

Analysis of Faunal Remains Recovered from
Tell Nimrin, Dead Sea Valley, Jordan.

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Introduction

This paper discusses all animal bones recovered from Tell Nimrin, Dead Sea Valley, Jordan during the summers of 1989, 1990, 1993, and 1995. The fauna are associated with occupation levels which range in age from the Middle Bronze Age (2000-1500 B.C.) to modern Islamic times. Tell Nimrin is unique in that little evidence exists for occupation east of the Jordan River during the Middle Bronze Age. Between 1500 and 1000 B.C., the site was abandoned then reoccupied during the Iron Age (ca. 950 B.C.). Comparison of animals represented at Tell Nimrin among Middle Bronze Age, Iron Age and subsequent later levels should provide insights into changing subsistence strategies and land use during these little known time periods on the East Bank of the Jordan River.

Methods Used in the Analysis

In the field, bones were bagged separately and labeled daily with a feature and field specimen number which could be cross referenced with associated ceramics. These bagged bones were transported to field laboratories at the American Center for Oriental Research, Amman (1989, 1990), Deir 'Alla Archaeological Station (1993), and the University of Jordan Agricultural Research Station (1995). In the laboratory, bones were dry brushed, washed when necessary, and separated into generalized categories such as large, medium, or small mammals; fish and birds, etc. Bones possessing diagnostic morphologic features including epiphyses, foramina, and tuberosities were further identified, when possible, to family, genus, and species. Without the aid of a comparative collection, sources useful in the identification included: Boessneck 1969 and Schmid 1972. All bones were examined for butcher marks, green bone breaks, rodent or carnivore gnawing, and evidence of burning. Worked bones or bone tools, were separated from the assemblage, washed, repaired, and registered. Bones, so incomplete or fragmentary that they could only be assigned to general groups, were recorded as representing one of the broad groups and then discarded. Those bones which, when cleaned, showed enough fine morphology for positive or near positive identification but could not be adequately identified without the aid of a comparative collection--bones of fishes and rodents, etc--and bones of special interest--possessing pathological conditions, were packaged and sent to the Osteology Laboratory, Kansas State University, where they underwent further cleaning and identification.

The general format of this report, for both field work and report writing, follows Finnegan (1978, 1981) and Clason and Buitenhuis (1978). Table 1 lists the number of bags and numbers and percentages of specific animals identified for all years of excavation. For the purpose of this study, all excavation units were grouped into cultural phases as defined by the excavator. The phase groupings used in this analysis include: Middle Bronze, Iron I, Iron II, Persian, Late Hellenistic/Roman, Byzantine, Islamic, and Ottoman-Modern. The number of identified specimens (NISP) and percentages have been calculated for each taxon by time period (Tables 2, 3, and 4). Table 2 provides the NISP of animal taxa represented from the major time periods at Tell Nimrin. Table 3 shows the calculated percentages animal taxa across the major time periods at Nimrin. Table 4 provides the percentages of various taxa within

the major time periods represented at the site. Additionally, Appendix A: Tables 1 and 2 provide detailed information about taxa distribution over time at Nimrin.

Basic assumptions involved in this analysis include: 1) the sample excavated from each deposit in each time period is representative, 2) the rate of deposition of sediment in each type of deposit is the same between time periods, and 3) each kind of element (e.g. distal tibia) for each animal has the same probability of being deposited, recovered, and identified in each successive time period or across the site.

This report presents a descriptive analysis of the kinds of animals recovered from Nimrin, overall percentages of animals found at the tell from the Middle Bronze Age to Islamic Period occupations, and how changes in percentages of animal types may reflect shifts in animal use as well as adaptations to environmental shifts throughout time.

Bone Condition and Preservation

Although often displaying extensive cultural modification as a result of human processing (heavy fracturing and green bone breaks), as a whole, the surfaces of bones, recovered from Nimrin are generally in good to excellent condition relative to natural taphonomic factors. Bone surfaces are clear, and fractures--both spiral and non spiral--show no signs of rounding due to hydraulic movement and/or subaerial sandblasting. Weathering, involving split line cracks and exfoliation, is minimal, ranking Stage 2 or lower on the Behrensmeyer (1978) scale. Much of the assemblage is basically unweathered. Weathering is directly influenced by temperature, precipitation, humidity, sunlight and length of time on ground surface (White 1992). Although bones recovered from archaeological excavations showed minimal weathering, bones showing the greatest degree of weathering, Stages 3 and 4, were recovered from a surface survey conducted during the 1989 field season. These bones were uncovered when bulldozers scraped 3-5m of soil from the tell surface to fill westward facing military bunkers after the 1967 war. Twenty years of intense summer solar radiation, trampling by humans and animals, and predictably heavy winter rainfall contributed to the accelerated deterioration of bone surfaces. The intense weathering of bones found on the tell surface indicates that deposition of bones in the past must have been rapid after meat and marrow were removed. Interestingly, weathering was minimal on sub adult mammalian individuals and bones of fowl, usually considered more friable than larger, heavier adult mammalian bone.

The Nimrin bones displayed little rootlet damage. The low intensity of root marking did not obscure cultural modifications. A paucity of rootlet marks indicate that when the tell was periodically uninhabited (e.g. 1500-1000 B.C.), vegetation did not quickly become established on the surface and roots did not penetrate to great depths.

Certain pockets of bones were in such poor condition they could not be identified to genera. Bones associated with levels of mud brick or mud brick detritus suffered the greatest amount of taphonomic damage over time. Excavating the friable bones from the concrete-like matrix often led to their further destruction. Unavoidable bagging procedures and transport of bones to the lab led to further disintegration of bone. Of the bones analyzed, 21.71 % (NISP=5963) were so badly broken that they could not be classified, and are listed as unidentifiable bone (Table1).

Frequently, bones of certain size and thickness, but lacking specific morphologic features, could only be classified in the general categories: large, medium, and small mammals. Bones belonging to the large mammal category probably represent the cow (Bos), horse or donkey (Equus), camel (Camelus),

or possibly large deer (*Cervus*). Bones belonging to the medium mammal category undoubtedly represent non diagnostic fragments of sheep (*Ovis*) and goats (*Capra*). Bones within the non diagnostic, small mammal category include the hare (*Lepus*) and smaller rodents.

Within any given category, for example sheep, only one animal was recorded unless the bones identifiable as sheep showed both mature and immature individuals, in which case two animals were recorded. If multiple bones were found (e.g. three left sheep femora) then the number of elements were counted assuming at least that number of animals to be represented. (See Casteel 1977 and Nichol and Wild 1984 concerning minimum numbers).

Results

Field, and subsequent laboratory, analyses of the Nimrin animal bones show that approximately 75 % (N=18165) of recovered bone could be identified at the general mammal, generic, or lower taxonomic levels. *Capra*, *Ovis*, Sheep/Goat, and the nondiagnostic medium mammal, were the most frequently occurring animal groups identified in the faunal assemblage at Tell Nimrin. The largest percentage of identified bone material from the Nimrin excavations is the sheep-goat category, representing 7.6% (N=1842) if all mature and immature individuals are considered. In addition, at the genus and species level, 1.46% (N=352) of the sample represents sheep (*Ovis aries*) and 1.14% (N=276) represents goat (*Capra hircus*). This gives an overall percentage of 10.23 % of the recovered material representing these animals. The basic criteria for the identification of these animals follows the work of Boessneck (1969) and Boessneck, Muller, and Teischert (1964). We are relatively confident that in our sheep-goat category, we have included no animals of the genus *Gazella* or wild forms of sheep and goat, particularly the ibex (*Capra ibex*). Some bone fragments lacked diagnostic features or were too badly damaged to lend themselves to identification at anything other than the general medium mammal category. Nevertheless, it is highly likely that the bones in the medium mammal category (48.61%; N=11,728) represent either sheep or goats. Altogether, the four categories encompassing sheep and goats represents 58.84% (N=14,198) of the bone assemblage.

The majority of diagnostic sheep/goat bones showed evidence of spalls, or green bone fractures. These types of fractures occur during the butchering process of the animal when heavy blows are delivered against the shafts of long and and the axial skeleton with sharp tools not unlike cleavers. The majority of sheep/goat bone fragments and spalls recovered from the site included autopodia, metapodials, phalanges, and hoof cores--bones associated with the lower, non-meat bearing portion of the legs. Very likely, one of the first steps in the process of butchering these animals involved removing the lower legs in the region of the autopodia. Disarticulated legs bones were discarded as the meat-bearing portions of the carcass were saved for further processing.

Highest numbers and percentages of diagnostic sheep and goat bones taken together occur in the Iron II levels (Tables 2 and 3). However, the number of diagnostic *Capra* and *Ovis* bones remain nearly constant (equally proportional) throughout time at the tell. It is therefore difficult to detect any changing trends in population patterns of these animals which could possibly be due to shifts in climate or animal husbandry. Nevertheless, it is noteworthy that as Tell Nimrin shifted from a small agricultural village of the early Middle Bronze Age (MBA) to a city proper near the end of the MBA, sheep continued to slightly outnumber goats. This trend continued throughout the entire time sequence of tell occupation into the modern era. This would suggest that past environmental conditions in the Jordan Valley provided enhanced forage for sheep while goats would have been employed as browsers on drier vegetation. Relatively stable percentages of slightly higher sheep populations to those of goats indicates

favorable environmental conditions and that environmental and/or cultural desertification did not greatly impact agrarian lifeways at this site on the banks of Jordan through time.

Although bones and teeth of pig (*Sus*) constitute 4.71% of the Middle Bronze Age faunal assemblage, percentages of pig drop dramatically constituting less than 1% of the faunal assemblage beginning with the Iron Age (Table 4). Bones of pig (N=75) are most frequently represented by teeth and mandibles. The bones reflect immature animals; therefore, it is uncertain whether these represent the remains of domesticated or wild animals. The nearby river, with its associated shade, would have provided an oasis for wild and/or domesticated hog varieties which both lack the capacity to sweat and internally cool themselves. The reasons for reductions in percentages of hogs over time at Tell Nimrin is probably twofold: 1) the introduction of religious taboos against eating pork, and 2) increased demands for clean water sources as human populations grew at Nimrin.

Other than the generalized category of large mammal (8.57%; N=2068), the remains of *Bos* are relatively high representing 1.59% (N=384) of the total material (Table 1). While we cannot ascribe species to much of this material, we suggest that it represents *Bos* cf. *taurus*--the domesticated cow. Cattle figure most prominently during the Iron II (4.26%) and Late Hellenistic-Roman (3.49%) time periods, suggesting improved grazing conditions in the Jordan Valley during these time periods. Frequency changes in cattle do not seem to be associated with changing proportions of sheep or goats, but there appears to be a slight increase in numbers of chickens (total N=63; Table 1) during time periods that cattle increase (0.35% and 0.73% respectively; Table 4). However, this association between such different species may be purely incidental. Moreover, at Tell Nimrin there does not appear to be a transition from hog to chicken use over time as was observed at Pella (Kohler 1981) and Tell Qarqur, Syria (Finnegan and West 1984).

The horse/donkey is represented by 126 bones (Table 1). Highest percentages of this taxa occur during the Persian period (73.60%; N=92; Tables 2 and 3). No *Equus* bones were recovered from Ottoman-Modern levels; and only one bone was found in occupation levels dating to the Iron I and Late Hellenistic-Roman periods (Table 2). Remains of camel were rare at Tell Nimrin and were recovered only from occupations representing Iron II (N=1), Byzantine (N=1), and Islamic (N=4) time periods (Table 2).

Wild animals are rarely represented at Tell Nimrin; only 32 fragments of fish, including Cyprinidae (carp), were recovered from the site (Tables 1 and 2). Fish remains were recovered in deposits from Iron I and II, Persian, Byzantine, and Islamic periods. No fish remains were recovered from Middle Bronze Age deposits. This suggests that early inhabitants at the village did not use this locally available, potentially rich resource, or that fish bones have not survived the archaeological record in the lowest levels of the site. Likewise, amphibians, arthropods, insectivores, rodents, snakes, and wild birds are rare to virtually nonexistent in Tell Nimrin deposits. On the other hand, meat/hide bearing cervids and gazelles must have been occasionally hunted and used. Bones of large deer appear from Iron I to the Byzantine period. Currently, there is no evidence that wild deer were hunted during the Middle Bronze Age at Tell Nimrin.

The above data suggest that, unlike subsistence activities of earlier sites--Ain Ghazal and Jericho--in the Dead Sea Valley, animal husbandry of sheep, goats, and cattle constituted the chief subsistence base at Tell Nimrin. Hunting wild animals and fishing were purely ancillary activities and perhaps were possibly associated with a privileged upper class (e.g. see von den Driesch 1993). Faunal evidence suggests that by the Middle Bronze Age, people at Tell Nimrin were fully agrarian and largely relied on domesticated sheep and goats for their meat, fat, hides, and milk. Cattle also were used, but to

much less extent than smaller bovids. Although pigs were probably locally available in marshy areas of the nearby Jordan River, these animals were most heavily hunted and used during the Middle Bronze Age, and were used only marginally from Iron II onward. Medium sized birds, including chickens, were used during the entire occupation of the site; however, their importance does not appear to have increased over time. Faunal evidence also suggest that beasts of burden, including horses and donkeys, were used by Tell Nimrin residents during all periods except for Ottoman-Modern time periods. Horses and donkey were used most heavily during the Persian period. Camels are relatively rare compared to equids--appearing only during Iron II, Byzantine, and Islamic time periods.

Intersite Comparisons

The following sites were selected for faunal comparison purposes with Tell Nimrin because: 1) their occupation levels temporally overlap with Nimrin and/or 2) they are in geographic proximity to Nimrin or are located in similar ecological settings. These sites include Tell Habu Kabira, situated on the right bank of the Euphrates River, which contains Middle Bronze Age occupations (von den Driesch 1993). The percentages of bone remains from Nimrin are somewhat comparable to other Syrian sites such as Tell Hadidi and Ta'as (Clason and Buitenhuis 1978; Clason 1981). The sites of Hadidi and Ta'as represent Byzantine and early Islamic settlements with the Hadidi site beginning at roughly 3250 B.C. with some items of Early and Middle Bronze Ages. Occupation continued into Iron and Roman times (Dornemann 1978, 1985). Additionally, Nimrin is compared with the Middle Bronze aged occupations in the Refaim Valley, Israel (Horowitz 1989), Iron aged deposits at Mount Ebal, Israel (Horowitz 1986-87), and Hellenistic and Persian occupations at Tel Yoqneam (Horowitz and Dahan, 1990). Refer to Table 4 for comparisons with Tell Nimrin time periods.

Table 5: Percentages of sheep/goats recovered at selected sites in the Near East compared with the same time periods at Tell Nimrin (Sheep-Goat and Medium Mammal categories are combined for Tell Nimrin percentages).

Site	Temporal affiliation	% of sheep-goats in assemblage
Tell Nimrin	Middle Bronze	67.6
Habuba Kabira	Middle Bronze	71.2
Refaim Valley	Middle Bronze	65.3
Tell Nimrin	Iron I	87.5
Mount Ebal	Iron I	65.0
Tell Nimrin	Persian	84.59
Tel Yoqneam	Persian	51.0
Tell Nimrin	Hellenistic	78.2
Tel Yoqneam	Hellenistic	26.0

Like Nimrim, sheep and goat husbandry figures heavily in faunal assemblages at all of the comparative sites during all time periods (Table 5). The only extreme variation occurs during the Hellenistic Period at Tel Yoqneam. Here, domesticated cattle dominate the assemblage (Table 6). Nevertheless, cattle at Tell Nimrin never reached the levels recovered at other selected archaeological sites in the region. However, it is likely that most of the bones in the Large Mammal category belong to cattle. This greatly increases the percentages of cattle represented at the site.

Table 6: Percentages of cattle recovered at selected sites in the Near East compared with the same time periods at Tell Nimrin. (Cattle and Large Mammal categories are combined for Tell Nimrin percentages).

Site	Temporal Affiliation	% of cattle in assemblage
Tell Nimrin	Middle Bronze	14.7
Habuba Kabira	Middle Bronze	12.5
Refaim Valley	Middle Bronze	18.5
Tell Nimrin	Iron I	10.6
Mount Ebal	Iron I	21.0
Tell Nimrin	Persian	12.9
Tel Yoqneam	Persian	41.0
Tell Nimrin	Hellenistic	11.0
Tel Yoqneam	Hellenistic	52.5

Following the Middle Bronze (4.71%) at Tell Nimrin, percentages of hogs dramatically drop and remain low (<1% of the total assemblage) from Iron I to modern times. Hogs were also well represented during Middle Bronze occupations at Refaim Valley but are greatly reduced in Middle Bronze levels at Habuba Kabira (Table 7). On the other hand, hogs are well represented in Hellenistic occupations at Tel Yoqneam. Currently, there is no obvious explanation for this pattern difference in hog use in the Dead Sea Valley region.

Table 7: Percentages of hogs recovered from selected sites in the Near East compared with the same time periods at Tell Nimrin.

Site	Temporal Affiliation	% of hogs in the assemblage
Tell Nimrin	Middle Bronze	4.7
Habuba Kabira	Middle Bronze	0.3
Refaim Valley	Middle Bronze	8.2
Tell Nimrin	Iron I	0.0
Mount Ebal	Iron I	0.0
Tell Nimrin	Persian	0.1
Tel Yoqneam	Persian	2.0
Tell Nirmin	Hellenistic	0.2
Tel Yoqneam	Hellenistic	15.5

Equid remains reach their highest representation during the Persian Period (5.25%) at Tell Nimrin, and are low (<1.0%) during all other time periods. Equid representation is also low at other selected sites, but reaches 7.5% during the Middle Bronze Age at Refaim Valley (Table 8). The high percentage of equids at Refaim Valley may represent wild forms, rather than the domesticated forms of later time periods.

Table 8: Percentages of equids recovered from selected sites in the Near East compared with the same time periods at Tell Nimrin.

Site	Temporal Affiliation	% of equids in the assemblage
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Tell Nimrin	Middle Bronze	0.3
Habuba Kabira	Middle Bronze	1.0
Refaim Valley	Middle Bronze	7.5
Tell Nimrin	Iron I	0.3
Mount Ebal	Iron I	0.0
Tell Nimrin	Persian	5.2
Tel Yoqneam	Persian	0.0
Tell Nimrin	Hellenistic	0.2
Tel Yoqneam	Hellenistic	1.1

Wild fauna represented at Tell Nimrin include: both identified and unidentified birds, amphibians, arthropods, cervids, fish, insectivores, rodents, snake, and possible gazelle, the actual numbers of these animals are quite low (Table 1). Together, they constitute <2% of the total Tell Nimrin faunal assemblage. The Tell Nimrin percentage of wild animals compares most favorably with Middle Bronze Age levels at Refaim Valley and with Hellenistic occupations at Tel Yoqneam (Table 9).

Table 9: Percentages of wild fauna recovered from selected sites in the Near East.

Site	Temporal Affiliation	% of wild fauna
Habuba Kabira	Middle Bronze	9.2
Refaim Valley	Middle Bronze	<1.0
Mount Ebal	Iron 1	14.0
Tel Yoqneam	Persian	6.0
Tel Yoqneam	Hellenistic	3.0

Although the faunal lists for Tell Nimrin and Hadidi are similar in that ovicaprid husbandry is prominent, there are also differences. A greater number of types of wild animals have been found at Hadidi and Ta'as than have been found at Tell Nimrin. While we have identified *Bos taurus* at Tell Nimrin, we have not yet identified *Bos primigenius* (wild cattle) found at Hadidi. Likewise, the European beaver and several species of mice were not identified at Tell Nimrin. However, the hare (*Lepus capensis*) and possible gazelle (*Gazella* sp) were identified at Tell Nimrin. The paucity of bones of wild animals at Nimrin indicates a lifestyle largely dependent on animal husbandry rather than hunting.

Conclusions

The types and frequencies of animal remains at Tell Nimrin compare favorably with other sites located along the Rift Valley for roughly the same time periods. However, neither the Tell Nimrin nor Israel excavations provide the extensive number of wild species which have been compiled for Syrian sites to the north. Tell Nimrin lacks the bones of wild animals which could have been used for meat, pelts, ornamentation, or all three. This paucity suggests that inhabitants of Tell Nimrin, from the Middle Bronze Age onward, devoted themselves primarily to animal husbandry and use of domesticated herds, and only occasionally used wild animal resources. Although other sites such as Qarqur (Finnegan and West 1984) and Pella (Kohler 1981) suggest a change from pig to chicken husbandry with a fairly stable as well as dominant reliance on sheep-goat husbandry over time, Tell Nimrin provides no evidence of this shift in economy occurring over time.

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