

Early Iron Age Dor (Israel): A Faunal Perspective

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This paper presents a study of archaeozoological remains from an early Iron Age (Iron I–IIA) sequence at the “Sea People” Phoenician site of Tel Dor, on Israel’s Carmel coast (Area D2). Detailed taphonomic and archaeozoological documentation provides information on a wide range of issues: subsistence practices of the site’s inhabitants, which were based both on domestic animals and on the exploitation of the immediate environment; aspects of Dor’s urban matrix in the early Iron Age; the site’s long-distance commercial contacts; and dietary habits that broaden our understanding regarding the identity of its population. These are examined in the context of other contemporaneous sites in the region.

INTRODUCTION

Dor in the Early Iron Age: A Brief Summary

Tel Dor is situated on Israel’s Carmel coast, ca. 30 km south of Haifa, about midway between Lebanon and Philistia (fig. 1). Prior to the construction of artificial harbors in the Mediterranean, it was one of the few sites along its eastern littoral that provided well-sheltered anchorage, in the two bays flanking the site from north and south.

This factor, and the relatively easy access from the site inland—toward the Jezreel Valley and beyond—were decisive for the site’s history.

A detailed stratigraphic sequence of early Iron Age remains has turned Dor into one of the most important sites for the study of this period on the Canaanite coast. Descriptions and interpretations of Dor in this period may be found in Stern 1990; 1991; 1993; 2000a; 2000b; Gilboa 2005; in press; Sharon and Gilboa in press and in references therein. These form the basis for the following short summary.



Fig. 1. Location map of Dor.

In the early Iron Age, Dor was probably the most prominent site on the coastal stretch from the Yarkon River to 'Akko, when other anchorages, such as Tel Nami and Tell Abu Hawam, were either deserted or

diminished in importance (see lately Artzy 2006). In addition, Dor is the only site specifically mentioned in Egyptian records as the seat of a “non-Philistine Sea People”—the *Skl* (here, *Šikila*), and thus it also

holds the key for interpreting the material culture and occupational history of this “group,” and highlighting various aspects of the “Sea People” phenomenon.

The Late Bronze Age town of Dor has not been located yet, and thus the crucial LB/Iron Age transition is not yet understood (Sharon and Gilboa in press). However, as in a few excavation areas, in different parts of the tell, early Iron Age levels overlie natural deposits and bedrock, the (surely existing) Late Bronze Age settlement must have been significantly smaller than its early Iron Age successors.

Early Iron Age remains were uncovered in 10 excavation areas scattered over most of the tell. They indicate that throughout this period, settlement occupied approximately the entire present mound, about 7 ha (fig. 2). For the early Iron Age in Canaan, this is a medium–large town. As mentioned, it was surely the major early Iron Age site between the Sharon plain and ‘Akko. It also seems that the settlement was densely built, and fortified for most of its existence. In every excavation area that reached the appropriate depth, structures were encountered. Toward the end of the sequence (during Ir1b; see below), the site features some of the most massive buildings known around the early Iron Age Mediterranean—for example, those in Area D2, Phases 10–8 (see fig. 3).

In light of the above, in the context of early Iron Age Canaan, we deemed ourselves justified in dubbing early Iron Age Dor an urban site. However, even without delving here into the thorny issue of defining “urbanism,” it is patently clear that site size, fortifications and other architectural remains, and complex commercial activities (for which see below) cannot serve as the sole criteria for defining the nature of the site and site hierarchy. Some warning beacons to this effect were evident from sediment analyses. Analyses of phytoliths—including the spherulites concentrations in them, their morphology, and manner of deposition—indicated to our surprise that in the early Iron Age, animals (probably mainly sheep and goats) were penned in various structures *on the tell* (Albert et al. 2008), including in at least one of the spaces of the “Monumental Building” in Area D2, which is the most imposing early Iron Age Phoenician structure currently known (see Shahack-Gross et al. 2005: Layers G and I) and one of the most massive early Iron Age structures around the Mediterranean.

A major caveat in assessing Dor’s economic role in the early Iron Age is that we possess to date no real data regarding early Iron Age demography in

the town’s immediate vicinity, which would help us to assess site hierarchy and economic/political integration. Though the region has been surveyed, few early Iron Age villages, hamlets, or the like are known, with the exception of ‘En Hagit in Wadi Milh east of Dor (of the Ir1b horizon; see below) and Tell Mevorakh to the south (Ir1l2 and Ir2a) (see Sharon and Gilboa in press). If Dor was an “urban” nexus, where was her *hinterland*?

Some Notes on Stratigraphy, Chronology, and Nomenclature

Six chrono-stratigraphical horizons have been defined in these areas for the early Iron Age, each of them of apparently short duration. They are specified here with their Dor-specific terminology, and correlated for reference to well-known chronological horizons in other regions of the country. Ir1a *early* and Ir1a *late* correlate with the main “Philistine-Bichrome phases” in Philistia, such as Tell Qasile Strata XII–XI. Ir1alb and Ir1b correlate with Qasile Stratum X and the “Megiddo VIA horizon,” probably starting somewhat earlier; Ir1l2 is transitional between the Megiddo VIA horizon and the “classic” (Black-on-Red-bearing) earliest Iron IIA contexts in the southern Levant; and Ir2a is contemporary with the latter. As the implications of the Dor sequence for the still unresolved debate over the absolute chronology of the early Iron Age in Israel have been discussed extensively, and as chronology is not our primary concern here, the reader is referred for these issues to Gilboa and Sharon 2003; Sharon et al. 2005. Here suffice it to say that for the entire sequence, Dor produced radiometric dates that are about 70–100 years later than those of the conventional, so-called high chronology.

Current Interpretation of the Dor Early Iron Age Sequence

Stratigraphically, the most conspicuous element in the stratigraphic continuum summarized above, encountered in several excavation areas, is a severe destruction layer that seals the Ir1a *late* horizon. This, and the abundant Phoenician Bichrome pottery in subsequent horizons, was the main consideration for the interpretation offered for this sequence by its first excavator, E. Stern. According to him (e.g., Stern 1991), the pre-destruction sequence (Ir1a *early* and *late*) represents the *Šikila* town and has many

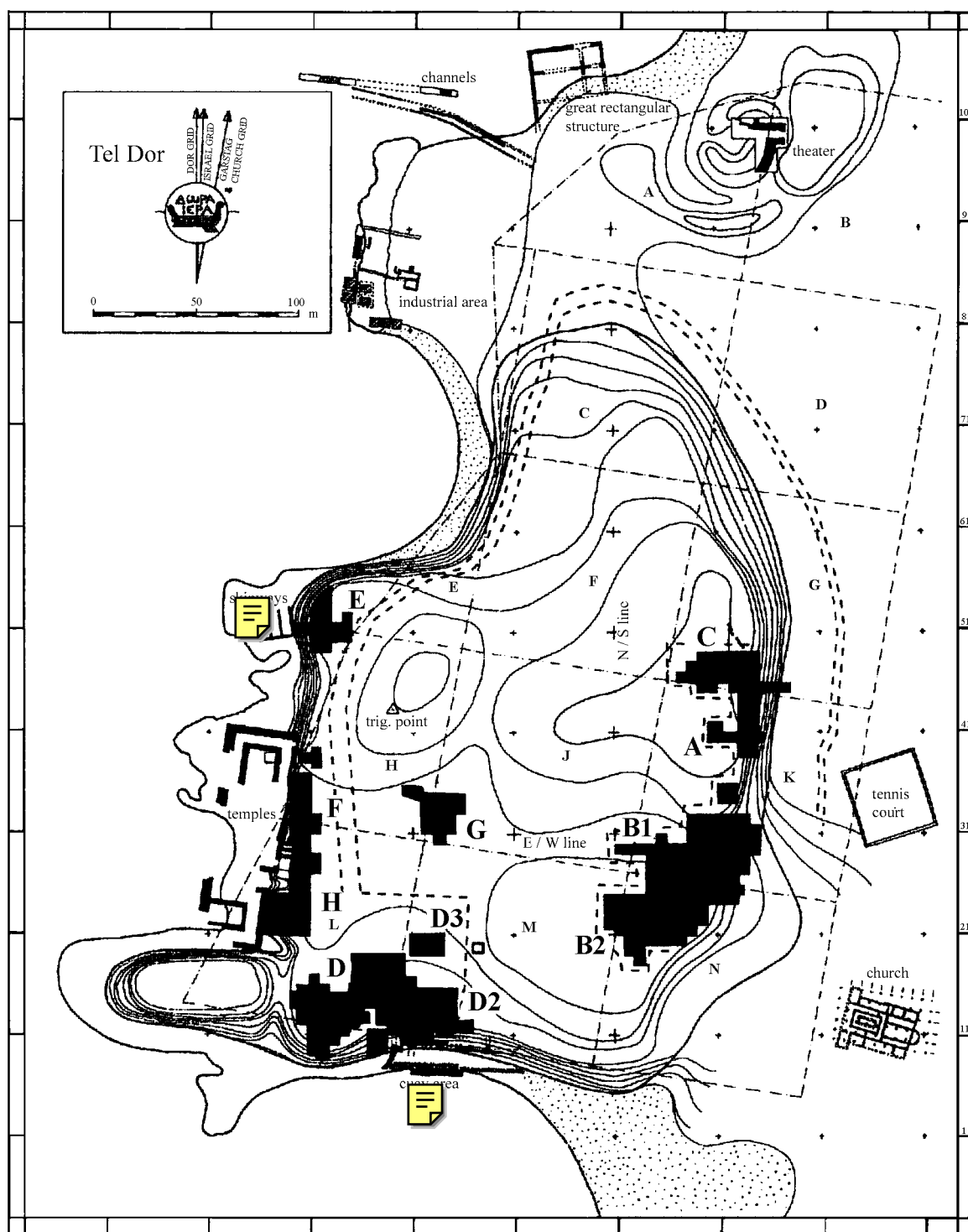


Fig. 2. Excavation areas at Dor.

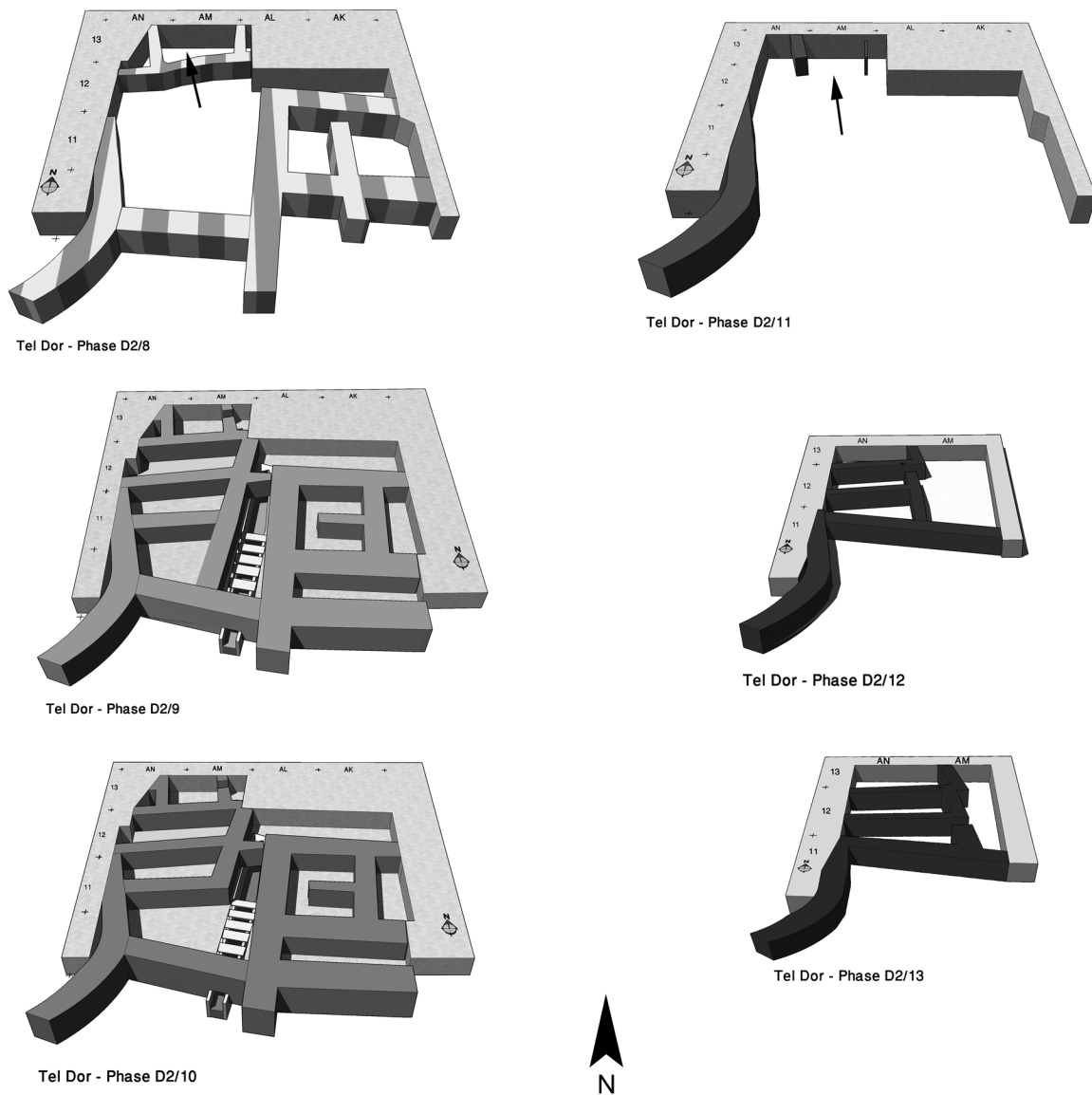


Fig. 3. Schematic plans of Area D2, Phases 13–8b.

affinities with Philistia. This town is destroyed by Phoenicians expanding southward from heartland Phoenicia (in the Lebanon), who *inter alia* settle at Dor.

Another view (Gilboa 2005; Sharon and Gilboa in press) rather emphasizes continuity between the pre- and post-destruction habitations and sees the *Šikila* and Phoenician entities as coterminus, destruction notwithstanding (Gilboa 2005; Sharon and Gilboa in press). According to this view, the material

culture in the Irla *early* and *late* horizons is basically Canaanite, but with evidence for new populations from Cyprus and possibly Syria (for the latter, see Gilboa in press). It is this amalgamation that the Egyptians termed *SKL*. Among other things, the socioeconomic circumstances of the absorption of these new elements dictated that some of them revert to practicing entrepreneurial economic avenues, such as overseas trade. It is the same mixed population that we, eventually, dub “Phoenician.”

As in Philistia, too, according to our understanding, a considerable part of the new populations originated (also) in Cyprus; thus the difference between Philistine and *Šikila* = Phoenician is not primarily that of a different origin. It is a difference in the sociopolitical statuses and identities (“ethnicities”) forged *locally*, dictated by the local matrices into which new populations were absorbed in the various sites/regions, and possibly also by the number of newcomers.¹

When compared with the well-known early Iron I sites of Philistia, the following main differences stand out at Dor: (1) Its material culture reveals no indications whatsoever of any new “western” elements beyond the Cypriot ones. If our interpretation is correct, these newcomers to Dor did not achieve an elevated status as those in Philistia did, and probably were fewer in number. (2) Beyond the new Cypriot (and some Syrian) characteristics, material culture is overwhelmingly Canaanite. (3) Ceramics indicate that as opposed to Philistia, Dor had extensive overseas contacts, especially with Cyprus, but also with Egypt. Indeed, currently Dor is the only early Iron Age site along the eastern Mediterranean littoral where such intensive activity is attested. Other commercial interactions in evidence are with the southern part of Philistia/northern Negev (by some Philistine containers), and with the hill country (collared-rim jars).

Goals and Scope of the Archaeozoological Analysis

All these previous interpretations of early Iron Age Dor were based mainly on the analysis of the stratigraphical sequence, architecture, ceramics, and other finds and on correlating these with literary evidence. This paper attempts to add to our heuristic toolkit the study of archaeozoological data. After all, next to ceramics, animal bones are the most common and diverse class of archaeological materials uncovered.

Though in recent years archaeozoology has become one of the fastest-growing subdisciplines of archaeology, systematic studies of animal bones of historic sites in the southern Levant are still few and far between. In the context of the early Iron

Age in Israel, it is mainly the juxtaposition of Philistine versus Israelite dietary habits that has generated scholarly and public interest (e.g., Hesse and Wapnish 1997, and more works cited below; recently Lev-Tov 2000).² Though this question is, of course, highly relevant for the Tel Dor case, it is but one dimension of the variegated interpretive possibilities offered by archaeozoological analyses. Other studies of Iron Age bone assemblages are referred to below, but faunal studies of early Iron Age Phoenician sites are still nonexistent.³

Regarding the specific sequence discussed here, we set three goals. The first was to elucidate economic structures in terms of diet breadth and meat procurement and processing. As in most other tell sites, the assemblage consists of numerous bone fragments and isolated teeth. These bones, however, bear the signature of butchering, cooking, and other bone/meat processing activities (e.g., Binford 1981), as well as of disintegration and various postdepositional processes (Lyman 1994). Analysis of these signatures, coupled with information on the spectrum of species represented, body part distributions, pathological alteration, and kill-off patterns of the major livestock species have the potential to provide insights into a variety of topics related to economic subsistence and, as part of this, into the relationships of Dor’s occupants with their environment(s). (For all these issues, see, e.g., Hesse and Wapnish 1985; 1997; Hesse 1986; 1990; Davis 1987a; Crabtree 1990; Wapnish and Hesse 1991; Zeder 1991; 1998; Lev-Tov 2000; 2003; O’Connor 2003; Bar-Oz and Dayan 2003; Bar-Oz 2004; Bar-Oz and Munro 2004; Van Neer et al. 2004). Our main concern was to assess whether early Iron Age Dor can be postulated to be a (solely) meat-consuming town, where animals are mostly supplied by surrounding producers, or whether (as indicated by the sediment analyses mentioned above, and possibly also by the seeming lack of such sites) the site can be demonstrated to have pro-

¹ But in Philistia an Aegean origin is definitely a possibility for some “newcomers.”

² The concern with pig consumption in these studies and other phenomena relating to kosher vs. non-kosher butchering and consumption patterns also characterizes many faunal studies in Israel for later historical periods, e.g., Cope 2004 for Gamla and Yodfat and Bar-Oz et al. 2007 for Jerusalem in the Second Temple period.

³ A possible exception is Horwitz 2000, an analysis of the small assemblage of Kh. Rosh Zayit on the northern margins of the ‘Akko plain. This is an Iron IIA assemblage, paralleling the end of the Dor sequence studied here. Whether the site qualifies as “Phoenician” is, however, debatable.

duced its own meat. The model we employed is the classical model by Zeder (1991), which is based on a large database of faunal remains and ethnographic research from the Kur River Basin in Iran. In a nutshell, Zeder proposes that the longer the chain of transmission of animal products between the producer and the consumer, the more standardized the resulting bone assemblage will be, in terms of age and sex distributions, body-part representation frequencies, and butchery mark distribution.

Second, as mentioned, on present evidence Dor emerges as the most active port on the early Iron Age southern Levantine coast. Not only did it import substantial amounts of ceramics from Cyprus, and jars with as yet unidentified contents from Egypt, it also exported some commodities in “Phoenician Bichrome” jugs to Cyprus.⁴ It is highly likely that major inland sites, such as Megiddo, were served via Dor. Recently, this has been demonstrated by the fact that at Megiddo, in Stratum VIA (Ir1b) some of the “Phoenician Bichrome” containers probably originated at Dor (Arie 2006; Arie, Buzaglo, and Goren 2006). Stratum VIA Megiddo also produced substantial quantities of Egyptian Nile perch (Lernau 2006). This, and Dor’s attested commercial relations with Egypt (the Egyptian jars), suggests that Dor was the likely port through which these fish reached Megiddo (and probably other sites as well), which led us to expect a similar abundance of Egyptian species at Dor.

Third, the “Sea People” issue was examined vis-à-vis the dietary habits observed in early Iron Age Philistia. One of the most conspicuous phenomena there is a dramatic increase in pork consumption, commonly explained by the arrival of Aegean emigrants, though this is by no means the only possible explanation (see above, and details and references further below). As nothing in Dor’s material culture indicates any Aegean association, such a phenomenon was not expected. On the other hand, as mentioned, we believe that Dor’s material culture provides evocative evidence for Cypriot presence, and in fact we interpret the *ŠKL* = Phoenicians as an amalgamation of Canaanites and Cypriots. However, at this point in time it is very difficult to predict what sort of influence on local dietary habits such a phenomenon

would have had, as the spectrum of livestock species of Cyprus is very similar to that of the southern Levant; *inter alia*, as in most sites in our region, exploitation of pigs was minimal (see Reese 2005 and references therein).⁵

In the background of all these general questions, however, looms a fundamental problem—that of elucidating the formation processes of the bone assemblages we study, and concomitantly, of assessing the contextual value of fauna in complex tell sites. Which bone assemblages can be considered in primary deposition and thus, presumably functionally related to artifacts found in the same contexts and to the architectural spaces they were found in? How does one identify redepositions in bone assemblages in such sites?⁶ At Dor this issue is currently the subject of a comprehensive research project and here it is addressed only marginally.

This report deals with the faunal remains from Area D2 at Dor. A report prepared for another contemporary sequence (Area G; Lisk 1999) has not been published yet and is only occasionally referred to. In order to achieve the goals defined above, we first provide a short summary of the relevant stratigraphic sequence and the contexts that produced the bones, followed by a detailed taphonomic and zooarchaeological documentation of the faunal remains. As the study provides detailed information on livestock, wild game, and fish resources exploited, in the future it may serve as a point of reference for interregional studies of Iron Age subsistence in the southern Levant.⁷ Following the description of the site’s economic profile and the formation of the bone assemblage, we provide comparisons with other early Iron Age faunal assemblages in the region in order to put the dietary habits, food production systems, and trade networks in a wider perspective.

⁵ The sites discussed by Reese are mostly in the Late Cypriot II–IIIa range and thus are earlier than the Dor sequence. Analyses of meaningful LC IIIB–CG III faunal remains are at present extremely rare (but see similar pig scarcities at Kition [Nobis 1985]; and at Amathus [Reese 1992]). Likewise, among the bones at the Cypriot-Achaic precinct at Kourion (of clear cultic associations), no pig bones were clearly identified (Davis 1996).

⁶ For considerations of the effects of residual bones in Near Eastern tells, see, e.g., Hesse 1986: 18–22; Hesse and Rosen 1988: esp. fig. 8. In a sense our work combines the two chronological approaches discussed in those papers.

⁷ The complete data can be obtained from the corresponding author upon request.

⁴ This has recently been demonstrated by petrographic analyses of such jugs in Cyprus (the evidence is still unpublished, and we thank Yuval Goren for this information).

**A SHORT INTRODUCTION
TO AREA D2: STRATIGRAPHY,
ARCHITECTURE, CONTEXTS,
AND CHRONOLOGY**

Area D2 is situated on the tell's southern slope and overlooks its southern bay (figs. 2, 3). Its southern margins have collapsed and been washed away by the surge. The earliest structures here, constructed on bedrock, date to the early Iron Age, and since then the area was occupied continuously until the third century C.E. The entire early Iron Age architectural sequence (Phases D2/14–D2/8b, see below) abuts a huge wall (the so-called Bastion) which currently forms the western boundary of the deep (Iron Age) part of the area. This massive wall probably served as a fortification and/or retaining wall for the area lying west of D2; it may have been constructed either in the Bronze Age or in the early Iron Age, concurrently with Phase D2/14.

For the sake of analysis, Area D2 is divided, based on its architecture, into two parts. Most of "D2 east" is occupied by a segment of a very large, obviously public building ("The Monumental Building"), which is constructed in Phase D2/10 and survives until Phase 8. The structures west of this building ("D2 west") provide one of the best stratigraphical/architectural sequences for the early Iron Age at Dor.

The earliest Iron Age building (Phases D2/13–12) is constructed on some shallow fills and bits of floors overlying bedrock, defined as Phases D2/15–14. It is a rubble structure (nicknamed "Natti's Building"), of which primarily three rooms are known. It abuts the "Bastion" on the west, and on the east it is cut by the "Monumental Building." Its southern wall was apparently the southernmost wall of the settlement here, and accordingly was 1.5 m wide. The exact nature of this building has not been elucidated yet. Its first construction stage (Phase 13) apparently ended in destruction, as some artifacts on its floors were found in situ and some were burnt. Very rapidly, the building was reconstructed, with some new walls, but on practically the same lines. This phase too (D2/12) apparently ended with some fire, but there were no artifacts in primary deposition.

Because of the dearth of artifacts in Phase D2/13, its date is currently difficult to determine: it either belongs to Ir1a *late* (the pre-destruction horizon else-

where) or to Ir1alb (the first post-destruction period in other excavation areas).

On top of these ruins, an ephemeral occupation episode (Phase D2/11) is represented by some bits of floors, walls, and a few artifacts in situ (more on these below); it dates to Ir1b.

This poor settlement, in turn, is superimposed by an impressive building complex (Phase D2/10), comprising the following elements: on the east the Monumental Building is constructed. West and north of the latter extends an extensive mudbrick built complex, whose spaces were meant to serve different activities. On the south are narrow spaces, which have no entrances in their well-preserved walls, and which by their configuration and ceramic content were used for storage. North of them lies an open courtyard with various installations, apparently a working area. On the south, a newly constructed so-called Sea Wall was established, of boulders, to separate the mudbrick complex from the sea.

Some architectural alterations to the plan of the mudbrick complex were defined as Phase D2/9; the most significant one was the closing of the open space between the mudbrick storerooms and the Sea Wall, to create another, apparently roofed space.

The two phases of the mudbrick building produced extensive and well-sealed artifactual assemblages. Some pottery could be mended, some pottery in the courtyard was in articulation, but most of the assemblages cannot be demonstrated to be in primary deposition. Both phases, like the preceding Phase D2/11, date to Ir1b.

At a certain point, the mudbrick building was apparently deliberately annihilated, in an orderly fashion, and filled in (there is no evidence of destruction). Its southern part was sealed by a series of extensive *pisée* platforms (with no buildings), and over its courtyard/work area a new structure was erected, of rubble and at least one ashlar corner ("Benny's Building"; Phase 8c). Of this structure one large (but not complete) room is known, and a bit of another. Benny's house collapsed, burying under it extensive in situ assemblages of ceramic and other artifacts, part of them burnt. It was soon rebuilt (Phase D2/8b), a new floor was laid, but the building collapsed again, yielding another primary floor deposit (for these two deposits, see more below). Phase D2/8b ("Benny's lower floor") dates to the Ir1l2, and phase D2/8c ("Benny's upper floor") to Ir2a.

METHODS

Retrieval

The bones studies here were collected manually; the deposits were not sifted, but excavators were instructed to crumble the debris and to collect every bone fragment. This means that at least regarding medium to large animals, most of the material has been collected and loss of data may be considered minimal. Regarding smaller taxa (fish, birds, rodents), which are much more vulnerable to the sampling method, the picture is surely different (see Payne 1973; Clason and Prummel 1977; Orton 2000: 164). In Area G at Dor (Lisk 1999), where some of the material has been sifted, smaller species of fish (such as sardines), and rodents (such as house mouse) were recovered. Therefore, we are aware of possible biases in species richness, relative abundance, body size, and skeletal element presentation (Barker 1975; Casteel 1976; Gordon 1993; Shaffer and Sanchez 1994; James 1997; Zohar and Belmaker 2005).

Since 2003 a systematic sifting protocol has been implemented at Dor (*inter alia*, to assess loss patterns of bones in nonsifted contexts). Though we cannot present detailed results yet, it is obvious that sifted contexts definitely produce more small faunal remains, such as fish and rodents. The data for small taxa must then be considered incomplete.

Stratigraphic/Contextual Considerations

The contexts included in this study were chosen by a combination of stratigraphical/contextual and artifactual considerations. First, we considered bones originating only in “D2 west,” where the stratigraphical sequence was the most detailed and clearest. This choice thus excluded the Monumental Building on the east. We took into consideration only faunal remains that originated from stratigraphically secure loci of the Phases 14–8b range, of three categories: primary deposits, sealed deposits, and unsealed deposits which by stratigraphic and ceramic considerations were considered “clean,” i.e., not disturbed by later intrusions. Most of the contexts considered here are either primary and/or sealed, and all of them were chosen from the well-defined spaces of the buildings described above. Based on the ceramic contents of these loci, no clear redepositions could be defined in them, but in such a tight chrono-stratigraphical se-

TABLE 1. Total NISP and MNI According to Each Phase.

| <i>Phase</i> | <i>NISP</i> | <i>MNI</i> |
|--------------|-------------|------------|
| Whole phases | 2304 | 144 |
| Phase 8 | 1027 | 72 |
| Phase 9+10* | 569 | 43 |
| Phase 11 | 228 | 30 |
| Phase 12+13* | 83 | 12 |
| Mix | 397 | 40 |

quence, when ceramic changes are slow and gradual, residual material is very hard to trace and is surely present. Regarding ceramics, however, even in this sequence, there were discernible differences between assemblages of each phase—and clear trajectories in pottery evolution (see Gilboa 2001; Gilboa and Sharon 2003); so regarding the pottery, we can at least state that residual material did not obscure the basic differences between phases. Whether this principle may apply here to bones as well is, for the time being, a moot question (and is further discussed below). The least we can say is that inasmuch as there are no occupations in this area earlier than the Iron Age, and indeed, “early” pottery (of Middle and Late Bronze Age date) was extremely scarce, we have no reason to expect pre-Iron Age bones.

Initially, each stratigraphical phase was studied separately (see table 1). All phases, however, revealed quite constant patterns,⁸ and for the three goals of this paper we lumped all the phases into one analytical unit. Some specific contexts are discussed below.

Anatomic Identification and Taxonomic Determination

As a first step in the analysis, the assemblage was separated into identifiable and unidentifiable fragments. The skeletal elements were identified anatomically and taxonomically using the comparative collections housed at the University of Haifa; the Hebrew University, Jerusalem; Tel Aviv University; and several bone catalogs (such as Schmidt 1972; Gilbert 1990; Cohen and Serjeantson 1996; Hilson 1996). For mammal remains we followed Davis's

⁸ This conclusion is based on the absence of significant difference in the faunal composition of the different phases (Friedman analysis; $F = 0.6$, $p < 0.9$).

(1992) “diagnostic bones” method (see also Watson 1979). Our “diagnostic bones” include articular ends of long bones, horn fragments, selected cranial fragments (petrosus, occipital), mandibular teeth, atlas and axis vertebrae, scapulae and pelvis acetabuli, tarsal bones, and phalanges 1–3. These skeletal elements are easy to identify and provide essential information on body-part representation and age. In addition, they allow identification to species.

Identification of sheep and goats was based on morphological parameters (following Boessneck 1969; Payne 1985; Davis 1987a; Zeder and Lapham 2002) and metric criteria of selected bones (Payne 1969). Where such identification was impossible (as is usually the case), bones were assigned to a sheep/goat category. Identification of equids (donkeys and horses) was based on morphological parameters of teeth (Davis 1980). Separating between fallow deer (*Dama mesopotamica*) and red deer was based on both size and morphology criteria (Lister 1996). Fish were identified using the collections of the Tel Aviv University Zoological Museum. When possible, fish bones were identified to species (or genus) level. Otherwise, they were identified only to family or even order level (such as cartilage fish, Sparidae). Fish and bird identification was possible on a limited number of bones. Therefore, many of the identifications are restricted to family level. Bird remains were also categorized by size, as follows: pigeon size (= a), goose size (= b), pelican size (= c).

Quantification

The diagnostic bones were used to calculate the number of identified specimens (NISP), the minimum number of individuals (MNI), and the minimum number of skeletal elements (MNE). All these values were calculated using the assumptions described in Klein and Cruz-Uribe 1984 and Lyman 1994. NISP values were used as the basic measure of taxonomic abundance and richness (Grayson 1984).

Measurements

Metric measurements were performed to distinguish between closely related species with similar morphologies but different body dimensions, such as sheep and goats (e.g., Payne 1985; Davis 1987a). Body size was also used to distinguish wild from domestic taxa (e.g., wild boars versus pigs). Lack of complete/measurable bone elements prevented us from sexing all the domestic taxa. In bony fish, the allo-

metric relationship (standard length and body mass), alongside skeletal dimensions, was used to estimate body sizes (e.g., Casteel 1974; Morales and Rosenlund 1979; Enghoff 1983; Wheeler and Locker 1985; Van Neer 1989; Zohar, Dayan, and Spanier 1997).

Measurements were performed on bones that fitted Wheeler and Jones's (1989) criteria. They included cranial (premaxilla, maxilla, dentary, basioccipital) and postcranial bones (atlas, axis). Body-size estimation of Sparidae was performed following the equations in Desse and Desse-Berset 1996a. That of groupers was based on Desse and Desse-Berset 1996b, and *Lates niloticus* body-size estimation followed Van Neer's (1989) equations. In elasmobranch (sharks, skates, and rays), vertebrae dimensions were used to distinguish between sharks and rays (following Kozuch and Fitzgerald 1989).

Age Determination

The mortality profile of the major livestock species was analyzed on the basis of epiphyseal closures (Silver 1969) and on the eruption and wear of the lower deciduous fourth premolar (dP4) and the lower third molar (M3) (Payne 1973). The first method, however, is relevant only for animals up to 4.5 years old, and allows only for rough age divisions. Thus, dental wear is better for determining age class, since wear is a continuous process throughout life.

Taphonomic Analysis

There is a growing volume of literature that demonstrates the role of different taphonomic agents (see Lyman 1994 for a review of literature; also Meadow 1980; Klein and Cruz-Uribe 1984; Bar-Oz and Dayan 2002; 2003; Bar-Oz and Munro 2004) and those of different processing methods, which modify or destroy particular bones (Binford 1981; Colley 1986; Belcher 1994; Stewart and Gifford-Gonzales 1994; Wilkins, Harvey, and Dobson 1995; Zohar and Cooke 1997; Munro and Bar-Oz 2005; Bar-Oz and Dayan 2007; Bar-Oz and Munro 2007). Therefore, several criteria were used to identify and to reconstruct the formation of the bone assemblage (Grupe 1995; Nicholson 1996; Hedges 2002; Trueman and Martill 2002; Reich et al. 2003; Bar-Oz 2004; Bar-Oz and Munro 2004).

First, we examined the skeletal element completeness of sheep/goat and cattle. The distribution of skeletal elements was examined according to nine anatomical regions (horn, head, neck, axial skeleton,

upper forelimbs, lower forelimbs, upper hind limbs, lower hind limbs, and toes; following Stiner 2002). These observations have the potential to highlight skeletal biases that may have resulted from selective transport or butchery. For the selected regions we calculated the relative abundance of skeletal elements (%MNE).

Further exploration of skeletal completeness and bone preservation was undertaken through examining the relationship between bone survivorship and bone density (based on density values of *Connachates taurinus*; data from Lam, Xingbin, and Pearson 1999). We also examined the relationship between the frequency of bones and their nutritional value (based on caloric values of *Ovis aries*—MGUI; data from Binford 1978) in order to discern the possibility of selective transport.

All identifiable elements were inspected for macroscopic bone surface modifications using a low-resolution magnifying lens (X2.5). Modifications such as butchery marks (Binford 1981), rodent gnawing, carnivore punctures, scoring, and digestion were recorded (Lyman 1994; Fisher 1995). Butchery marks were classified into four categories indicative of the major stages in the butchery sequence: slaughtering and hanging, skinning, dismemberment of the carcass, and filleting the meat from the bones (based on the cut marks typology of Binford 1981; see also Cope 1999; 2004).

RESULTS

The Bone Assemblage

The analysis presented below is based on a total of 2,308 identified bone specimens, derived from a minimum number of 145 mammal, fish, bird, and reptile individuals; they constitute about 30% of the entire bone collection. The distribution of 34 identified species is detailed in table 2 and fig. 4. The 1,888 mammal bones comprise approximately 75% of the entire assemblage. They are mainly domesticated, but some wild species are also present. Despite the preponderance of mammals, the highest species richness (S) is observed for fish (S = 12), followed by mammals (S = 11) and birds (S = 8). The wild species indicate that although domestic livestock provided most of the livelihood, the Tel Dor inhabitants also exploited their environment.

In general, the entire assemblage was found in an excellent preservation condition. This is attested by the presence of the whole range of bone densities,

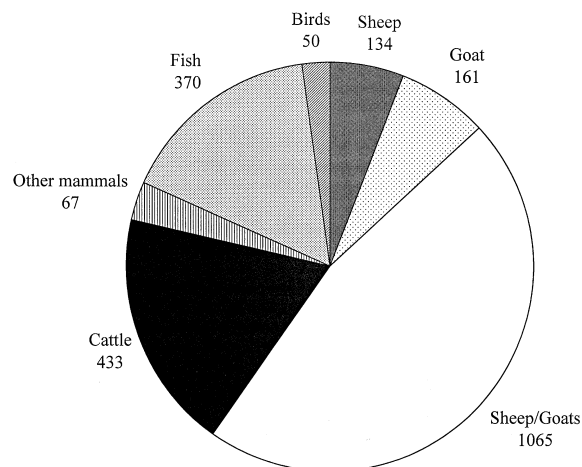


Fig. 4. Relative abundance of major taxa in early Iron Age Dor, Area D2. Other species include mainly wild mammals (table 1). Species with no economic values (carnivores, equids, and reptiles) are excluded (NISP is given for each taxa).

including porous parts, bones of young animals, and bones of birds and other small animals (see below). Analysis of body-parts representation, cut marks, and nutritional value provides further insights about the nature of the deposits, and in particular whether they represent the remains of butchery activities or food consumption waste.

We found no relationship between sheep/goat bone survivorship (%MNI) and bone density (Spearman's $r = 0.35$; $P = 0.11$). The absence of correlation indicates that density-mediated bias was not a major factor in altering and modifying the skeletal-part representation of the Dor assemblage. Apparently, loss of bones due to postdepositional fragmentation was quite minimal. However, most of the long bones are broken into proximal, shaft, or distal fractures. This most probably resulted from intensive bone processing by humans (see below).

Exploitation of Livestock and Other Domesticated Animals

Sheep (*Ovis aries*) and Goats (*Capra hircus*). Sheep and goats, including the sheep/goat category (N = 1,359) comprise approximately 60% of the entire faunal assemblage and 76% of the livestock. Differentiating between sheep and goats was possible only for 21% of the sheep/goat assemblage. Based on taxonomic and morphometric distinctive features, it is possible to determine that both species are represented. Table 3 presents the sheep/goats

TABLE 2. Number of Identified Specimens (NISP) and Minimum Number of Individuals (MNI) for the Taxa Represented in the Assemblage

| | <i>Common Name</i> | <i>Habitat</i> | <i>NISP</i> | <i>MNI</i> |
|------------------------------------|--------------------------------------|---------------------------------------|-------------|------------|
| <u>Mammals</u> | | | | |
| <i>Capra hircus</i> | Goat | — | 161 | 8 |
| <i>Ovis aries</i> | Sheep | — | 134 | 15 |
| <i>Capra/Ovis</i> | Sheep/goats | — | 1064 | 57 |
| <i>Bos taurus</i> | Cattle | — | 433 | 12 |
| <i>Hippopotamus amphibius</i> | Hippopotamus | Permanent water | 4 | 1 |
| <i>Gazella gazella</i> | Mountain gazelle | Open landscape and bushland | 6 | 2 |
| <i>Dama mesopotamica</i> | Mesopotamian fallow deer | Bushland and woodland | 42 | 2 |
| <i>Cervus elaphus</i> | Red deer | Bushland and woodland | 2 | 1 |
| <i>Equus assinus</i> | Donkey | — | 10 | 1 |
| <i>Sus scrofa</i> | Wild boar | Open landscape and bushland | 13 | 1 |
| <i>Canis sp.</i> | Canines | — | 3 | 1 |
| <i>Vulpes vulpes</i> | Fox | — | 1 | 1 |
| <i>Erinaceus sp.</i> | Hedgehog | Open landscape and bushland | 4 | 1 |
| | Total mammals | | 1877 | 105 |
| <u>Reptiles</u> | | | | |
| <i>Trionyx triungulis</i> | Soft-shell turtle | Permanent water | 8 | 1 |
| <i>Testudo graeca</i> | Tortoise | — | 2 | 1 |
| | Total reptiles | | 10 | 2 |
| <u>Fish</u> | | | | |
| <i>Chondrichthyes</i> | Shark/Stingray | Mediterranean littoral zone | 19 | 1 |
| <i>Balistes carolinensis</i> | Grey triggerfish | Mediterranean rocky littoral zone | 20 | 1 |
| <i>Lates niloticus</i> | Nile perch | Nile | 188 | 7 |
| <i>Clariidae bagrus</i> | Nile catfish | Nile | 3 | 1 |
| <i>Clarias gariepinus</i> | Catfish | Freshwater | 1 | 1 |
| <i>Mugilidae sp.</i> | Mullet | Estuaries, Mediterranean & freshwater | 37 | 1 |
| <i>Liza ramada</i> | Red mullet | Estuaries, Mediterranean & freshwater | 3 | 1 |
| <i>Mugil cephalus</i> | Grey mullet | Estuaries, Mediterranean & freshwater | 9 | 1 |
| <i>Argyrosomus sp. (Scianidae)</i> | Meagre/ Drum | Mediterranean littoral zone | 1 | 1 |
| <i>Sparus sp.</i> | Sea bream | Mediterranean littoral zone | 65 | 7 |
| <i>Epinephalus sp.</i> | Dusky grouper | Mediterranean rocky littoral zone | 23 | 2 |
| <i>Tilapia sp.</i> | St. Peter's | Freshwater | 1 | 1 |
| | Total fish | | 370 | 25 |
| <u>Birds</u> | | | | |
| <i>Anas platyrhynchos</i> | Mallard | Freshwater (winter) | 6 | 1 |
| <i>Phalacrocorax carbo</i> | Cormorant | Freshwater (winter) | 2 | 1 |
| <i>Pelecanus onocrotalus</i> | Pelican | Freshwater (winter) | 3 | 1 |
| <i>Grus grus</i> | Crane | Grassland (winter) | 1 | 1 |
| <i>Himantopus himantopus</i> | Black-winged stilt | Freshwater (winter time) | 2 | 1 |
| <i>Anser sp.</i> | Goose | Grassland (winter) | 10 | 2 |
| <i>Alectorius chukar</i> | Partridge | Open landscape and bushland | 1 | 1 |
| <i>Gyps fulvus</i> | Eurasian griffon | Mountain & cliffs | 1 | 1 |
| <i>Anser size</i> | Goose size | — | 19 | 5 |
| <i>Pelecanus size</i> | Pelican size | — | 5 | 1 |
| | Total birds | | 50 | 15 |
| | Total identified animal bones | | 2307 | 147 |

TABLE 3. Frequencies of Sheep vs. Goats Calculated Using Different Methods

| <i>Method</i> | <i>Reference</i> | <i>Goat</i> | <i>Sheep</i> | <i>Total</i> |
|---|-----------------------|--------------|--------------|--------------|
| 1. Crania and postcrania morphological criteria | Boessneck 1969 | 161 (55%) | 134 (45%) | 295 |
| 2. Post crania morphological criteria | Zeder and Lapham 2002 | 122 (49%) | 125 (51%) | 247 |
| 3. Metapodial morphology | Boessneck 1969 | 14 (42%) | 19 (58%) | 33 |
| 4. Mandible deciduous 4th premolar morphology | Payne 1985 | 4 (40%) | 6 (60%) | 10 |
| 5. Metapodial measurement | Payne 1969 | 19 (47%) | 19 (53%) | 36 |

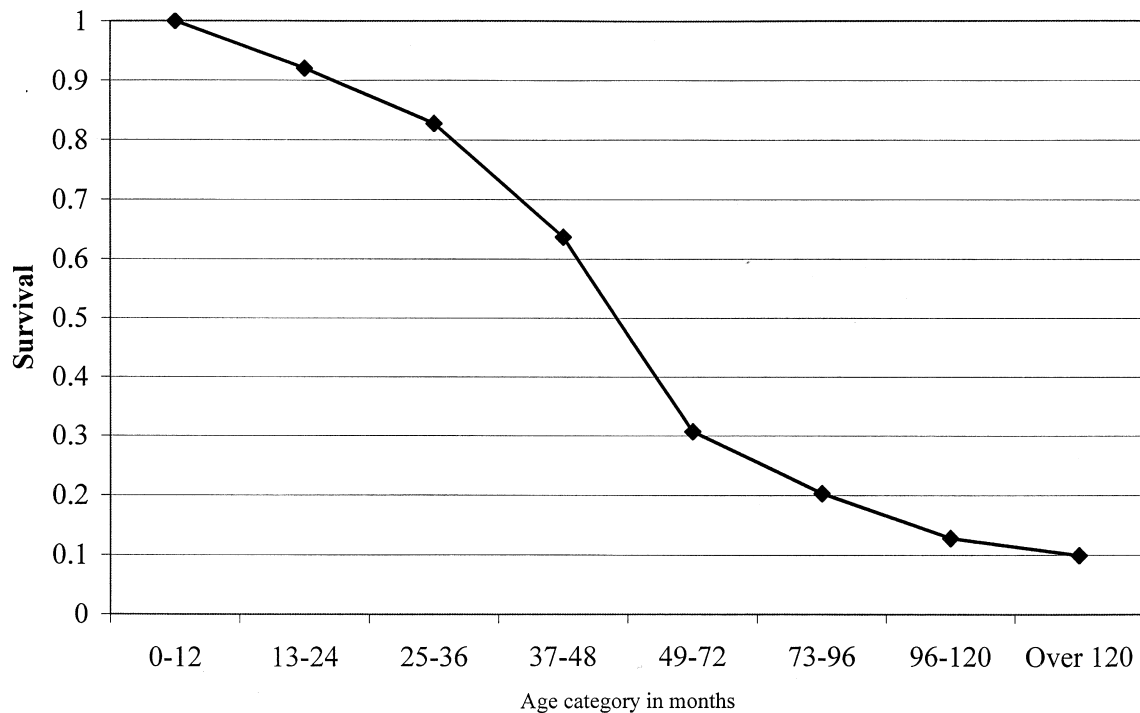


Fig. 5. Survivorship curve of sheep/goat according to dental wear rate of the last deciduous lower premolar (dP4) and the lower third molar (M3). Age classes follow Payne 1973.

ratios as calculated by the five principal methods commonly used to this end. All of them indicate a more or less even ratio of the two species. Method 1, which uses the largest sample, results in some advantage to goats, as opposed to the other four methods which show a very slight advantage to sheep. Method 4 indicates a more significant preference for sheep, but it is based on a sample of 10 teeth only; hence the results are insignificant.

The survivorship curve of sheep/goat according to the dental wear rate of the last deciduous lower premolar (dP4) and that of the lower third molar (M3) (age classes follow Payne's 1973 criteria; $N = 173$) shows that the majority of sheep and goats were kept to adulthood: over 80% survived beyond the age of 24 months (fig. 5). Similarly, the percentage of young individuals, based on epiphyseal fusion of several skeletal elements whose fusion occurs before

24 months (i.e., proximal and distal metapodial, scapula glenoid fossa, proximal radius, distal humerus, and distal tibia; $N = 696$), is 11%. Thus, it appears that most of the sheep/goats were kept to adulthood.

Skeletal elements that are customarily used for sexing sheep and goats (horn cores, atlas, axis, acetabulum; following West 1990; Zeder 2001; and Greenfield 2006) were very few, and thus we cannot discriminate between the survivorship profiles of each sex.

Cattle (*Bos taurus*). Only 433 cattle bones were identified, comprising 24% of the livestock. The small sample of cattle teeth ($N = 14$) did not allow an analysis of dental wear, and age determination is thus based on epiphyseal closure alone (comparative data from Silver 1969). Young cattle individuals (under 24 months) amount only to 4% of the assemblage. This low ratio of calves strongly attests that cattle were raised and kept primarily for milk or labor exploitation.

Other Domesticated Mammals. The assemblage also contains several equid bones ($N = 10$), of which two teeth were identified as belonging to donkeys (*Equus asinus*). Canines ($N = 3$) are most probably dogs (*Canis familiaris*).

Butchery and Consumption of Livestock

Figure 6 shows the distribution of skeletal parts of sheep, goats, and cattle, based on MNE percentages. Although not a single skeleton was recovered in articulation, all body parts of these three species are well represented. The sheep/goats skeletal profile shows a relatively equal representation of horns, limbs (particularly lower fore and hind limbs), and toes. It also includes numerous upper fore limbs. Likewise, the cattle remains demonstrate a fairly complete representation of skeletal elements.

Furthermore, no correlation was found between the identified bones of sheep and goats and their food utility value (Spearman's $r = 0.40$, $P = 0.07$), and the assemblage comprises bones of both high and low dietary values. This suggests that selective transport (i.e., of specific body parts) was not a major agent in the formation of the bone assemblages.

Cut marks ($N = 346$) were observed mainly on sheep/goats and, to a lesser extent, on the cattle and wild mammals. However, their ratio within the different taxa is very similar (table 4). Typologically, most of them relate to different stages in the handling

of the animals' carcasses. These include slaughter and hanging; skinning; dismemberment of the carcass; and filleting of the meat from the bones. The presence of cut marks from all the butchering episodes suggests that a full range of slaughtering activities occurred onsite. This is also reflected when the proportional distribution of butchery marks by anatomical units is investigated for cattle and sheep/goats (fig. 7). The comparison indicates similar butchering methods for both taxa: high frequencies of butchery marks on the head and on the upper front limbs, and fewer on the neck, axial, lower front, and upper and lower hind limbs, and toes. Likewise, no difference was observed between the frequency of cut marks on the less meaty lower limbs and the meatier upper limbs of both taxa.

Furthermore, these data indicate that sheep, goat, and cattle carcasses underwent thorough dismemberment and preparation onsite, and that carcass processing included both lower and high utility parts.

In addition, we compared the abundance of butchery marks on fused (adult individuals) and unfused (young individuals) skeletal elements. We found that in both categories (sheep/goat vs. cattle), the butchery marks on the young individuals are not as common as the butchery marks on the adults (adult cattle 21.8%; young cattle 9.5%; adult sheep/goat 43.8%; young sheep/goats 13.8%).

Exploitation of Wild Mammals

Swine (*Sus scrofa*). Bones that may be identified as either pig or wild boar are all but nonexistent in the assemblage (less than 1% of the total mammal NISPs; $N = 13$, including mandibular teeth, scapula, ulna, metacarpal, metatarsal, and phalanges). This was also the situation in the early Iron Age assemblage of Area G at Dor (1.3% of total mammals NISPs; $N = 32$; Lisk 1999: 46). Differentiation between domestic pigs and wild boars is based primarily on size estimation: domestic pigs are smaller than wild boars. We compared three third lower molar teeth recovered at Dor with a sample of modern wild boars (data from Haber 2001 and Haber and Dayan 2004) and found considerable overlap (table 5; fig. 8). This indicates that these teeth can be safely identified as belonging to wild boars (and this may explain the rarity of this category in the assemblage).

Hippopotamus (*Hippopotamus amphibius*). The hippo remains include three teeth fragments and a complete tibia of a one-year-old individual (fig. 9).

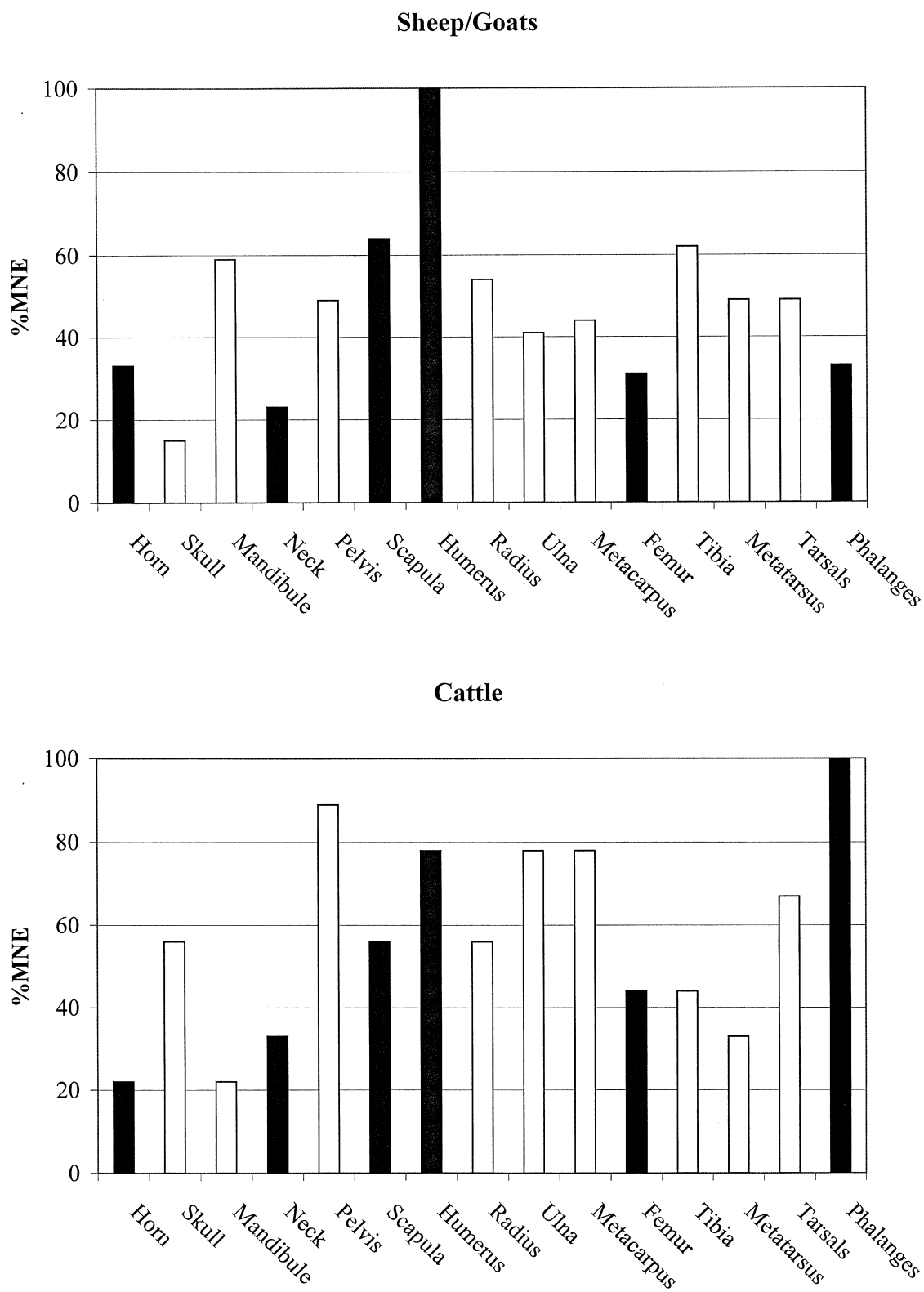


Fig. 6. Skeletal part representation of sheep/goat (top) and cattle (bottom).

TABLE 4. Summary of Cut Marks on Mammal Bones and Associated Activities

| | | <i>Slaughter and hanging</i> | | <i>Skinning</i> | | <i>Dismembering</i> | | <i>Filleting</i> | |
|-------------|-----------|----------------------------------|--------------------|-----------------|--------------------|---------------------|----------------|------------------|--|
| | | <i>N</i> | | <i>N</i> | | <i>N</i> | | <i>N</i> | |
| Sheep/goat | Occipital | 7 | Horn | 3 | Mandible | 1 | Scapula | 3 | |
| | Calcaneus | 2 | Mandible | 4 | Maxilla | 1 | Humerus | 5 | |
| | | | Carpal | 1 | Ver. Atlas | 3 | Radius | 2 | |
| | | | Central 4th tarsal | 1 | Ver. Axis | 7 | Ulna | 2 | |
| | | | Phalanx 1 | 12 | Scapula | 14 | Metacarpus | 4 | |
| | | | Phalanx 2 | 1 | Humerus | 58 | Femur | 5 | |
| | | | | | Radius | 11 | Tibia | 4 | |
| | | | | | Ulna | 15 | Calcaneus | 3 | |
| | | | | | Femur | 13 | Pelvis (acet.) | 2 | |
| | | | | | Tibia | 3 | Ver. Thoracic | 3 | |
| | | | | | Metapodial | 6 | Ver. Cervical | 1 | |
| | | | | | Calcaneus | 1 | Ver. Lumbar | 3 | |
| | | | | | Aastragalus | 14 | Rib | 11 | |
| | | | | | Central 4th tarsal | 5 | | | |
| | | | | | Pelvis (acet.) | 28 | | | |
| | | | | | Rib | 4 | | | |
| | | | | | Sacrum | 1 | | | |
| Cattle | Occipital | 3 | Horn | 2 | Mandible | 1 | Ulna | 2 | |
| | Calcaneus | 2 | Mandible | 1 | Humerus | 6 | Metacarpus | 3 | |
| | | | Phalanx 1 | 4 | Scapula | 2 | Calcaneus | 1 | |
| | | | Phalanx 2 | 3 | Radius | 3 | Pelvis (acet.) | 1 | |
| | | | | | Ulna | 5 | Rib | 7 | |
| | | | | | Femur | 5 | | | |
| | | | | | Metapodial | 4 | | | |
| | | | | | Aastragalus | 6 | | | |
| | | | | | Central 4th tarsal | 3 | | | |
| | | | | | Pelvis (acet.) | 5 | | | |
| Fallow deer | | | Antler | 2 | Mandible | 1 | Tibia | 1 | |
| | | | | | Femur | 2 | Metapodial | 1 | |
| | | | | | Pelvis (acet.) | 1 | | | |
| Red deer | | | | | Aastragalus | 2 | | | |
| Wild boar | | | | | Mandible | 1 | | | |
| | | | | | Scapula | 1 | | | |
| Gazelle | | | Horn | 1 | | | | | |

Abbreviations: acet.= acetabulum; ver.= vertebra.

Sources: Following Binford 1981; and Cope 1999; 2004.

Such finds are rare in Iron Age contexts in Israel, particularly in its northern part (Horwitz and Tchernov 1990; Tsahar personal communication).

Other Wild Mammals. Other wild mammals in the assemblage (which have most likely been hunted) are open landscape and woodland ungulate species. They include the Mesopotamian fallow deer (*Dama mesopotamica*), mountain gazelle (*Gazella gazella*),

red deer (*Cervus elaphus*), fox (*Vulpes vulpes*), and hedgehog (*Erinaceus europaeus*) (see table 2).

Birds and Reptiles. The bird remains (N = 50) comprise predominantly water species: goose, mallard, cormorant, pelican, black-winged stilt, and crane (in order of relative abundance; table 2). In addition, there are 24 bones that could only be identified to goose size (N = 19) and pelican size (N = 5). A

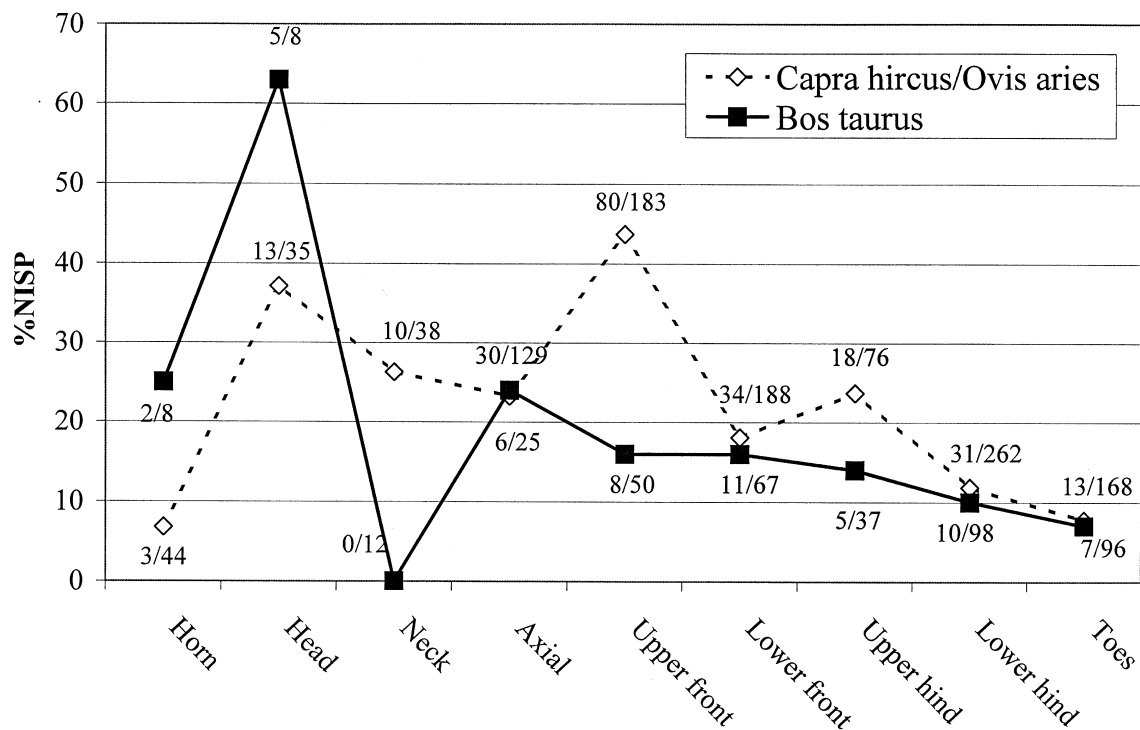


Fig. 7. Sheep/goat bones with cut marks arranged by anatomical unit (based on NISP, excluding isolated teeth). NISP values are given for each column.

partridge and a vulture were represented by one bone each.

Also occurring are the remains of spiny soft-shell tortoise ($N = 8$), and spur-thighed tortoise ($N = 2$). The shell of the former was found complete, in situ, upside down near a wall in Phase D2/11, and was probably used as some receptacle/installation (fig. 10; regarding Phase 11, see more below).

Fish Exploitation and Consumption

The fish assemblage includes 756 skeletal elements, of which 370 (MNI = 25), were identified to 12 species from 10 families (table 2). Most of the remains belong to bony fish, but cartilaginous fish remains were also recovered, including several vertebrae centrums, a teeth plate, and a tail spine of a ray (Myliobatidae). The species identified represent several aquatic habitats: the Mediterranean (sea bream, mullet, dusky grouper, grey triggerfish, shark/stingray, grey mullet, red mullet, meagre); freshwater (catfish, St. Peter's) and some imported species from the Nile (Nile perch, Nile catfish). Nile perch (*Lates niloticus*) remains were extremely abundant (51% of the total fish NISP), followed by the sea

bream (*Sparus* sp., 17.6%) and the three species of mullets (Mugilidae, 13.2%; table 2; fig.11).

Although sieving was not carried out for most of the Area D2 deposits discussed here, various skeletal elements were retrieved, including both cranial and postcranial elements (usually, in hand-picked assemblages, postcranial elements, and vertebrae in particular, are much better represented as they are more visible).

Interestingly, most of the cranial remains identified belong either to *L. niloticus* or to *Sparus* sp. In the case of *L. niloticus*, this find shows that the fish were transported whole. This is especially revealing for the Nile perch, whose larger specimens were over 2 m long.

Estimation of body size (standard length) was possible for the Sparidae (sea bream; Desse and Desse-Berset 1996a), *Epinephelus* sp. (groupers; Desse and Desse-Berset 1996b), and for Nile perch (following Van Neer 1989). As observed from the data in table 6, the fish present a wide range of body sizes, although fish smaller than 20 cm in length are absent. This can be attributed to the lack of fine sieving (Shahack-Gross et al. 2005).

Cut marks were observed on a few bones belonging to Nile perch (5 bones, of which 4 are of skulls;

TABLE 5. Width (W) and Length (L) of Lower Third Molars of Swine from Early Iron Age Dor, in Comparison to Recent Wild Boars from the Mediterranean Region of Northern Israel

| <i>Species</i> | <i>N</i> | | <i>Range</i> | | <i>Average</i> | | <i>SD</i> | | <i>T-Test</i> | |
|------------------|----------|----------|--------------|-------------|----------------|----------|-----------|----------|---------------|----------|
| | <i>W</i> | <i>L</i> | <i>W</i> | <i>L</i> | <i>W</i> | <i>L</i> | <i>W</i> | <i>L</i> | <i>W</i> | <i>L</i> |
| Dor | 3 | 2 | 13.32–19.22 | 37.92–39.81 | 16.83 | 38.87 | 2.45 | 1.34 | t = 1.67 | t = 0.24 |
| Recent wild boar | 19 | 19 | 16.35–19.93 | 34.29–45.39 | 18.00 | 39.36 | 0.87 | 2.81 | p = 0.11 | p = 0.81 |

Source: Data from Haber 2001.

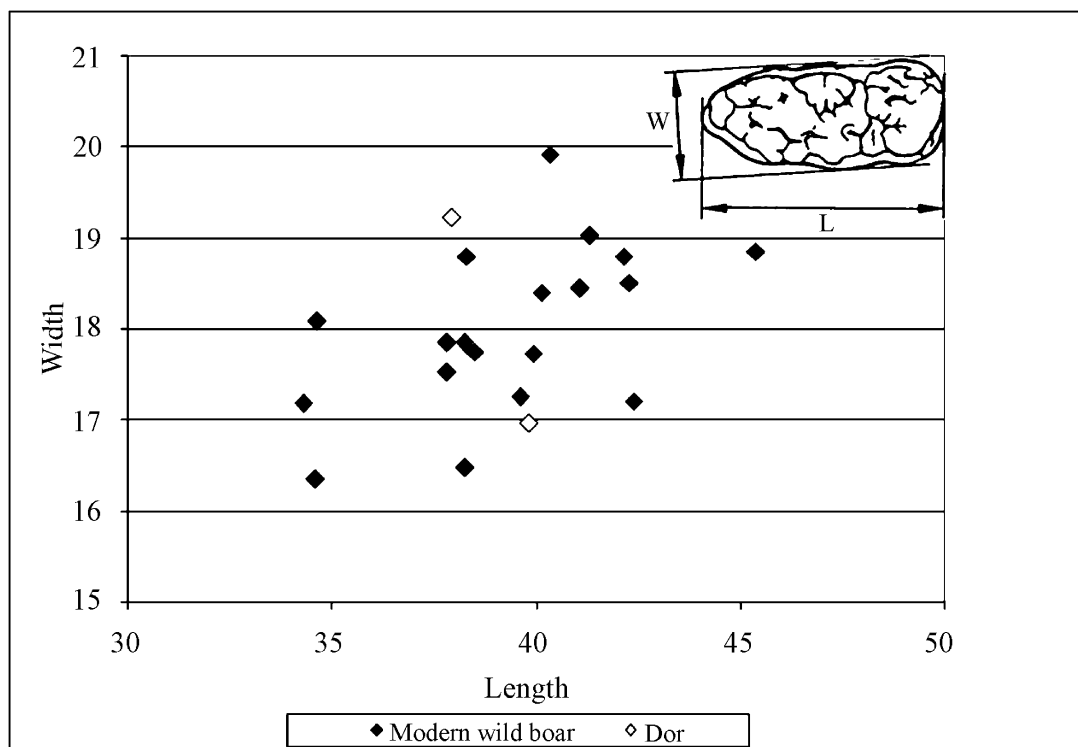


Fig. 8. Scatter plot of third lower molar (width vs. length) of modern wild boars (◆) and specimens from early Iron Age Dor (◇).

fig. 12). Considering the rarity of cut marks usually observed on fish remains, this is remarkable. In term of their locations, these marks correspond to those found by Zohar and Cooke (1997) on modern fish processed by traditional fishermen for long-term preservation, by salting and sun drying.

DISCUSSION

Economic Profile

The D2 faunal assemblage is dominated by domestic livestock, which consisted predominantly of sheep

and goats and, to a lesser extent, cattle. The preponderance of animals older than two years of age, as well as the abundance of goats (which are relatively poor in meat when compared with sheep and cattle), indicate that the animals were used mainly for labor and secondary products (until, finally, they were slaughtered as well; but for another interpretation, see Cribb 1987). Fish were also a major food resource in the economy of the site.

Table 7 and fig. 13 summarize the occurrences of sheep, goat, cattle, and pig/wild boars in various Iron Age sites in the southern Levant, with one site each in Syria and Transjordan. All these assemblages



Fig. 9. Complete juvenile tibia of *Hippopotamus amphibius* from early Iron Age Dor (L17241, Phase D2/8).

were quantified in roughly similar ways, and the data are based on published NISP values. In many of these reports, including that of Dor Area G (Lisk 1999), the reason why swine remains were defined as domesticated pig is not made explicit (exceptions are, for example, Hesse 1986: 20; see also Wapnish and Hesse 1988). We did not include here bone assemblages from which less than 200 identified specimens were published. Though we did not conduct a systematic investigation into the contexts that produced the bones, we a priori disregarded “special” con-

texts, such as cultic ones, where specific functions may have resulted in anomalies in the distributions (e.g., the High Place at Dan—Wapnish and Hesse 1991; and Mt. Ebal—Horwitz 1986–1987). As is demonstrated in fig. 13, the relative occurrences of sheep and goat versus cattle and pig are fairly constant, different ecological niches notwithstanding (for some differences, see below).⁹ This was the habitual economic strategy in this part of the Levant, the “traditional Middle Eastern subsistence pattern” (Horowitz, Tchernov, and Dar 1990; Tchernov and Kolska-Horowitz 1990; Grigson 1995), attested, with various fluctuations, since the Early Bronze Age.¹⁰

Only about half of these published reports have attempted a distinction between sheep and goats (fig. 14, data extracted from table 7). Sample sizes are small, and the comparison must be interpreted with caution, but it appears that sheep and goats have been exploited in the Iron Age in roughly equal numbers. Exceptions are dictated mainly by localized ecological factors (Tchernov and Kolska-Horowitz 1990; Grigson 1995).

Meat distribution and consumption patterns can be deduced by the frequency of body parts (of live-stock) and butchering marks. As all body parts are

⁹ High frequencies of sheep/goat compared with cattle were mostly noticed in arid areas, including the desert fringe (e.g., in our sample, Tell Hesban [LaBianca 1995] and Be’er Sheva [Sasson 2004]). Cattle is predominant only at Tel Kinrot (Bar-Oz and Raban-Gerstel forthcoming) and Tel Dan (Wapnish and Hesse 1991), probably reflecting the lush and marshy environments with abundant water supply (though, as mentioned, the Dan assemblage may also reflect its cultic nature). Regarding Tel Kinrot, we note that the sample is quite small.

¹⁰ One comment is in order here in this respect. In one of her frequently cited papers, Grigson (1995) calculated the relative contribution of sheep, goat, pig, and cattle in cis- and Transjordanian sites from the Pottery Neolithic until Iron Age II, reaching the conclusion that in all these periods, in all regions investigated, cattle was the prime source of meat. This, at first, may seem to contradict the data cited above. It is, however, a somewhat controversial conclusion. Grigson’s method takes the number of bones identified for each species (NISP), multiplying it by a factor denoting the amount of meat (in kg) a typical animal of that species yields (e.g., a cow yields 625 kg, a pig 100, and a sheep 80 kg). This method is controversial for two reasons. First, in unsieved faunal assemblages, cattle bones will be relatively better represented (as they are larger and more visible). Since the meat yield factor of a cow is larger by nearly an order of magnitude from that of a sheep, this situation will cause a gross exaggeration in the dietary contribution of cattle (for the problematics of using NISP values to quantify meat yields, see also Grayson 1984; Lyman 1994; White 1953). In addition, Grigson does not take into consideration the use of domestic animals for purposes other than meat, i.e., secondary products and labor (only pigs had no use beyond their meat).

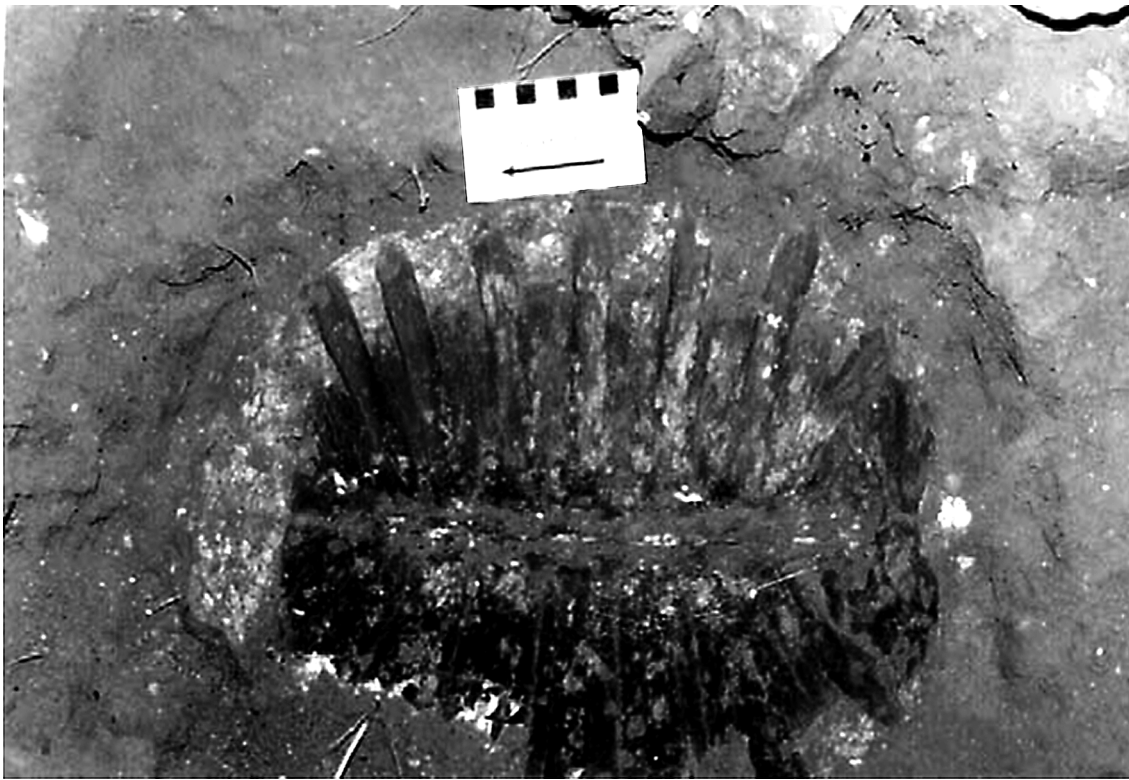


Fig. 10. Upside-down turtle shell, possibly used as some installation in L19623, Phase D2/11.

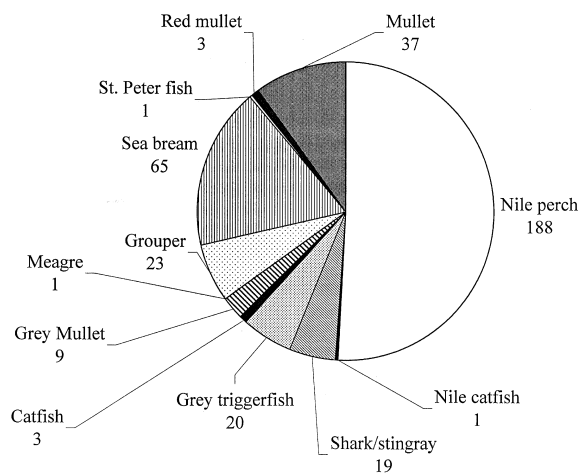


Fig. 11. Relative abundance of fish taxa, with NISP values.

well represented, regardless of their economical value, it is obvious that the animals were complete when butchered, on a large scale, onsite. Likewise, there is no overrepresentation of the more meaty parts (such as upper limbs), and there is a substantial presence of

slaughter offal, i.e., body parts of very low economic value, such as toes and skulls (for a different situation, see, e.g., Hellwing and Gophna 1984: 54). This conclusion is corroborated by the butchery patterns revealed in the assemblage. Both sheep/goat and cattle skeletal elements represent a mixture of primary butchery (slaughter, skinning, and carcass division) and secondary butchery, i.e., food processing and consumption (see discussions in Hellwing and Gophna 1984; Hesse and Wapnish 1985; Zeder 1991: 23–44 and references there). In their locations, angles, and accuracy, the cut marks are highly standardized, and it is tempting to speculate that they exemplify specialized butchery.

The fact that goats, which are relatively poor in meat (when compared with sheep and cattle), are represented in substantial numbers means (a) that they were probably used mainly for secondary products¹¹ and (b) that they were probably raised locally. If Dor was only or mostly consuming meat produced

¹¹ As mentioned above, this is also indicated by the mortality profile of the livestock.

TABLE 6. Body-Size Estimation of Fish (standard length in mm) Compared with Modern Fish

| <i>Species</i> | <i>Bone</i> | <i>Estimated Size Length</i> | | | | | <i>Recent Data</i> | |
|----------------|---------------|------------------------------|------------|------------|----------------|-----------|--------------------|------------|
| | | <i>n</i> | <i>Min</i> | <i>Max</i> | <i>Average</i> | <i>SD</i> | <i>Average</i> | <i>Max</i> |
| Sea bream | Premaxilla | 16 | 222.50 | 410.62 | 297.55 | 52.82 | 150–350 | 600 |
| | Dentary | 10 | 197.88 | 588.03 | 333.34 | 127.11 | | |
| | Atlas | 2 | 288.37 | 719.33 | 477.15 | 187.71 | | |
| Grouper | Dentary | 3 | 446.04 | 640.12 | 561.05 | 101.91 | 200–800 | 1200 |
| | Maxilla | 1 | 363.16 | 363.16 | 363.16 | 363.16 | | |
| Nile perch | Atlas | 5 | 575.93 | 1695.62 | 1101.87 | 293.96 | | 2000 |
| | Axis | 7 | 423.33 | 2019.15 | 1011.49 | 462.78 | | |
| | Basioccipital | 4 | 558.51 | 1123.76 | 794.24 | 204.23 | | |
| | Dentary | 1 | 1125.40 | 1173.43 | 1149.40 | 24.00 | | |

Source: Recent body sizes of sea bream and groupers are from Golani and Darom 1997; sizes of Nile perch are from Berra 2001: 376.

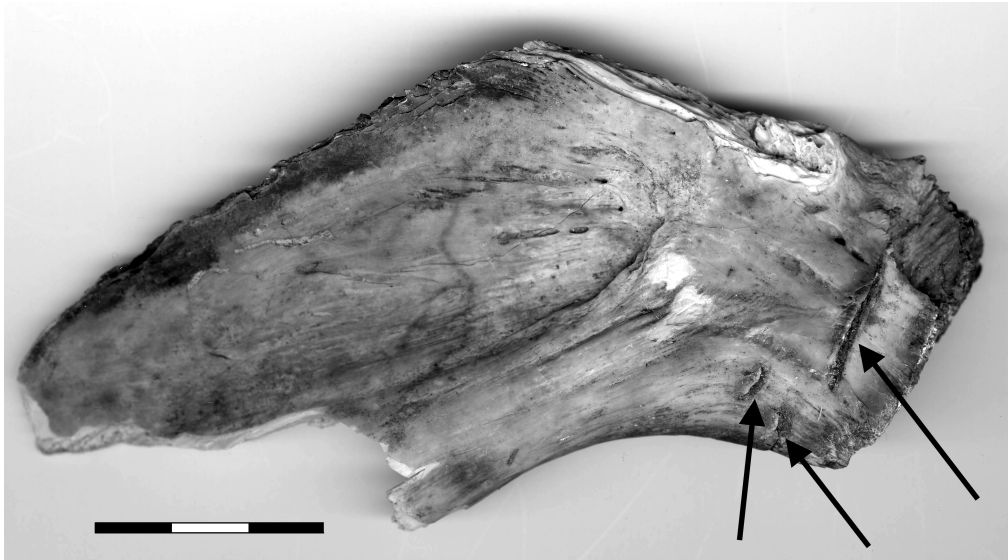


Fig. 12. Butchery marks on a prepercular cranial bone of Nile perch; the arrows indicate the locations of the multiple cuts.

elsewhere, we would expect to find more animals with high yields of meat (i.e., sheep vs. goat).

Exploitation of the Environment

Hunting. Although the inhabitants of Dor mainly raised livestock species, they continued to exploit their surrounding environment (table 2) by hunting, fishing, and trapping a wide range of wild animals.

Though their relative portion in the assemblage is modest, the variety of species is exceptional. The (few) wild ungulates represented suggest some exploitation of the different ecological niches surrounding the site. Fallow deer and red deer represent the woodlands, and the open landscape and bushland are represented by boar and gazelle.

Exploitation of the marshy environment (the tell's immediate vicinity) is attested by the soft-shell turtle

TABLE 7. Relative Abundance of Sheep, Goat, Cattle, and Pig Remains in Selected Iron Age Bone Assemblages from the Southern Levant where NISP > 200

| <i>Site</i> | <i>Location</i> | <i>Iron Age</i> | <i>Reference</i> | <i>NISP</i> | <i>Sheep/ Goat</i> | | | <i>Sheep/Goat</i> | <i>Cattle</i> | <i>Pig</i> |
|-------------------------|----------------------|-----------------|---------------------------------|-------------|------------------------|-----|-----|-------------------|---------------|------------|
| Dor, Area G, Phases 9-6 | Carmel coast | I-IIA | Lisk 1999 | 4792 | 1432 | 84 | 31 | 1547 | 679 | 32 |
| Be'er-Sheva IX-VI | Northern Negev | I-II | Hellwing 1984 | 1222 | 1010 | | | 1010 | 164 | 3 |
| Be'er-Sheva II | Northern Negev | IIB | Sasson 2004 | 4227 | 2499 | 445 | 568 | 3512 | 568 | 6 |
| Miqne-Ekron VII-IV | Shephelah | I (-IIA?) | Lev-Tov 2000 | 7318 | 2729 | 172 | 224 | 3125 | 2625 | 1322 |
| Miqne-Ekron III-I | Shephelah | IIB-IIC | Lev-Tov 2000 | 2765 | 1679 | 87 | 162 | 1928 | 617 | 99 |
| Lachish V-II | Shephelah | IIA-IIC | Croft 2004 | 3098 | 1636 | 200 | 269 | 2105 | 826 | 18 |
| Tell Qasile XII-IX | Sharon coastal plain | I-IIA | Davis 1985 | 242 | 181 | | | 181 | 55 | 3 |
| Tel Masos III-I | Northern Negev | I-IIA | Tchernov & Drori 1983 | 414 | 278 | | | 278 | 109 | 1 |
| Tel Michal XIV-XII | Sharon coastal plain | IIA-IIB | Hellwing & Feig 1984 | 648 | 239 | | | 239 | 123 | 3 |
| Tel Kinrot VI-IV | Sea of Galilee | IB | Manhart & Von den Driesch 2004 | 1361 | 448 | 64 | 79 | 591 | 666 | 13 |
| Tel Kinrot III-I | Sea of Galilee | IIB-IIC | Manhart & Von den Driesch 2004 | 3364 | 857 | 199 | 256 | 1312 | 1505 | 66 |
| Tel Kinrot II-I | Sea of Galilee | I | Bar-Oz & Raban-Gerstel n.d | 723 | 361 | 10 | 35 | 406 | 244 | 15 |
| Tel Harasim IVB | Shephelah | IIB | Maher 2005 | 1163 | 723 | | | 723 | 372 | 3 |
| Tell Qiri IX-V | Jezreel Valley | I-IIC | Davis 1987b | 971 | 793 | | | 793 | 142 | 14 |
| Izbet Sarta III-I | Samaria foothills | I-IIA | Hellwing & Adjiman 1986 | 1203 | 635 | | | 635 | 411 | 5 |
| Shiloh V | Samaria | I | Hellwing, Sade, & Kishon 1993 | 1350 | 1014 | | | 1014 | 306 | 1 |
| ʿAin Dara XX-XIII | Syria | I | Frey & Marean 1999 | 1233 | 413 | 89 | 109 | 611 | 208 | 329 |
| Tell Heshan XX-XIX | Jordan | I | LaBianca & Von den Driesch 1995 | 2699 | 1866 | 112 | 175 | 2153 | 401 | 2 |

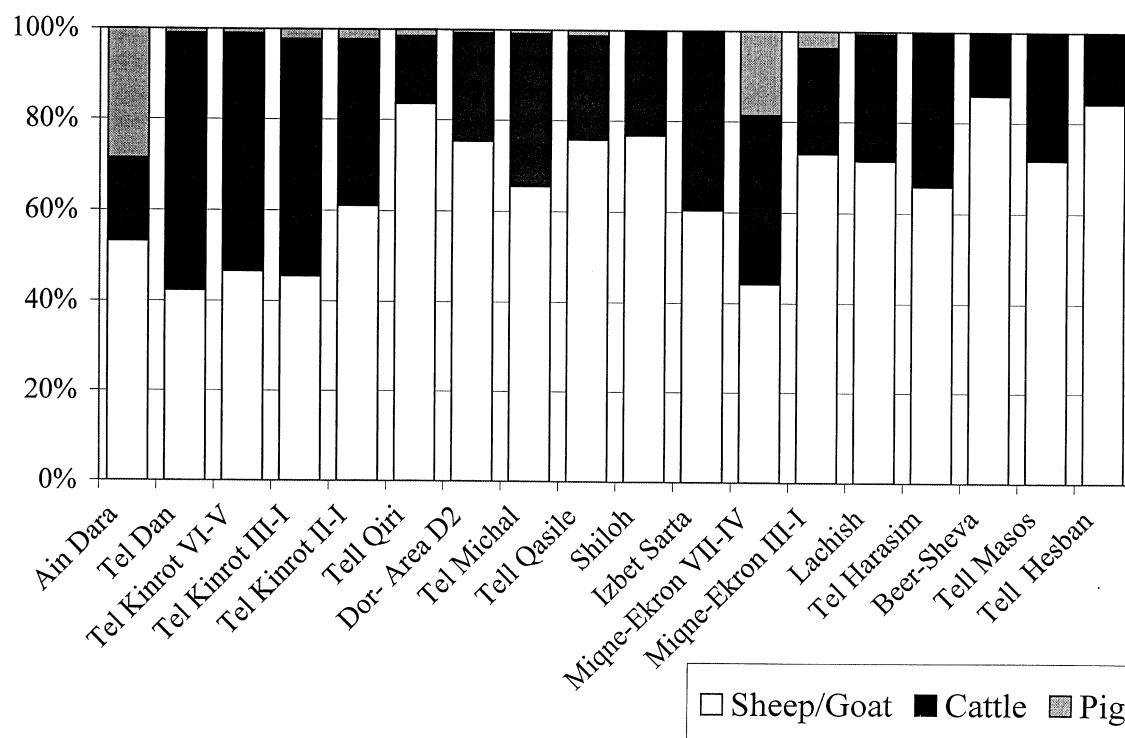


Fig. 13. Relative frequencies of sheep/goat, cattle, and pigs in selected Iron Age assemblages in the southern Levant (references in table 7).

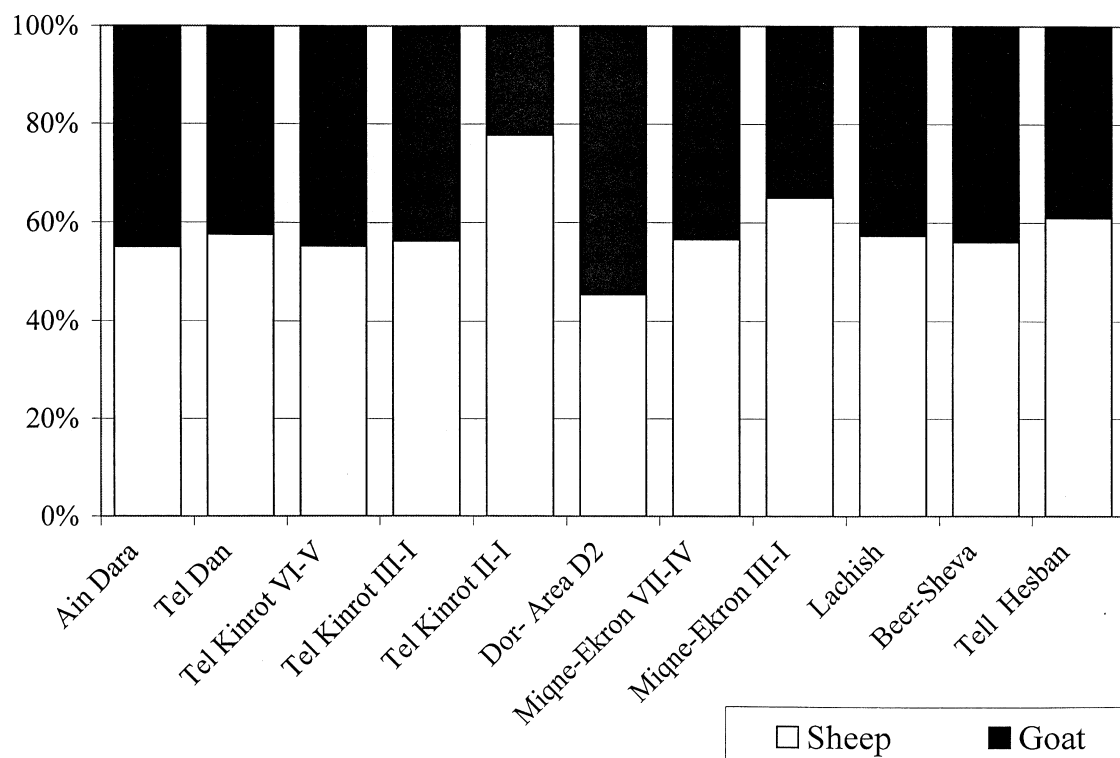


Fig. 14. Relative frequencies of sheep versus goats in Iron Age assemblages in the southern Levant (reference in table 7).

and the hippopotamus remains (at least one of them is juvenile). It is surprising that the very nourishing and easy-to-catch turtles are not better represented. Although hippopotamus remains are rare (another complete humerus was recovered in an insecure Iron Age context in Area B1; Stern 1985: 60–64, identified by L. K. Horwitz), we regard them as a natural part of the marshy surroundings of Dor and find no reason to assume that hippopotami were imported from Egypt. Hippopotami were part of the landscape of the Sharon and coastal plain of the southern Levant until the early Iron Age (Horwitz and Tchernov 1990; Mendelsohn and Yom-Tov 1999). In general, hippopotamus postcranial bones (as opposed to ivory, unworked or processed) are very rare in the archaeological record of historical sites in Israel.¹²

Fishing. Although reconstruction of fish exploitation patterns is severely hampered by the collection protocol, the relatively rich spectrum of species implies that fishing was important. Fishing took place mainly in the shallow littoral zone of the Mediterranean and its estuaries. Although very rare, freshwater fish were exploited as well. The species represented were most likely captured by unselective methods such as traps or nets, although spears might have also been in use for larger Serranidae and Sparidae that occupy rocky habitats (von Brandt 1972; Van Neer, Zohar, and Lernau 2005). A similar pattern of fish exploitation was observed in Area G (Lisk 1999), where Sparidae and Serranidae were also highly abundant.

The notable absence of pelagic fish cannot be attributed to the retrieval method, since in Area G, where part of the sediments were wet sieved with a fine mesh, pelagic fish are also absent (Lisk 1999). Moreover, some of the pelagic fish, such as little tunny (*Euthynnus alletteratus*), are relatively large fish. It thus seems that the fishermen of Dor did not venture into the deep sea.

Since sieving was not applied in most Iron Age sites, our knowledge regarding fish exploitation

during this period is meager (Van Neer, Zohar, and Lernau 2005 and references), and it is difficult to compare the Dor fish assemblage to that of other sites. Still, the scanty information available indicates that, like the situation at Dor, early Iron Age populations exploited mainly the shallow littoral zone and did not engage in deep sea fishing (Van Neer, Zohar, and Lernau 2005).

Aspects of “Urbanism”

As was shown by the foregoing analyses, the site produced a significant part of its meat (and did not, or at least did not only “import” it from elsewhere), and animals were butchered onsite. This is indicated by the following phenomena: the high abundance of species; the emphasis on sheep/goat and cattle, especially adult animals, exploited for their secondary products; the skeletal completeness; and the evidence for a full range of butchering stages. In all these characteristics, Dor fits well Zeder’s (1991: 23–44, table 1) definition of a producer-consumer settlement, as opposed to consumer only (though we cannot, of course, preclude the possibility that some meat was also obtained elsewhere). This is compatible with the evidence mentioned above obtained by the analysis of phytoliths and spherulite-bearing sediments, and this combined evidence dictates a new reading of the nature of “urbanism” in early Iron Age Dor (see also the concluding remarks of the Dor phytoliths study in Albert et al. 2008: 73–74 and references there).

Trade Networks

Importation of fish from Egypt is attested by the abundant Nilotic species, mainly *Lates niloticus* and also *Bagrus* sp.¹³ We cannot rule out the possibility that Nile perch were transported alive (possibly in some large containers on board ships), but this seems quite improbable, especially for the larger specimens.

Identification of stored fish is primarily based on skeleton completeness and cut marks (Zohar et al. 2001; Zohar and Cooke 1997). Although in the pres-

¹² But found at Tel Aphek (Early Bronze; Hellwing and Gophna 1984); Tell Qasile (Iron I; Haas 1953; Davis 1985); Tel ‘Erani (Early Bronze; Yeivin 1957); Tel Nagila (Middle Bronze; Ducos 1968); Tel Kinrot (Iron I; Manhart and von den Driesch 2004). In addition, bones found at the Tananim and Yarkon rivers (the Sharon plain, south of Dor), were radiometrically dated to the Early Bronze Age; see Bytinski-Salz 1965.

¹³ Although Lernau (1986–1987) has suggested that Nile perch were part of the natural habitat of the coastal rivers of Israel, it is accepted nowadays that this species could never have survived in these small, shallow rivers, and therefore, in all periods, these constitute imports, most likely from Egypt (Van Neer et al. 2004).

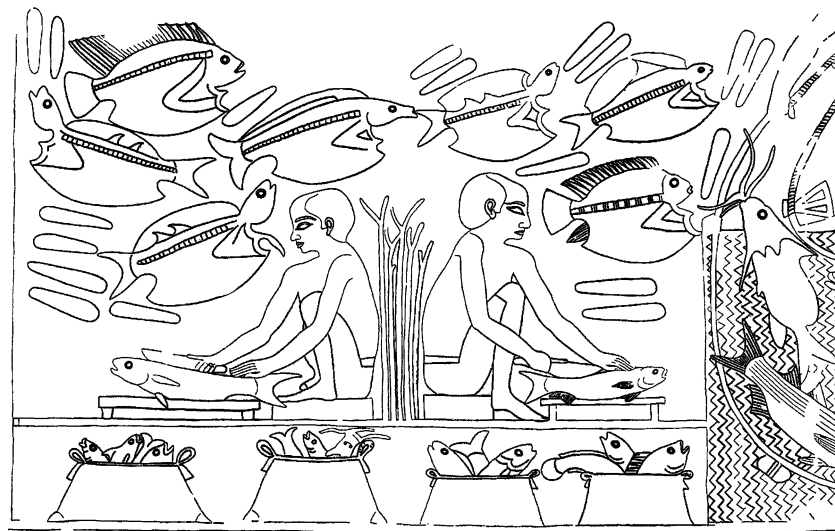


Fig. 15. Processing of salted and dried fish in Tombs 2 and 29 at Beni Hasan (Newberry 1893: pls. 12, 28).

ent study some of these methods could not be fully applied, the reconstructed sizes of the Nilotic perch, the presence of cranial and postcranial bones, and the cut marks demonstrate that we are dealing here with dry and salted fish, split lengthwise. It seems reasonable to assume that at least some of the Nile perch were shipped as complete fish. This may be compared to fish drying and salting processes depicted in Tombs 2 and 29 at Beni Hasan (Newberry 1893: pls. 12, 28; here fig. 12). From these it can be deduced that the fishes' heads were left intact and the bodies were cut longitudinally before drying. In Area D2, of the five butchery marks on Nile perch, four are on crania, and thus in all likelihood they indicate dried fish.¹⁴

The Egyptian fish at Dor thus complement the picture obtained by ceramic analysis. As mentioned, to date Dor is the only early Iron Age site in the southern Levant where extensive contacts with Egypt are attested by hundreds of Egyptian store jar frag-

ments (and some complete vessels), at least from the Late Bronze Age II until Ir1/2 and possibly into Ir2a (Gilboa 2005; Sharon and Gilboa in press and reference therein).¹⁵ We do not yet know what these jars contained, but fish are definitely a possibility, as postulated by Kathryn Eriksson (1995: 200) for some of the Egyptian jars at Hala Sultan Tekke in Cyprus (see also Åström 2006). For the time being, however, we cannot prove a systemic association between fish and jars.

The Nile perch at Dor are definitely not a unique phenomenon. As summarized by Arndt et al. (2003) and Van Neer et al. (2004), a significant importation of Egyptian fish into the Levant is attested since the Chalcolithic period, and not only in coastal sites; but in most cases quantities cannot be assessed. In conjunction, however, Egyptian fish and Egyptian jars highlight Dor's prominence as a port of call for (probably maritime) traffic from that region, which, of course, finds its clearest literary expression in the Wenamun Report. This indeed meets our expectations, but it cannot be proved that inland sites, like nearby Megiddo, were catered through Dor.

¹⁴ Whether or not the abundance of Nile perch at Dor is confined to the Iron Age only, and/or is context specific, still remains to be determined. In Area G in the same time span, these fish were much scarcer (Lisk 1999), though, as mentioned, some of the contexts there had been sifted. Likewise, in late Iron Age (seventh-century B.C.E.) deposits excavated in Area D2 in recent years, which were extensively sifted, Nile perch are extremely rare.

¹⁵ These commercial contacts exemplify a different phenomenon than that attested by the (mostly Canaanite-based) production of a variety of Egyptian shapes in the Egyptian centers in Canaan during the Late Bronze Age and the LB/Iron Age transition.

Pigs vs. No Pigs

In the framework of early Iron Age Canaan/Israel, an epoch perceived by many as that of the ethnogenesis of Israelites, Philistines, and others, attempts to define ethnicity in the archaeological record still hold center stage (discussions, obviously, are too numerous to cite). No doubt, dietary habits must be a major consideration (in Finkelstein 1997, quite despairingly, they were even claimed to be the only line of inquiry left).

Occurrences of pig remains in the Levant, and their interpretations, have been extensively discussed by Hesse (1990), Hesse and Wapnish (1998), Zeder (1996; 1998), and others. As mentioned above, early Iron Age sites in Philistia are among the very few contexts where pig remains were prominent.¹⁶ This was best exemplified for Tel Migne-Ekron, where percentages of pig bones (NISP = 1322) are as follows: Stratum VII–13%; Stratum VI–23%, Stratum V–24%, Stratum IV–7%; i.e. an average of 18% in the early Iron Age. Subsequently, in the late Iron Age, there is a drastic decline: 5% in Strata III/II and 2% in Stratum Ic–b (Lev-Tov 1999; 2000; see also Hesse 1986). Significant pig remains were reported for three other early Iron Age sites in Philistia: Tel Batash, Ashkelon, and Ashdod, and pigs were also reported at Tell Qasile.¹⁷ Taken against the regional faunal background and compared with dietary habits in the Aegean, Hesse, Wapnish, and recently Lev-Tov (e.g., Hesse 1990; Hesse and Wapnish 1997; Lev-Tov 2000: 132) concluded that pigs in Philistia exemplify dietary habits of a new population from the Aegean, an origin that has been advocated for the Philistines long ago by other considerations (e.g., lately Dothan 2003). Indeed, this seems a very plausible explanation, and it has almost unanimously been embraced. Thus, the zero occurrences of domesticated pigs at Dor, a site usually conceived as another “Sea People” site, is of interest.

¹⁶ Among the sites in table 6, this was also attested at ‘Ain Dara (Iron Age I, combining Temple and non-temple contexts; Frey and Marean 1999).

¹⁷ Tel Batash Late Bronze Age: 5% (NISP = 317); Iron Age I: 8% (NISP = 231); Iron Age II: 9% (NISP = 914); Ashkelon 13th/12th century B.C.E.: 4% (NISP = 101); 12th century B.C.E.: 19% (NISP = 109); 11th century B.C.E.: 5% (NISP = 179); 10th century B.C.E.: 4% (NISP = 216) (Hesse 1990); Ashdod 12th century B.C.E.: 15% (NISP = 68); 11th century B.C.E.: 7% (NISP 112); for Tell Qasile, see Davis 1985.

Chronologically speaking, the Dor sequence reported here overlaps that of Migne-Ekron only partially. In both Areas D2 and G there is no equivalent to Stratum VII at Migne (the LB/Ir horizon in our terminology), and it is unclear whether the site was inhabited then. The Area D2 sequence discussed here roughly parallels Strata V–IV at Migne, (our Ir1a1b, Ir1b, and Ir112, Phases D2/14–8c); and also includes Ir2a (Phase 8a), which may be later than Migne IV, but is probably earlier than Stratum III there.¹⁸ However, most of the assemblage studied (Phases D2/11–8a; 1,519 of the 2,308 identified bones), belongs to the latter part of this range, equaling, *grosso modo*, Migne Va, IV, and somewhat later. The sequence in Area G studied by Lisk (1999) covers the same time span, with the addition of one earlier horizon, which is not clearly represented in D2: Phase G/9, our Ir1a *late* (pre-destruction), which falls somewhere in the range of Migne VIa–Vb.

Minute chronological comparanda notwithstanding, evidently nothing at Dor resembles the pig phenomenon of Philistia (less than 1% in both areas studied, and at least in Area D2 comprising wild boars and not domestic animals). The difference between Dor and Philistia in various media of material culture has been discussed at length in the past (see above and references in those publications), and the results of the faunal analysis fit this picture well, meet our expectations, and indeed further highlight the uniqueness of Philistia in this respect too. They are unable, however, to corroborate or refute our assumption regarding newcomers from Cyprus.

Regarding pigs in early Iron Age Philistia, however, Hesse (1990: 219) raised another possible explanation, which deserves serious consideration. Drawing on a variety of ethnohistorical cases, he suggested that the reason for their abundance may have been that the transition to Iron I in Philistia, coinciding with the new population influxes, disrupted traditional pastoral systems and marketing networks, “forcing the inhabitants to fall back on the species best adapted to their environment in the plains, cattle and pig.” Indeed, it seems that the socioeconomic effects of the two main phenomena marking this period in Philistia—the withdrawal of the Egyptians and the arrival of “westerners”—have not been sufficiently assessed (see comments in Gilboa 2006–

¹⁸ Not enough information on Stratum III at Migne has been published to date, and no chronological comparison is possible.

2007). Particularly, though some scholars envision the early Iron Age sites in Philistia as a commercial nexus both for terrestrial and overseas trade (Bauer 1998; Sherrat 1998; Knauf 2001), this is hardly corroborated by evidence in the ground (e.g., Barako 2000; Gilboa 2005: 67–70). In fact, there is some artifactual evidence to the contrary. To date, for most of the early Iron Age in Philistia, evidence for commercial links with Cyprus is scarce, as opposed, for example, to the situation at Dor. “Collared rim jars,” which were transported in and between the hilly regions of Canaan/Israel, the northern valleys, and northern coastal plain (e.g., Artzy 1994; Wengrow 1996; Cohen-Weinberger and Wolff 2001), are all but nonexistent. Even commerce with neighboring Egypt is significantly less conspicuous than at Dor: the numerous Egyptian jars at Dor throughout the early Iron Age have, for the time being, surprisingly few corollaries in the extensively excavated sites of Philistia. This issue, however, will not be further explored here.

SOME CAVEATS: TOWARD FUTURE CONTEXTUAL ANALYSIS OF BONES

As mentioned, the foregoing analysis was based on an amalgamation of eight stratigraphical phases, each composed of several architectural spaces (fig. 3). Obviously, in complex architectural landscapes such as “urban” sites like Dor, this is not enough, and many insights might be gained by differentiating subunits (architectural and other).

The principal challenge for any contextual analysis in tell sites is that of identifying redeposited, residual material, which is especially problematic for a continuously inhabited site like Dor, where, as a rule, human activity took place on earthen surfaces and “floors” (this was the case for all the contexts analyzed in D2 and most of the contexts in G).

From among the D2 contexts we chose three test cases. The first two are floor deposits in “Benny’s House” of Phases 8c and 8b (indicated by an arrow in fig. 3; Ir1/2 and Ir2a, respectively). These are two superimposed earthen floors in the best exposed room of the house, of which only three walls are known (the northern wall lies outside the excavation area). The extant dimensions of the room are about 25 m², and in the three known walls there is only one

narrow (ca. 1 m) entrance, in the western wall. The two floors were strewn with ceramic vessels in primary deposition, many of them in articulation, and by this fact, and by architectural considerations, it is clear that both phases of this room met a sudden end. These, then, were our best shot at primary faunal deposits. The ceramic profile of these assemblages has not been analyzed yet, but at first glance seems a normal, “domestic” assemblage, comprising many household vessels, ground stone tools, and the like (see provisionally Gilboa 2001: pls. 5.59–5.66, 5.73–5.76). The Phase 8c floor also produced elaborately painted Phoenician Bichrome drinking/serving vessels (e.g., Stern 2000a: color pl. X:2; Gilboa and Sharon 2003: fig. 11:11). For the time being, the only reasons to postulate a nondomestic function for this room is the very fact that it was situated in an area where structures in the previous (and subsequent) phases were of an obvious public nature (see above) and that “Benny’s House” had at least one ashlar corner—a rare feature in Iron Age Dor.

These two primary contexts (8c floor: NISP = 219; 8b: NISP = 72) produced results that in all respects were similar to those obtained from the amalgamated assemblage. Sheep and goat were dominant, and cattle percentages ranged between 17.8% and 19.4%. The percentage of cut marks (14%) is also similar to that of the general assemblage, and likewise the body-part representation among the bones bearing cut marks.

The third assemblage analyzed separately is that of Phase 11 (indicated by an arrow in fig. 3; Ir1b), which was exposed over an area of about 20 m² (NISP = 261). Here there was no pottery in obvious primary deposition, but some features and artifacts were definitely in situ, like the upside-down turtle shell in fig. 10 and surrounding bone tools and weights, and an in-situ phytolith deposit retaining the shape of a rounded mat. The main reason we chose this phase was that its scant architectural remains were significantly less imposing than those of previous and subsequent phases and seemed to represent some nonmonumental interlude.

Generally, the Phase 11 bone assemblage was also similar, but the following differences were noted. (1) This is the only phase in Area D2 where sheep outnumber goats (1.5:1 vs. an average of 1:1.2). (2) The relative abundance of Nile perch is significantly higher than those of other fish (78% of the fishes, as opposed to 52% in the general assemblage).

(3) Cut marks were significantly more numerous here (on 25% of the identified bones, vs. about 14% in the general assemblage and on the floors of “Benny’s House” discussed above), while signs of burning were all but nonexistent (one bone).

Regarding the Phase 8c–8b floors, the abundance of bones with cut marks representing all stages of butchery in a primary assemblage led us to postulate that the room excavated served *inter alia* for butchering animals and food preparation; and even the possibility of a slaughterhouse was entertained. The first option could be compatible with the architectural and artifactual characteristics of the building, but the second—probably not. One solution postulated to accommodate the slaughterhouse option was that animal-related activity took place on the first floor and that the numerous pottery vessels collapsed from a second floor, or a roof. But there was no real evidence in the field to substantiate this. Regarding Phase 11, it was suggested that at least some part of Area D2 was used to store and process the imported fish; as mentioned, the area overlooks the site’s southern lagoon. (Some fish-processing function has also been suggested for one of the rooms of the early Iron Age Monumental Building in the eastern part of the area; see Shahack-Gross *et al.* 2005: fig. 2, table 1: layer D.)¹⁹

But is it legitimate at all to try to deduce room function from their faunal composition in the cases

presented above? Even without delving here into the Pompeii premise debate, the answer, obviously, is negative. On both floors of “Benny’s House” dozens of pottery vessels were indeed found *in situ* or in some other primary deposition (and were sealed by an overlying floor)—and these can be argued to belong to one systemic context, but this conclusion cannot be automatically applied to any other find in these contexts. The fact that these deposits were considered sealed probably means that intrusions can be considered minimal or nonexistent, but redepositions are always a possibility, either in the sense of artifacts originating from an earlier stratigraphic/architectural “phase” or from earlier periods of activities on the same floors. The same, of course, is also true for Phase 11, though here the fact that the bone assemblage has some intrinsic characteristics, diverging from that of the amalgamated assemblage, may indicate that here we indeed have, at least partially, some discrete assemblage.

This, then, seems to be one of the main challenges of faunal analyses in complex sites, especially in those, like tell sites, where formation processes are largely due to anthropogenic activities, where large amounts of debris were being shifted around (and where large amounts of animal bones are represented in each and every context excavated). Future analysis of bones in such complex sites will have to operate on a significantly more refined spatial and contextual resolution (e.g., differentiating between types of buildings/spaces and different accumulations within them). As mentioned, such a multivariate taphonomic analysis is indeed being implemented now at Dor.

¹⁹ That context, however, is later than Phase 11—paralleling either Phase 8c or 8b.

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Most of the faunal assemblages discussed here were excavated between 1995 and 2000, when the Tel Dor excavations were directed by Ephraim Stern of the Hebrew University, also on behalf of the Israel Exploration Society and the Berman Foundation for Biblical Archaeology. Area D2 was supervised in these seasons by Gilboa, with Natti Kranot and Benny Har-Even supervising the subareas on the west. The stratigraphy has been analyzed with the collaboration of Kranot, Har-Even, and Svetlana Matskevitch. Matskevitch, Talia Goldman, and Yiftah Shalev of the Hebrew University produced the graphics, and Gold-

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