

THE ZOOARCHAEOLOGICAL REMAINS FROM *TELL HESBÂN*

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Introduction

The faunal remains recovered during the summer of 1971 at *Tell Heshbân*, Jordan, consisted of more than 22,000 bones and bone fragments of which about 21% (5,867 bones) were identifiable. The fragmentary state of the remaining 79% made it impossible to assign them to any particular species. Most of these rejected skeletal parts were splinters from limb bones of ungulates. The present report represents the findings of a preliminary study of 2,838 of the identifiable bones. This sample was made up of readily identifiable fragments, such as complete or partially complete mandibles (19.00%), metapodialia (14.20%), first phalanges (9.45%), humeri (9.45%), tibiae (9.25%), pelves (9.85%), scapulae (8.20%), radii (7.45%), femora (6.70%), maxillae (3.80%), second phalanges (3.60%).

The Squares¹ which contributed the most toward the total collection of the 5,867 identifiable bones were B.1 (958 = 16.33%), B.4 (673 = 11.47%), C.4 (794 = 13.53%), C.5 (689 = 11.74%), and D.6 (940 = 16.02%). Squares B.1 and B.4 are located south of and below the acropolis. Squares C.4 and C.5 are on the western slope of the *tell*. Square D.6, on the acropolis, contained a cistern in which were found an unusually large amount of bones (483 identified fragments).

As would be expected, 95% of the identifiable bones were re-

¹The major sectors of excavation at *Heshbân* are called "Areas" and are identified by capital letters (A-F). Squares are smaller spaces within the Areas, and are identified by arabic numerals. Locus numbers are assigned to any discernible soil layer or "thing" (e.g., wall, pit, hearth) within the Square. Thus, the notation D.6:33 indicates Area D, Square 6, Cistern (i.e., Locus) 33.

mains of domestic animals (12 species). To these can be added two dozen species of wild mammals, birds, reptiles, fishes, and invertebrates. Together these comprise *Tell Ḥesbân's* presently known faunal assemblage:²

Large Mammals

Camel (dromedary), <i>Camelus dromedarius</i>	Domestic horse, <i>Equus caballus</i>
Domestic cattle, <i>Bos taurus</i>	Domestic pig, <i>Sus scrofa</i>
Domestic donkey, <i>Equus asinus</i>	Domestic sheep, <i>Ovis aries</i>
Domestic goat, <i>Capra hircus</i>	Dorcas gazelle, <i>Gazella dorcas</i> and/or <i>Gazella gazella</i> (mountain gazelle)

Small Mammals

Domestic cat, <i>Felis catus</i>	Porcupine, <i>Hystrix hirsutirostris</i>
Domestic dog, <i>Canis familiaris</i>	Red fox, <i>Vulpes vulpes</i>
Domestic rabbit, <i>Oryctolagus cuniculus</i>	Striped hyena, <i>Hyaena hyaena</i>
Eurasian badger, <i>Meles meles</i>	Syrian mole-rat, <i>Spalax ehrenbergi</i>
Hare, <i>Lepus</i> sp.	Weasel, <i>Mustela</i> sp.

Birds

Coot, <i>Fulica atra</i>	Griffon vulture, <i>Gyps fulvus</i>
Crow, <i>Corvus corone</i>	Houbara bustard, <i>Chlamydotis undulata</i>
Domestic chicken, <i>Gallus gallus</i>	Ostrich, <i>Struthio camelus</i>
Domestic goose, <i>Anser anser</i>	Raven, <i>Corvus corax</i>
Domestic pigeon, <i>Columba livia</i>	Rock partridge, <i>Alectoris graeca</i>
Egyptian vulture, <i>Neophron percnopterus</i>	

Reptiles

Snake family, unidentified	Turtle family, unidentified
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Fishes

Catfish family, unidentified	Parrot fish family, unidentified
Mackerel family, unidentified	

Invertebrates

Freshwater mussel, unidentified	Freshwater snail, unidentified
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²For his helpfulness with the identification of most of the bones not familiar to me, I am greatly indebted to Johannes Lepiksaar of the Naturhistoriska Museet in Göteborg, Sweden. The warm hospitality with which both he and his wife received me and the much appreciated instruction in zooarchaeology provided me great inspiration for the realization of this report. Others to whom I am indebted are Robert M. Little for his helpful suggestions and willingness to support and encourage me in my work with the bones; Judy Chapman and Hamat Tawfiq without whom all the tedious labor of cleaning and registering the bones would have been an insurmountable task; and finally, John Lauer whose computer programming made digesting the large quantity of bone data a realistic project.

Procedures

A statement describing certain departures from and additions to the first season's field and laboratory techniques is in order. A "bone tent" erected at the excavation site accounts for some of the changes. While during the 1968 expedition bones had to be transported directly from the *tell* to the headquarters in Amman before being handled by the anthropologist,³ the 1971 expedition's "bone tent" made possible a sorting of fragments in the field. Bones were left in the tent overnight to dry and harden. The following morning they were sorted by the anthropologist. Bones saved were then cleaned by dry brushing and registered according to the system described by Little.⁴ Only clean and registered bones were transported to headquarters for further processing.

At Loma Linda University, the data recorded at the field station—findspot, animal sort, element (humerus, radius, etc.), type of fragment (distal end, charred, epiphysis, etc.), measurements—were transferred to 80-column cards. A computer program was written to provide collation of this information according to each of these categories; as, for example, all material arranged according to findspots or all material arranged according to animal sorts, etc.⁵

Domestic Animal Remains

Sheep/goat remains were found in greater quantities than were any other domestic animal remains throughout all periods of human occupation thus far discovered at *Tell Hesbân*. They constitute roughly 71% of all collected bone material. More than 97% of these come from Squares B.1 (688 fragments), B.4 (122), C.4 (251), C.5 (338), and D.6 (543). The most frequently occurring bones were proximal or distal ends of limb bones, such as metapodialia, radii, tibiae, humeri, femora, first and second

³ Robert M. Little, "An Anthropological Preliminary Note on the First Season at *Tell Hesbân*," *AUSS*, 7 (1969), 234, 235.

⁴ *Ibid.*, 233.

⁵ Computer assistance was received from the Loma Linda University Scientific Computational Facility supported in part by NIH Grant RR-276-07.

phalanges, pelvis fragments, vertebrae, scapulae, and mandibles.

Sheep and goats seem to have constituted the major source of flesh food. This is evidenced by the fragmentary nature of practically all of these bones and by the number of cut, split, and roasted bones. Greatly assisted by the discussion of butchering techniques in the Deh Luran Plain,⁶ it was possible to attempt a reconstruction of some aspects of the butchering process, at least for the periods represented in Square B.1.

Butchering marks on at least four different atlantes and on three axes suggest that throat-cutting was done with the ventral or "throat-side" upward. The forelimb seems to have been removed as a unit by some process which nearly always destroyed the blade of the scapula. (Only in a few instances involving young animals was this not the case.) Frequently cut-marks on the distal end of humeri and proximal end of radii suggest further efforts to separate the meat-rich humerus from the remaining meat-poor limbs.

Numerous butchering marks on vertebra fragments indicate that the vertebral column was sectioned into smaller pieces. The butchering process seems also to have involved the slicing of the pelvic bone through the sacrum and thereafter into smaller sections. Practically all pelvic fragments could be grouped into six standard pieces resulting from this procedure. The femur, which incidentally seldom showed butchering marks at the proximal end, was probably separated from the body along with the rest of the hind limbs by disjuncting the proximal femoral joint.

When the bones had been stripped of flesh, they were broken open, perhaps to enable the marrow to be extracted. This must have been done especially with marrow-rich bones like humeri as these were never found unbroken. In order to shake the marrow out of the shaft of the bone, the bone seems to have been tapped against a hard surface. Pitted and chipped shafts were not infrequent.

⁶ Hole, Frank, *et al.*, "Prehistory and Human Ecology of the Deh-Luran Plain. An Early Village Sequence from Khuzistan, Iran," *Memoirs of the Museum of Anthropology, University of Michigan* (Ann Arbor, Mich., 1969), pp. 288, 289.

Even though only 264 bone fragments of cattle were identified, this number does not by itself prove that cattle were unimportant when compared with the number of sheep/goat bones (2012). Lepiksaar⁷ has pointed out that the per capita food value indicated by each cattle bone recovered is considerably larger than that of sheep and goat. Thus we may safely infer that cattle constituted an important second source of flesh food.

Cattle remains were more evenly distributed in all the Squares than were the remains of sheep and goats, but even so 61% came from the following five Squares: B.1 (23 bones), B.4 (43), C.4 (27), C.5 (35), and D.6 (34). A great majority of the bones were first and second phalanges. The other limb and body bones were present in varying quantities with metapodialia in the lead.

Pig remains were well distributed in many loci at *Tell Hesbân*: A.1:28, 43, 58; A.2:25, 28, 35, 79; A.4:27; B.2:22; B.3:27; B.4:1, 6, 15, 16, 50, 55, 57; C.1:15, 38; C.2:14; C.4:19; C.5:1, 2; D.1:43, 44; D.6:35, 36, 45. Most of the bones were those of young animals. Only one charred metapodial from C.1:38 gives us any hint as to the preparation of pork.

Of the 44 camel bones unearthed, 19 were found in Loci B.1:94, 97, 100. Most of these bones were vertebrae. There was also one well-preserved metapodial and some first and second phalanges found in this spot. Other locations in which camel remains, mainly phalanges and metapodialia, were found include: A.6:18; B.4:5, 15; C.1:1, 7; C.4:25, 35, 55, 58; C.5:1, 3-5; and D.6:1.

Horses seem to have played no great role during any period of occupation at *Tell Hesbân*. Only about one dozen bones from Squares A.5:4; B.1:94, 97, 100; and C.5 could be identified as horse remains. These were either metapodialia or first and second phalanges. There was a significantly greater amount of donkey remains found: altogether more than 60 bones distributed predominantly throughout Loci B.1:44, 89, 94, 96, 97, 100, 103, 304; C.4:13, 19, 22, 35, 55, 58; and C.5:1-4. Some traces of donkey were also found in most of the other Squares, especially in Loci

⁷ Lepiksaar, "Nytt om djur från det medeltida ny Varberg," *Särtryck ur Varbergs Museums Årsbok* (1969), pp. 4, 5.

D.6:1 and 33. The bones were largely fragments and broken ends of limb bones as well as well-preserved phalanges. Loci B.1:94, 96, 97, and 100 provided an exception as at least 18 vertebrae, a pelvis, and a sacrum fragment were found in those loci.

Bones of cats were found more frequently than those of dogs: 37 to 10. The remains of these two animals were found strewn throughout most Squares: cats in Loci B.4:6, 11, 39; C.1:32; C.4:25, 39; C.5:3; D.5:88; and D.6:33; and dogs in Loci A.1:45; B.1:304; B.2:35; B.3:2; B.4:6; C.1:26; C.4:3; C.5:5; and D.6:33. Most of these remains were limb bones, although mandibles were also quite common.

"Domestic chicken" almost sums up the extent of poultry found at *Tell Hesbân* in 1971. Furthermore, poultry seems to have been especially important to the Ayyūbid/Mamlūk (ca. 1174-1516) inhabitants of our site as more than half of the 238 chicken bones and the nearly whole skeleton of the only domestic pigeon found were recovered from the Mamlūk fill in Cistern D.6:33. Aside from two goose bones found in Locus C.1:45, domestic goose remains were also limited to that same locus in D.6.

The only other Squares in which domestic bird bones were present in somewhat significant quantities were A.1, B.4, C.1, and C.5. It should be noted that while most of the domestic animal bones were broken, the fragile chicken bones were mostly unbroken. The reason for this is that bird bones are hollow and contain no marrow which could be extracted and eaten.

Wildlife Remains

Gazelles seem to have been the mammals most frequently hunted by the occupants of our *tell*. Their remains, consisting of 20 limb bones, were distributed throughout most of the Squares: A.1:58; A.3:Surface; A.6:18; B.1:116; B.4:1, 10; C.2:12; C.4:2, 54; D.5:8; D.6:1, 20, 23, 31, and 33. Gazelles were probably hunted in the nearby mountains and plains to which they came from the surrounding deserts.

One of the more interesting remains unearthed in Locus C.5:5 was a nearly complete hyena mandible. Because hyenas are

numerous in Palestine and feed on carrion, they were naturally attracted to village refuse heaps.⁸

Red fox remains amounted to one mandible from Locus B.4:29, and one scapula and one radius from Cistern D.6:33. Foxes feed on fruits, insects, birds, mice, and carrion, and are as a rule common in cultivated fields surrounding villages.⁹

A femur of a Eurasian badger was found in Locus C.1:20. Badgers are abundant in the hilly and woody parts of the country, and their skins, valuable to traders,¹⁰ may have been the reason for their presence at *Tell Hesbân*.

Another femur, identified as coming from a weasel, was found in Locus A.4:28. Its presence at the site is perhaps best explained by its diet: rats, mice and voles, moles, small birds, frogs, rabbits, and, at times, carrion. All of these abound in inhabited territory.

A porcupine femur from Cistern D.6:33 adds further to the faunal assemblage from that locus. Porcupines are reportedly thought of as good food by bedouins,¹¹ hence this remain may indicate that the Mamlūk inhabitants also favored it.

The Syrian mole-rat, abundant all over Palestine, was relatively well represented with three skull fragments from Loci B.1:13; D.5:51; D.6:50, and one femur from B.4:15.

An ulna and a femur, possible remains of the Egyptian hare common to the Jordan valley, were found in Loci C.4:49 and D.6:21. A pelvis fragment of a rabbit (*Oryctolagus cuniculus*) was found in C.5:3. Both of these animals probably served to supplement the meat diet.

Remains of eight species of wild birds were found: (1) partridges (one ulna from Locus A.6:25; one tarsometatarsus each from A.6:74 and C.1:7; one humerus and one ulna from C.4:25; one ulna from C.4:22; two ulnae and one radius from D.6:15; one humerus and one femur from D.6:33; one humerus from

⁸ S. I. Atallah, "A Collection of Mammals from El-Jafr, Southern Jordan," *Zeitschrift für Säugetierkunde*, 32 (1967), 307.

⁹ *Ibid.*

¹⁰ F. S. Bodenheimer, *Animal Life in Palestine* (Jerusalem, 1935), p. 108.

¹¹ *Ibid.*, p. 104.

D.6:47); (2) ravens (two ulnae and one tibiotarsus from D.5:5); (3) crows (one ulna from B.1:103); (4) coots (one humerus from B.4:14); (5) bustards (one humerus and two femurs from D.6:33); (6) griffon vultures (one tarsometatarsus and one coracoidium from C.5:2; one carpometacarpus from C.5:3); (7) Egyptian vultures (one radius from C.5:3); and (8) ostriches (one tarsometatarsus from A.6:18). These were among the types whose bones could be identified by comparison with specimens at the Naturhistoriska Museet in Göteborg.

Most of these birds, except perhaps the two vultures (because of their steady diet of carrion), probably formed part of the diet of the city's inhabitants. The partridge seems to have been the most commonly hunted bird listed as its remains were relatively plentiful. These birds are great runners and will not fly unless compelled to do so. According to Bodenheimer,¹² the Arabs exploited this characteristic of partridges and occasionally arranged "battues" in order to exhaust the birds, so that they could then kill them with sticks.

According to the sources available,¹³ all eight species were at one time common in Palestine. All were year-round inhabitants except the Egyptian vulture, a summer breeder only, and the coot, common primarily in the country's waters during the winter.

Members of three families of fish have so far been identified. They are the Siluridae, a family of the suborder Nematognathi, or catfishes; Scaridae, or parrot fishes; and Scombridae, or the true mackerels. Pectoral fin spines of catfish were found in Loci C.4:17, 18, 27, 39, 63, and D.6:5.

The large assortment of parrot fish remains will be presented according to structures. The lower pharyngeal bones are readily identifiable as they are much enlarged and solidly united, their teeth being oblong and spoon-shaped and appearing as a mosaic on the concave surface.¹⁴ Four such lower pharyngeals were

¹² Ibid., p. 172.

¹³ F. Hüe and R. D. Etchécopar, "Notes ornithologiques du moyen-orient: I, II," *Oiseau et la revue française d'ornithologie*, 36 (1966), 95-109, 233-251; and Bodenheimer, *Animal Life*, pp. 133-180.

¹⁴ D. S. Jordan, *Fishes* (New York, 1925), p. 604).

found in Loci C.4:97 and C.5:3 and 5. Upper pharyngeals were more numerous, and were distributed as follows: one from Locus B.2:1, one from C.1:17, two from C.4:18 and 54, and three from unknown loci in Squares C.3 and C.4. Other parrot fish remains were premaxillary, one dental dexter, and one caudal vertebra from Locus C.5:3, and one caudal vertebra from C.5:1.

Presently only one vertebra from Square C.1 (the locus is unknown; the pottery pail with which it was associated is 373) establishes the presence of mackerels at *Tell Hesbân*.

Catfish, primarily freshwater creatures, are common in the major lakes belonging to the Jordan system.¹⁵ They inhabit the river bottoms from whence they were probably drawn and brought to our *tell*. Parrot fish and mackerels are marine and inhabit the warm seas of the Near East. Both have been reported as existing in the Gulf of Aqaba and in the Red Sea.¹⁶ Their presence in the Mediterranean is also quite likely.

Comparison of the Bones from Squares B.1 and D.6

A comparison of the remains from Square B.1 with those from D.6 reveals some interesting differences. Both Squares contained an approximately equal number of remains, 948 from B.1 and 940 from D.6. Furthermore, both Squares produced remains mostly from certain distinct periods: B.1 contained mainly finds from the Iron Age, while D.6 furnished mainly Ayyūbid/Mamlūk finds. (Incidentally 64% of the bones in D.6 came from the Ayyūbid/Mamlūk soil layers in Cistern D.6:33.)

In Fig. 11 the faunal assemblages of B.1 and D.6 are compared. It shows that there were twice as many individual species represented in D.6 as in B.1. Sheep/goat and cattle were of approximately equal importance in the two periods represented by the remains in the two Squares. Donkey, horse, and camel were significantly more common in B.1; whereas in D.6 chicken especially, but also numerous other wild mammals and birds, seem to have been more popular.

¹⁵ Bodenheimer, *Animal Life*, pp. 417-420.

¹⁶ H. Steinitz and A. Ben Tuvia, "Report on a Collection of Fishes from Eylath (Gulf of Aqaba), Red Sea: I; II, *Bulletin, Sea Fisheries Research Station, Israel*, 2 (1952), 1-12; 93 (1956), 1-15.

	<i>B.1</i>	<i>D.6</i>		<i>B.1</i>	<i>D.6</i>
Horse	5	1	Mole-rat	1	1
Donkey	33	3	Hare	—	1
Cattle	48	34	Porcupine	—	1
Sheep/Goat	510	540	Crow	1	—
Gazelle	1	6	Pigeon	—	16
Camel	19	2	Chicken	1	122
Pig	—	1	Partridge	—	1
Cat	—	5	Bustard	—	3
Dog	1	2	Goose	—	1
Red fox	—	2	Turtle	—	1

Fig. 11. A comparison of the faunal assemblages in B.1 and D.6.

Fig. 12 compares the meat-poor bones of cattle and sheep/goat with their meat-rich bones in B.1 and D.6. The comparison shows little variation within the meat-poor bone categories but significant variation among the meat-rich bones. Square D.6 had nearly twice as many meat-rich bones of sheep/goat as did B.1 and, even though the cattle remains were few, their presence in B.1 is considerably more impressive than in D.6.

MEAT-POOR BONES

MEAT-RICH BONES

	<i>Cattle</i>		<i>Sheep/Goat</i>			<i>Cattle</i>		<i>Sheep/Goat</i>	
	<i>B.1</i>	<i>D.6</i>	<i>B.1</i>	<i>D.6</i>		<i>B.1</i>	<i>D.6</i>	<i>B.1</i>	<i>D.6</i>
Metapodialia, u.d.	8	6	5	14	Scapulae	1	0	54	69
Metatarsals	0	1	5	8	Humeri	5	0	48	58
Metacarpals	2	0	10	20	Tibiae	4	4	34	68
Mandibles	0	1	54	27	Radii	4	0	32	64
First Phalanges	5	13	29	27	Pelves	0	0	53	93
Second Phalanges	4	7	4	7	Femora	0	0	8	71

Fig. 12. A comparison of the meat-poor and meat-rich bones of cattle and sheep/goat in B.1 and D.6.

One final comparison between the bones from these two Squares was made to discover the age at which most of the animals were slaughtered. Remains of young animals can be easily detected because their bones are without epiphysial unions. We found nearly twice as many diaphyses (without heads) and epiphyses (without shafts) in D.6 as in B.1. It can thus be concluded that animals were slaughtered at a younger age by the

Mamlūks whose food remains were found in D.6 than by the earlier inhabitants whose food remains came to light in B.1.

Conclusions

Thus far a list composed of 36 kinds of animal forms has been assembled from the remains found during the 1971 season of excavations at *Tell Hesbân*. This list includes eight large mammals, ten small mammals, two reptiles, three fishes, and two invertebrates. Domestic animals, especially sheep/goat and cattle, make up the majority of the identified fauna. Sheep/goat seem to have been the most important animals throughout all periods represented. Their bones, found in nearly all occupational levels, testify to their great economic value as the primary food animals.

Cattle were also of great economic value throughout most periods, as shown by the fact that 264 identified cattle bone fragments were found comparatively evenly distributed in most Squares. The least important of the domestic animals were pigs, which appear to have been slaughtered at a very young age.

Camels and donkeys seem to have been more common than horses; and remains of cats greatly outnumber remains of dogs.

Poultry at *Tell Hesbân* included domestic pigeons, geese, and chickens, with the last mentioned being by far the most evident. The fact that nearly half of the chicken bones were found in Cistern D.6:33 and that no chicken bones were found in Square B.1 might indicate that the Ayyūbid/Mamlūk inhabitants of our *tell* depended much more on birds than did the inhabitants of earlier times.

Gazelles, partridges, catfish, and parrot fish were the most popular game animals. Traces of other wild animals which may have contributed to the diet included porcupines, mole-rats, hares, rabbits, crows, ravens, coots, bustards, ostriches, and mackerels. Remains of hyenas, red foxes, badgers, weasels, vultures, snakes, turtles, freshwater mussels and snails were also found.

A comparison of the earlier remains from Square B.1 with the later ones from D.6 resulted in the following differences: (1) B.1

contained fewer different species but more domestic animals than did D.6, while the latter showed an increase in game animals and poultry; (2) meat-rich bones of sheep/goat were almost twice as numerous in D.6 as in B.1; and (3) animals were slaughtered at a much younger age in D.6 than in B.1.