of Ekron, but along with it developed a trade-oriented bulk goods agricultural strategy. That staple economy is evident in the increased number of sheep relative to goats as well as the larger size of sheep relative to the smaller goats. These shifts in caprid herding relate directly to the development at Ekron by the Assyrians of a formidable export-oriented textile industry. As market forces took hold of and redirected the city's economy, pigs drastically declined in importance. That phenomenon again is only indirectly understandable in an ethnicity/acculturation hypothesis. A more powerful explanation of that herding shift links this change to the high degree of regional incorporation which evolved in Iron Age II.

The animal bone data from the Iron Age II sample underlines the extent and nature of the bulk goods economy which developed at Ekron as it was incorporated into core-periphery regimes after the eleventh century BC. A wealth economy also developed there during the Iron Age II, as signified by finds of several silver caches, Egyptian ivories, imported pottery, and the Assyrian medallion – the latter a perhaps very visual symbol of the bond of loyalty between vassal and overlord. The two forms of economic exchange are equally valuable areas of investigation and inseparable from one another. While the social order of overlord, local elite, and population masses was maintained through access to prestige goods, it was exchange in staples which created Ekron's prosperity and, moreover, fed the artisans which made the highly valued craft products.

The regional and diachronic view adopted here demonstrates a link between plebeian piles of animal bones and politico-economic changes in the ancient Near East. Viewed as an integrated, continuous whole from about 1600 to 603 BC, the faunal assemblage from Tel Miqne-Ekron demonstrates more than its relationship to the world economy of three distinct times. Beyond that, it suggests that there occurred an evolution and intensification of the Mediterranean world-system in that time. Whereas in the Late Bronze Age the agricultural economy of Tel Miqne-Ekron was left unaffected by Egypt's imperial presence in the region, by the late Iron Age II virtually all aspects of the city's economy were tied to the Neo-Assyrian Empire's bureaucratic plans. The Neo-Assyrian Empire, unlike New Kingdom Egypt a millennium before, was both able to and keenly interested in exploiting the peripheries of the regions it controlled. Not only did the Assyrians exploit distant hinterlands in pursuit of a heretofore unseen type of wealth economy (e.g., Frankenstein 1979), but as well initiated collectivization of populations (e.g., Gitin 1989) in order to efficiently involve them in trade-oriented production of high bulk/low value staple goods.

The long-term perspective lent by world-systems theory is used here as an effective framework for understanding changes in the faunal assemblage of Ekron over time. These implications are carried beyond diet and connect the data to other categories of artifactual evidence. Such an orientation enables zooarchaeological data to be interpreted alongside pottery, architecture, and other evidence as opposed to being placed in an appendix. This, in other words is an attempt at 'archaeozoology as anthropology' (MacDonald 1991), as well as a desegregated approach to the archaeological record of the ancient Near East. Dever has called on archaeologists to "observe not only isolated 'exotic' artifacts, but also the ecological and social context that alone could give them cultural significance" (1995:113). This study set out to accomplish not only that, but attempted to turn that statement around, and delineate the overarching economic, ecological, and social contexts which are in the end responsible for the occasional appearance of exotic artifacts. Conclusions drawn from this diachronic study of Tel Miqne-Ekron's economy demonstrate how discussions of ancient economics can be profitably reoriented to be an inclusive program of archaeological investigation. The more complete study of ancient trade developed here relies on the abundant data produced by animal bones in conjunction with, rather than exclusively from, data derived from the much rarer evidence of prestige goods.

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Appendix

Appendix: List of All Identified Equid Bones

Part A: List of elements with excavation proveniences

Bone Number	Bucket	Locus	Locus Type	Phase	Stratum	Species	Element	Side	Fragment Present
1174	I.NW029.201	29020	Pit		I	Equus cf. asinus	calcaneus	left	complete
1173	I.NW029.201	29020	Pit		I	Equus cf. asinus	phalanx 2		complete
1190	I.NW029.203	29020	Pit		I	Equus cf. asinus	metatarsus		distal
1188	I.NW029.203	29020	Pit		I	Equus cf. asinus	cuneiform	right	complete
1172	I.NW029.201	29020	Pit		I	Equus cf. asinus	astragalus	right	complete
1183	I.NW029.203	29020	Pit		I	Equus cf. asinus	phalanx 2		distal
1189	I.NW029.203	29020	Pit		I	Equus cf. asinus	metatarsus		shaft
9518	I.NE010.016	10004	Debris		Ib	Equus sp.	astragalus	right	complete
1092	I.NW029.083	29021	Destruction Debris		IC/IB	Equus cf. asinus	tarsal		complete
1100	I.NW029.095	29024	Drain		IC/IB	Equus cf. asinus	calcaneus	left	complete
10198	I.NE007.010	7007	Debris		IC/IB?	Equus sp.	illium	right	complete
16784	I.NE002.244	2024	Debris	4B	II/III	Equus sp.	calcaneus	left	complete
19206	I.NE004.045	4023	Mudbrick	4A	II/III	Equus sp.	sesamoid		complete
1068	I.NW029.099	29024	Drain		IIA	Equus cf. asinus	phalanx 2		complete
1200	I.NW029.146	29024	Drain		IIA	Equus cf. asinus	tibia	left	distal & shaft
1212	I.NW029.151	29024	Drain		IIA	Equus cf. asinus	phalanx 1		complete
1202	I.NW029.146	29024	Drain		IIA	Equus cf. asinus	tarsal	left	complete
1203	I.NW029.146	29024	Drain		IIA	Equus cf. asinus	metatarsus	left	proximal & shaft
1201	I.NW029.146	29024	Drain		IIA	Equus cf. asinus	astragalus	left	complete
58	I.NW054.149	54038.1	Surface Matrix		IIB	Equus cf. asinus	astragalus	right	complete
1034	I.NW028.191	28082	Fill		IIB	Equus cf. asinus	thoracic vert		
19203	I.NE003.061	3018	Fill	5	IV	Equus sp.	acetabulum	left	complete
3342	I.NE003.177	3011	Fill	5	IV	Equus sp.	incisor	right	complete
102	I.NW053.162	54041	Surface		IVA	Equus cf. caballus	molar	right	complete
1314	I.NW029.252	29055.1	Surface Matrix		IVA	Equus cf. asinus	premolar	right	complete
4185	I.SW003.338	3082.1	Surface Matrix		IVA	Equus cf. asinus	rib		
16919	I.NE003.344	3060	Fill		post-VIA	Equus sp.	rib		proximal
17825	I.NE003.348	3062	Fill		post-VIA	Equus sp.	femur	left	proximal
4074	I.SW028.181	28072.1	Surface Matrix		V	Equus cf. asinus	molar	left	
5081	I.NE067.020	67016	Fill	6B-6A	V	Equus cf. asinus	astragalus	right	complete
5080	I.NE067.020	67016	Fill	6B-6A	V	Equus cf. asinus	tibia	right	distal
16910	I.NE003.113	3025C	Fill	post-6A	V	Equus sp.	patella	left	complete
5573	I.NE002.373	2097.1	Surface Matrix		V	Equus sp.	rib		shaft
19205	I.NE002.611	2124	Surface		V	Equus sp.	phalanx 3	right	complete
21363	I.NE002.358	2102	Surface Matrix		V?	Equus sp.	sesamoid		complete
21365	I.NE002.360	2102	Surface Matrix		V?	Equus sp.	phalanx 3	left	complete
4717	I.SW003.346	3084.1	Surface Matrix		VA	Equus cf. asinus	phalanx 2		proximal & shaft
3364	I.SW003.509	3149	Debris		VI	Equus cf. asinus	phalanx 3		complete
2022	I.NE068.061	68027	Pit	8A	VI	Equus cf. asinus	astragalus	left	
3363	I.SW003.509	3149	Debris		VI	Equus cf. asinus	phalanx 1		complete

<u>*Part A: List of elements with excavation proveniences (continued)*</u>

Bone Number	Bucket	Locus	Locus Type	Phase	Stratum	Species	Element	Side	Fragment Present
3362	I.SW003.509	3149	Debris		VI	Equus cf. asinus	metatarsus		distal
3361	I.SW003.509	3149	Debris		VI	Equus cf. asinus	phalanx 1		proximal
3317	I.SW003.505	3149	Debris		VI	Equus cf. asinus	carpal		complete
5595	I.NE037.165	37041	Animal Burial	8B	VI	Equus cf. asinus	sesamoid		complete
5593	I.NE037.165	37041	Animal Burial	8B	VI	Equus cf. asinus	rib		proximal
4493	I.NE004.313	4070A	Surface	8B	VI	Equus sp.	metacarpus	left	proximal
5831	I.NE038.040	38011	Pit	8B	VI	Equus cf. asinus	incisor		complete
5156	I.NE037.160	37041	Animal Burial	8B	VI	Equus cf. asinus	whole skeleton		
5594	I.NE037.165	37041	Animal Burial	8B	VI	Equus cf. asinus	phalanx 3		complete
3404	I.SW003.516	3151	Pit		VI	Equus cf. asinus	metatarsus		complete
16917	I.NE002.428	2114	Debris		VI?	Equus sp.	rib		shaft
17583	I.NE004.318	4094	Surface		VIA	Equus sp.	phalanx 1	right	complete
3892	I.SW028.375	28126.1	Surface Matrix		VIB	Equus cf. asinus	molar	right	complete
3893	I.SW028.375	28126.1	Surface Matrix		VIB	Equus cf. asinus	molar	right	complete
6217	I.NE036.294	36101	Surface	9B4	VII	Equus cf. asinus	molar	left	complete
6219	I.NE036.294	36101	Surface	9B4	VII	Equus cf. asinus	metacarpus	right	complete
5303	I.NE036.305	36105	Fill	9B4	VII	Equus cf. asinus	metatarsus		complete
5267	I.NE036.311	36100	Surface	9B3	VII	Equus cf. asinus	phalanx 1		distal & shaft
6220	I.NE036.294	36101	Surface	9B4	VII	Equus cf. asinus	metatarsus		distal & shaft
6221	I.NE036.294	36101	Surface	9B4	VII	Equus cf. asinus	phalanx 1		complete
5427	I.NE036.313	36106	Fill	9B4	VII	Equus cf. asinus	molar	right	complete
5432	I.NE036.315	36109	Fill	9C-B4	VII	Equus cf. asinus	molar		half
5408	I.NE036.319	36106	Surface	9B4	VII	Equus cf. asinus	radial carpal	right	complete
5410	I.NE036.319	36106	Surface	9B4	VII	Equus cf. asinus	molar	right	complete
5328	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	left	complete
5370	I.NE036.297	36106	Surface	9B4	VII	Equus cf. asinus	metatarsus		complete
5449	I.NE036.320	36109	Fill	9C-B4	VII	Equus cf. asinus	thoracic vert		dorsal
5450	I.NE036.320	36109	Fill	9C-B4	VII	Equus cf. asinus	thoracic vert		basal
5451	I.NE036.320	36109	Fill	9C-B4	VII	Equus cf. asinus	phalanx 3		
5372	I.NE036.297	36106	Surface	9B4	VII	Equus cf. asinus	phalanx 1		complete
5465	I.NE036.322	36110	Fill	9C-B4	VII	Equus cf. asinus	molar	right	complete
5466	I.NE036.322	36110	Fill	9C-B4	VII	Equus cf. asinus	3rd tarsal	left	complete
5296	I.NE036.301	36104	Surface	9B5	VII	Equus cf. asinus	molar		
2289	I.NE036.359	36126	Fill	9D2-C1	VII	Equus cf. asinus	metatarsus	left	complete
2132	I.NE037.114	37029	Surface	9B1	VII	Equus cf. asinus	molar	left	complete
5327	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	left	complete
5288	I.NE036.302	36105	Fill	9B4	VII	Equus cf. asinus	phalanx 1		complete
5681	I.NE037.143	37039	Animal Burial	8B	VII	Equus cf. asinus	femur		proximal
5338	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	sesamoid		complete
5334	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	right	complete
5373	I.NE036.297	36106	Surface	9B4	VII	Equus cf. asinus	phalanx 2		complete
5289	I.NE036.302	36105	Fill	9B4	VII	Equus cf. asinus	phalanx 2		complete
5592	I.NE037.167	37043	Fill	9C-B4	VII	Equus cf. asinus	incisor	right	
5602	I.NE037.167	37043	Fill	9C-B4	VII	Equus cf. asinus	phalanx 2		complete
5603	I.NE037.167	37043	Fill	9C-B4	VII	Equus cf. asinus	incisor	right	half
5623	I.NE037.168	37043	Fill	9C-B4	VII	Equus cf. asinus	astragalus	left	complete

Part A: List of elements with excavation proveniences (continued)

Bone Number	Bucket	Locus	Locus Type	Phase	Stratum	Species	Element	Side	Fragment Present
5425	I.NE036.313	36106	Fill	9B4	VII	Equus cf. asinus	molar		half
6216	I.NE036.294	36101	Surface	9B4	VII	Equus cf. asinus	incisor	right	complete
5371	I.NE036.297	36106	Surface	9B4	VII	Equus cf. asinus	metatarsus		complete
590	I.NE036.293	36100	Surface	9B3	VII	Equus cf. caballus	tibia	left	distal & shaft
1941	I.NE068.155	68053	Surface	9B2	VII	Equus cf. asinus	astragalus	left	complete
1942	I.NE068.155	68053	Surface	9B2	VII	Equus cf. asinus	phalanx 1		complete
1903	I.NE068.156	68053	Surface	9B2	VII	Equus cf. asinus	calcaneus	left	distal & shaft
1742	I.NE068.187	68068	Surface	9B3	VII	Equus cf. asinus	tarsal	right	complete
1797	I.NE068.216	68075	Wall Collapse	9C-B4	VII	Equus cf. asinus	molar	right	complete
1947	I.NE068.231	68075	Wall Collapse	9C-B4	VII	Equus cf. asinus	cuneiform		complete
6023	I.NE069.075	69019	Surface	9B3-B2	VII	Equus cf. asinus	incisor		complete
6085	I.NE069.078	69019.1	Surface Matrix	9B4-B3	VII	Equus cf. asinus	incisor	right	complete
6071	I.NE069.085	69019.1	Surface Matrix	9B4-B3	VII	Equus cf. asinus	incisor	left	complete
6072	I.NE069.085	69019.1	Surface Matrix	9B4-B3	VII	Equus cf. asinus	phalanx 3		complete
6081	I.NE069.086	69019.1	Surface Matrix	9B4-B3	VII	Equus cf. asinus	incisor	left	complete
6038	I.NE069.089	69019.1	Surface Matrix	9B4-B3	VII	Equus cf. asinus	metatarsus		shaft
5956	I.NW003.609	3165	Debris		VII	Equus cf. asinus	metatarsus		distal & shaft
5324	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	right	complete
5323	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	right	complete
5322	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	incisor	right	complete
5321	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	incisor	left	complete
5320	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	incisor	left	complete
5319	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	incisor	right	complete
5318	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	canine	right	complete
5317	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	incisor	right	complete
5316	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	canine	left	complete
5353	I.NE036.287	36103	Fill	9B4	VII	Equus cf. asinus	phalanx 1		proximal & shaft
6243	I.NE036.284	36104	Surface	9B4	VII	Equus cf. asinus	incisor	left	complete
6199	I.NE036.283	36100.1	Surface Matrix	9B3	VII	Equus cf. asinus	phalanx 3		complete
6227	I.NE036.282	36101	Surface	9B4	VII	Equus cf. asinus	metacarpus	right	proximal & shaft
6226	I.NE036.282	36101	Surface	9B4	VII	Equus cf. asinus	calcaneus	right	distal & shaft
6225	I.NE036.282	36101	Surface	9B4	VII	Equus cf. asinus	ischium	left	
6214	I.NE036.282	36101	Surface	9B4	VII	Equus cf. asinus	metacarpus	right	proximal & shaft
6174	I.NE036.274	36091	Surface	9B2	VII	Equus cf. asinus	phalanx 3		complete
6165	I.NE036.273	36091	Surface	9B2	VII	Equus cf. asinus	tarsal		complete
6163	I.NE036.273	36091	Surface	9B2	VII	Equus cf. asinus	molar	right	complete
5169	I.NE036.244	36089.A	Surface	9A	VII	Equus cf. asinus	carpal		complete
5332	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	right	complete
5331	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	right	complete
5330	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	left	complete
5329	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	right	complete
5680	I.NE037.134	37039	Animal Burial	8B	VII	Equus cf. asinus	sesamoid		complete

Part A: List of elements with excavation proveniences (continued)

Bone Number	Bucket	Locus	Locus Type	Phase	Stratum	Species	Element	Side	Fragment Present
5411	I.NE036.319	36106	Surface	9B4	VII	Equus cf. asinus	radius	left	cranial
5448	I.NE036.320	36109	Fill	9C-B4	VII	Equus cf. asinus	thoracic vert		dorsal
3790	I.SW028.419	28135	Surface		VII	Equus cf. asinus	phalanx 3		complete
5520	I.NE036.321	36109	Fill	9C-B4	VII	Equus cf. asinus	incisor	right	half
5382	I.NE036.295	36103	Fill	9B4	VII	Equus cf. asinus	phalanx 3		complete
6222	I.NE036.294	36101	Surface	9B4	VII	Equus cf. asinus	phalanx 2		complete
5274	I.NE036.293	36100	Surface	9B3	VII	Equus cf. caballus	astragalus	left	complete
5339	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	phalanx 1		complete
5341	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	metatarsus		distal
5342	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	metacarpus		proximal & shaft
5275	I.NE036.293	36100	Surface	9B3	VII	Equus cf. caballus	central tarsal	right	complete
5343	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	metacarpus		proximal & shaft
5344	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	radius	left	distal & shaft
5273	I.NE036.293	36100	Surface	9B3	VII	Equus cf. caballus	calcaneus	right	complete
5426	I.NE036.313	36106	Fill	9B4	VII	Equus cf. asinus	incisor	left	complete
5326	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	right	complete
5325	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	left	complete
5419	I.NE036.328	36106	Surface	9B4	VII	Equus cf. asinus	incisor	left	complete
16777	I.NE004.250	4078	Surface	9A	VII	Equus sp.	astragalus	left	complete
2810	I.NE005.148	5029	Surface	9D	VII	Equus sp.	lower m 3	left	complete
1405	I.NE006.022	6004	City Wall	9	VII	Equus sp.	metatarsus	left	complete
25144	I.NE007.125	7028	Debris	post-9A	VII	Equus sp.	metapodial		proximal
5333	I.NE036.291	36101	Surface	9B4	VII	Equus cf. asinus	molar	left	complete
7336	I.NE004.475	4116A	Debris		VIIC	Equus sp.	metacarpus	left	distal
2809	I.NE005.163	5031	Sediment	10A	VIII	Equus sp.	astragalus	right	
5154	I.NE037.130	37042	Fill	10A-9D2	VIII	Equus cf. asinus	metatarsus		distal & shaft
25309	I.NE005.138	5031	Sediment	10A	VIII	Equus sp.	tibia	left	proximal
18911	I.NE005.181	5033	Sediment	10A	VIII	Equus sp.	lower pm 3		complete
16908	I.NE005.344	5053	Surface	10A	VIII	Equus sp.	phalanx 2		complete
2509	I.SW029.425	29116	Debris		VIIIA	Equus cf. asinus	astragalus	left	complete
3053	I.SW029.586	29177	Construction Fill		VIIIB	Equus cf. asinus	phalanx 2		complete
3736	I.SW029.590	29177	Fill		VIIIB	Equus cf. asinus	molar	left	complete
3054	I.SW029.586	29177	Construction Fill		VIIIB	Equus cf. asinus	phalanx 3		

*Part B: List of measured equid bones**

*All measurement abbreviations after von den Driesch (1976), except as illustrated in Figure 3.

Bone Number	Element	Measure	Reading	Measure	Reading	Measure	Reading	Measure	Reading
18911	lower pm 3	L	23.7	B	15.1				
2810	lower m 3	L	25.5	B	11.9				
21365	phalanx 3	GL	39.5	GB	33.6	LF	11.1		
16777	astragalus	GH	43.6	GB	43.7	BFd	35.3	LmT	43.3
17583	phalanx 1	GL	45.9	Bp	17.1	BFp	13.9	Dp	15.6
1405	metatarsus	GL	217	Bd	22.5				
9518	astragalus							LmT	28
19206	sesamoid	GB	30.8						
2289	metatarsus	Bp	35.1	SD	20.8	Bd	28.8		
1203	metatarsus	Bp	37.7						
1314	premolar	L	18.8	B	11.3				
3893	molar	L	34.2	B	17.7				
5465	molar	L	35.1	B	17.7				
5334	molar	L	22.6	B	15.8				
5328	molar	L	23.5	B	16.2				
5333	molar	L	26.5	B	12.6				
6217	molar	L	29.1	B	24.7				
5332	molar	L	25.4	B	13.5				
5331	molar	L	23.5	B	16.7				
5330	molar	L	23.8	B	16.4				
1797	molar	L	20.8	B	20				
5329	molar	L	23.1	B	17.1				
6163	molar	L	26.7	B	16.8				
5324	molar	L	23.2	B	15.4				
2132	molar	L	32.3	B	26.8				
5327	molar	L	26.1	B	14.4				
5326	molar	L	25	B	14.8				
5325	molar	L	23.8	B	16.9				
5410	molar	L	29.3	B	10.6				

Part B: List of measured equid bones (continued)

Bone Number	Element	Measure	Reading	Measure	Reading	Measure	Reading	Measure	Reading
5323	molar	L	22.8	B	16.3				
5427	molar	L	28.5	B	19.2				
3736	molar	L	24.5	B	12				
3362	metatarsus			Bd	27.9				
1190	metatarsus			Bd	32.7	Dd	26.8		
6220	metatarsus			Bd	34.8	Dd	25.3		
5154	metatarsus			Bd	32			SD	25.2
5342	metacarpus	Bp	39.2			Dp	24.9		
6219	metacarpus			Bd	33.4			Dd	24.1
5343	metacarpus	Bp	37.9			Dp	25.9		
5267	phalanx 1					Bd	31.2		
5353	phalanx 1			Bp	35.3				
5372	phalanx 1	GL	57.7	Bp	32.9	Bd	27.3	SD	20
5288	phalanx 1	GL	65.6	Bp	35.3	Bd	30.3	SD	22.4
3363	phalanx 1	GL	51.2	Bp	25.1	Bd	24.3	SD	16.3
1942	phalanx 1	GL	71.6	Bp	38	Bd	31.7	SD	22.9
5339	phalanx 1	GL	65.2			Bd	31.7		
1212	phalanx 1	GL	68.5	Bp	36.9	Bd	31.4	SD	22.4
6221	phalanx 1	GL	65.7	Bp	35.3	Bd	31.4		
3053	phalanx 2	GL	36.5	Bp	37.4	Bd	35.6	SD	33.2
5373	phalanx 2	GL	32.1	Bp	31.1	Bd	27.1	SD	25.9
1068	phalanx 2	GL	32.2			Bd	29.2	SD	27.5
6222	phalanx 2	GL	34	Bp	35.4				
5289	phalanx 2	GL	34.2	Bp	36.2	Bd	32.3	SD	29.3
1173	phalanx 2	GL	33.2	Bp	33.9	Bd	29.8	SD	28.5
4717	phalanx 2			Bp	33.8				
1183	phalanx 2					Bd	30.1		
5602	phalanx 2	GL	31.3	Bp	32.4	Bd	28.8		
6174	phalanx 3			GB	36.1	GL	35.2		
3054	phalanx 3	Ld	33.3	GB	46.2	GL	35.3		

Part B: List of measured equid bones (continued)

Bone Number	Element	Measure	Reading	Measure	Reading	Measure	Reading	Measure	Reading
3364	phalanx 3	Ld	22.7	GB	27.6	GL	25.0		
3790	phalanx 3			GB	41				
6072	phalanx 3	Ld	28.4	GB	38.2				
5382	phalanx 3	Ld	30.9						
6199	phalanx 3	Ld	33.3	GB	40.6				
1200	tibia	Bd	51.7	Dd	36.5				
5081	astragalus	GB	30.2	GH	46.8				
5274	astragalus	GB	59.7	GH	64.6	LmT	61.6		
2509	astragalus	GB	40.4	GH	41.9				
5623	astragalus	GB	37.1	GH	43.7				
1941	astragalus	GB	40.7	GH	48.7				
1201	astragalus			GH	44.2	LmT	45.9		
1172	astragalus	GB		GH	43.9	LmT	44		
1903	calcaneus			HMal	40.7				
5273	calcaneus	GL	117	HMal	64.6				
1174	calcaneus	GL	79.8	HMal	21.8				
1100	calcaneus	GL	81.2	HMal	36.8				
5275	c. tarsal	GB	56.2						
5466	3rd tarsal	GB	33.1						

Part C: Measurements for donkey burial I.NE037, locus 37041

Phalanges

Bone Number	Element	Bp	Dp	GL	Bd	SD
5156-01	Phalanx 1	36	26.7	71.2	33	21.7
5156-02	Phalanx 1	36	26.5	66.2	32	21.7
5156-03	Phalanx 2	35	22.3	33.5	32	31
5156-04	Phalanx 1	32	16.9			
5156-05	Phalanx 3			35.5		

Metacarpals

Bone Number	Side	Bp	Dp	Dd
5156-06	right	38		34
5156-20	left	37	26.3	33

Mandibular Tooth Row

Bone Number	Side	Measurement 6	Measurement 6a	Measurement 8
5156-07	left	148.5	67.4	76.6
5156-21	right	148.3	70.4	75

Lower Teeth

Bone Number	Element	Side	Length	Breadth
5156-08	M3	left	25.7	12.6
5156-09	M2	left	22.3	14.1
5156-10	M1	left	22.8	16.3
5156-11	PM4	left	23.6	16.7
5156-12	PM3	left	23.3	16.7
5156-13	PM2	left	26.7	15.3
5156-14	PM2	right	26	16.4
5156-15	PM3	right	23.7	19.1
5156-16	PM4	right	23.7	16.8
5156-17	M1	right	23.1	18.1
5156-18	M2	right	21.4	14.6
5156-19	M3	right	27.2	13

Vita

Justin Samuel Elan Lev-Tov was born on April 29, 1967, in Washington, D.C. With the exception of a two year period spent living in Israel, he grew up entirely in the Washington area, mainly in Silver Spring, Maryland. In Silver Spring, Justin attended local public schools, and graduated in 1985 from Springbrook High School. While in high school, he was active in the local BBYO chapter.

Justin began his undergraduate studies in 1985, at the University of Maryland in College Park, majoring in anthropology and serving as an active member of the Anthropology Students Association. During his undergraduate studies, he had the opportunity to serve first as an intern and later as a temporary employee at the Smithsonian Institution's National Museum of Natural History, in the department of anthropology. There, Justin worked with Dr. Melinda Zeder, who was the first to introduce him both to the study of archaeological animal bones as well as the prehistory and early historic periods of the Near East. In 1990 he was graduated from the University of Maryland, his true *alma mater*.

Following the completion of his Bachelor of Arts degree at the University of Maryland, Justin began studies toward a Master of Arts degree at the University of Tennessee in Knoxville, with Professor Walter E. Klippel serving as his major professor. He finished his M.A. in 1994, partially fulfilling that degree by writing a master's thesis on the diet of early historic period farmers in East Tennessee. After finishing that degree, Justin was awarded a fellowship at American School of Classical Studies in Athens, Greece, where he spent a year studying an animal bone collection from Corinth, helping to develop the Malcolm Wiener Laboratory's osteological collections, and breaking his leg during a trip to Monemvassia.

Justin returned for a year to Knoxville from Greece in the summer of 1995, before leaving for the the 1996 Tel Miqne-Ekron excavation season and afterwards the Albright Institute of Archaeological Research in Jerusalem, Israel. At the Albright, he spent three productive years identifying a portion of the large animal bone collection from Ekron. While an Albright fellow, he had the opportunity to participate in archaeological conferences, excavations, tours, and observe the vestiges of British colonialism. Justin returned from Israel to Knoxville in summer of 1999, and completed his Ph.D. degree in May of 2000.