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ELITE EQUIDS: REDEFINING EQUID BURIALS OF THE MID- TO LATE 3rd MILLENNIUM BC FROM UMM EL-MARRA, SYRIA

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Abstract

In the burial complex at Umm el-Marra, Syria, dating to the mid- to late 3rd millennium, humans were interred with precious items of gold, silver, and lapis lazuli, as well as more mundane items made of ceramics and bronze. Animals, too, were buried in these chambers—namely whole and partial sheep, goat, cattle, adult dogs and various types of fowl. Buried separately from these chambers, and in their own mud-brick structures, were the complete and partial skeletons of at least 26 equids. These installations are without parallel across Syro-Mesopotamia in the 3rd millennium BC. Ongoing investigations of their morphological, metrical, and behavioural features show that these animals differed from other equids found at Umm el-Marra, and also from those found at other sites in the ancient Near East. Key morphological and metrical attributes indicate that these animals are neither donkeys, nor onagers, nor horses. While the question of their identification remains open, they may plausibly be identified with the high status, hybrid equids of the mid- to late 3rd millennium, the *kunga*: a cross between the onager and the donkey.

Keywords: Bronze Age, donkey, onager, hybride, burial pratices.

Résumé

Dans le complexe funéraire de Umm el-Marra en Syrie, daté du milieu à la fin du III^e^ millénaire av. J.-C., les humains étaient enterrés avec des ustensiles de valeur en or, en argent et en lapis lazuli ainsi qu'avec des objets plus banals en céramique et en bronze. Des animaux étaient également inhumés dans ces chambres funéraires, en particulier des squelettes complets ou partiels de moutons, de chèvres, de bœufs, de chiens adultes ainsi que différents types de volailles. Séparément de ces chambres, inhumés dans leur propre structure de briques en terre, les squelettes complets et partiels de 26 équidés, au moins, ont été retrouvés. De telles installations sont uniques dans la Syrie et la Mésopotamie du III^e^ millénaire. Les analyses en cours des caractéristiques morphologiques, métriques et des proportions de ces équidés montrent qu'ils diffèrent des autres équidés trouvés à Umm el Marra et également de ceux trouvés sur d'autres sites du Proche-Orient ancien. Les particularités morphologiques et métriques principales indiquent que ces animaux n'étaient ni des ânes, ni des onagres, ni des chevaux. Bien que la question de leur détermination reste ouverte, ils pourraient de manière plausible être identifiés comme les équidés hybrides d'un statut particulièrement élevé du milieu à la fin du III^e^ millénaire, les kunga *: croisements entre onagre et âne.*

Mots-clés : *Âge du Bronze, âne, hémione, hybride, pratiques funéraires.*

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INTRODUCTION

An elite burial complex has been found at the site of Tell Umm el-Marra, northern Syria (Schwartz *et al.* 2003, 2006), which is located roughly midway between the Euphrates River to the east, and the modern city of Aleppo to the west (*fig. 1*). Within the complex, at least 8 tombs were used sequentially between *ca* 2500-2200 BC. Ceramic vessels comprised the largest category of items found in the tombs, but jewelry and vessels of gold, silver, bronze and lapis lazuli were numerous.

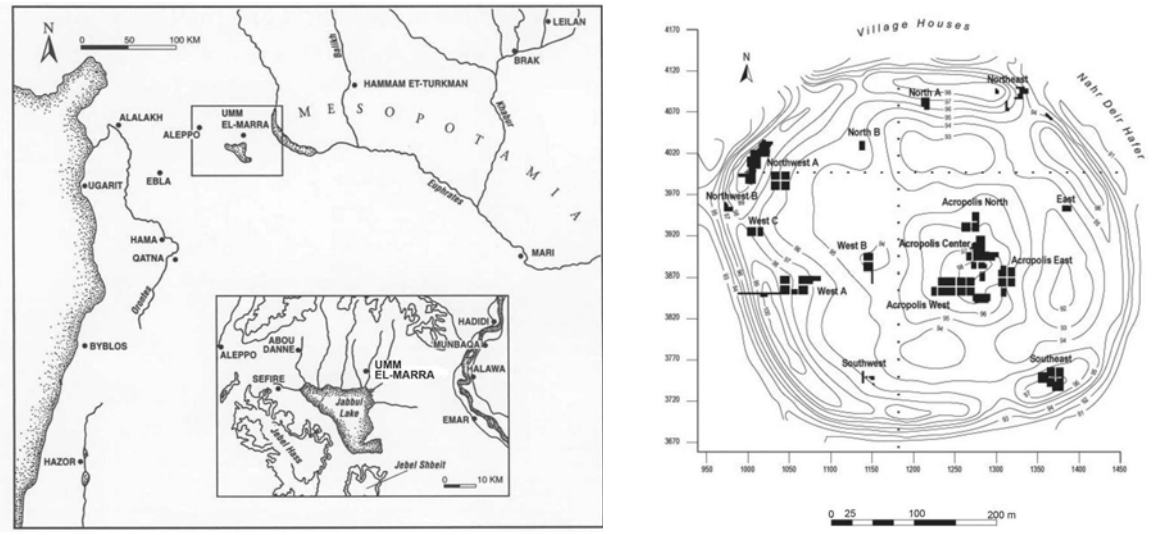

Fig. 1—Map of Syria and Umm el-Marra, with excavation areas.

Animal bones were commonly found within the individual tombs (Schwartz *et al.* 2006). Articulated joints of sheep, goat, cattle and dog were found, as well as a few complete skeletons of sheep and goat. Disarticulated (but complete) skeletons of ducks and geese were placed in the tombs, but it is not clear whether the large numbers of frogs that were found were deliberately interred. Two tombs had small numbers of isolated bones of equids. But, a minimum of 26 complete equids—plus isolated skulls and bones from at least five more—were interred in nine separate installations in roughly the center of this burial complex.

Despite the inclusion of numerous valuable items and partial and complete animals within the monumental tombs, separate chambers were built to house dead equids. Such treatment is unique within the tradition of equids in burials from Syro-Mesopotamia in the third millennium BC (see Zarins 1986 for a summary), where complete equids were usually interred inside of the chambers along with the humans. In addition to the style of their emplacement, the sheer number of equids involved—minimally 31—is unparalleled from known burials or cemeteries. Finally, preliminary analysis of the equids suggests that they do not conform to any of the expected taxa: *E. hemionus*, *E. asinus*, or *E. przewalskii*. Rather, they are tentatively identified as hybrids—specifically a donkey and hemione cross. Such an identification is further suggested by the unique and elite nature of their interment. Textual documents dated between *ca* 2600-2000 BC indicate that an equid—the "*kunga*" (spelled BAR.AN)—was a valued animal exchanged among elites and sometimes buried with them (for summaries: Postgate 1986; Zarins 1986). It is commonly suggested that the *kunga* was some form of a hemione x donkey cross (Postgate 1986; Heimpel 1994, p. 10, n. 23; Archi 1998, p. 9, note 48; *contra* Maekawa 1979).

The elite nature of the complex is attested by the high value of the goods placed in the tombs (gold, silver, lapis), and also the monumental nature of the tombs themselves. But, the settlement's socio-political setting and status raises the possibility that these burials held "royal" personages. Umm el-Marra was the largest, and probably most important settlement in the Jabbul region. Though subsidiary to the politically

dominant city-state of Ebla, located south and west of Aleppo, its relations with that city's elite may have provided some of the wealth found in the tombs. Umm el-Marra is possibly to be identified as the ancient city of Tuba (Catagnoti 1992; Schwartz *et al.* 2006, p. 603, n. 3), whose king is mentioned in texts from Ebla (Nougayrol, Amiet 1962). Valuable gifts flowed out of Ebla to kings and dignitaries (Archi 1993, 1998), including to female members of Ebla's royal household sent elsewhere for interdynastic marriages (Biga 1998; Archi 2002). Among those gifts were jewelry of the materials and types that were recovered from Umm el-Marra's elite burial complex. Animals were also given as gifts, including the valuable *kunga*.

In this paper, I first present the equid installations found within the Umm el-Marra burial complex. Then, I discuss the morpho-metric traits of this equid population. Finally, the evidence for associating the burial equids with the *kunga* is briefly discussed.

DESCRIPTION OF EQUID INSTALLATIONS

The equids were found in five, separate mud-brick installations (lettered A-E), on a north/south axis at the center of the complex (*fig. 2*). To the west, several equids were found on a stone platform against Tomb 8. To the east, other equids were found in oval depressions or pits.

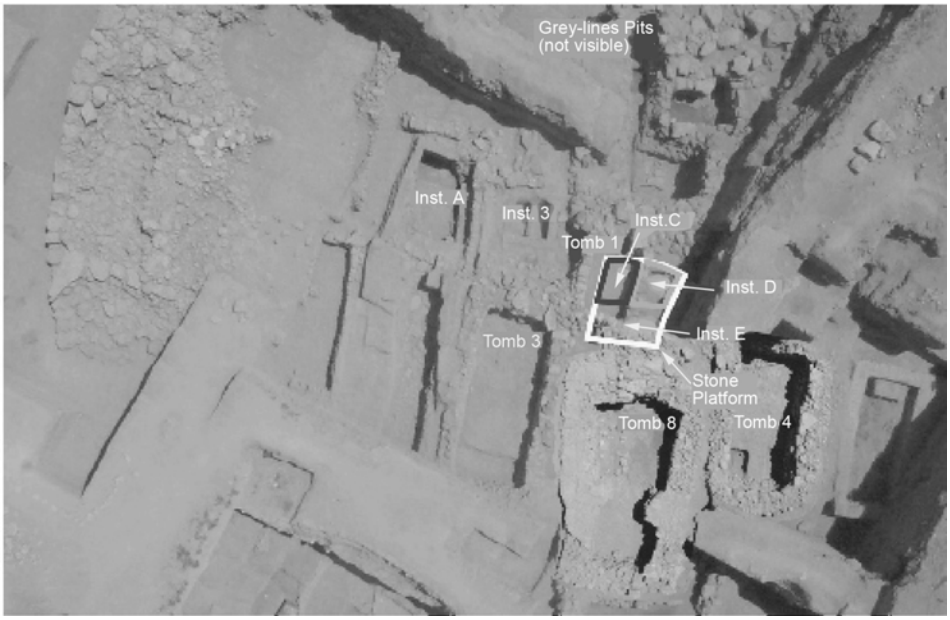

Fig. 2—Aerial photo of burial complex, merged from 2 seasons (2004, 2006).

Installation A

This room was *ca* 3.8 by 2.4 m in size at the northern edge of the complex. Its four walls had stone substructures and mud-brick superstructures. Mudbrick benches lined the north and south walls, and there was a blocked doorway in the east. The large amount of tumbled mudbrick in the room and the blocked doorway suggest that the room was roofed in antiquity.

Skeletons of four, complete, male equids were found inside the room. The skulls of two were found against the north bench, while the skulls of the other two were against the west bench. Based on the

crown heights of their cheek teeth, three of the individuals were prime-aged equids, *ca* 9-13 years of age. The other individual was younger, *ca* 4-5 years of age. All of the skulls showed irregular chipping and wear on the anterior, occlusal edges of their upper incisors (UPI1). Two of the skulls showed additional, extensive abrasions of the labial enamel of the upper, central incisors. The 4-5 year old individual had such abrasion only on its left UPI1, while the prime-aged animal had abrasions on both left and right UPI1s. These abrasions appear to be the result of the use of a lip ring, which abraded larger areas over time. Heavier wear on the cheekteeth of these two animals—relative to their incisors—suggests that they did not graze extensively; they were probably frequently provided with fodder, a necessary consequence of lip-ring use.[2]

The post-cranial skeletons were intermingled, making it difficult to match all of the bones and the skulls to individual skeletons. Those that could be matched indicate that the youngest individual was also the tallest, at *ca* 1.36 m at the shoulder.[3] Two of the remaining three were *ca* 1.33 m tall. The final individual was substantially shorter, standing roughly 1.19 m at the shoulder. Three of the four individuals showed heavy development at the scapular origin (on the glenoid process) and radial insertion of their *biceps brachii* muscles, consistent with draft pulling.

The skull and a few longbones of a human infant were found, which had been deposited at some later time.

Installation B

Just south of Installation A was a chamber *ca* 1.4 by 1.2 m wide, and between 1 and 1.2 m deep. Its thin, single-brick wide walls were dug into the ground. Two, complete, equids were placed standing in the installation, facing west. Both individuals were male, each had a distinct overbite, and each had been worked from an early age. The degree of tooth wear suggests that the individual in the northern chamber was very old, probably *ca* 20 years of age. Its upper, central incisors had characteristic “crib wear”. This individual stood *ca* 1.24 m high at the shoulder. The individual in the southern chamber was also aged, but certainly younger than 20 years of age. This equid stood *ca* 1.27 m high at the shoulder.

Because of the difference between the animals’ heights and the chamber’s depth, their skulls and necks stuck out over the top edge of the chamber; those parts were recovered laying on the ledge formed by the western wall. Along with the skulls, a spouted vessel was also placed on this ledge, though it is not clear when. The vessel contained the bones of three human infants.[4] Following the interment of the equids, three puppies were placed in each compartment. A human infant was placed in the southern compartment, while the skull of a juvenile equid was placed in the northern compartment.

Installation C

To the south of Installation B was a chamber quite similar in size to it (see above). This installation lays directly beneath Tomb 1, and was slightly disturbed by the erection of its stone walls. The perimeter of the installation—and the internal divider—were constructed using a single row of bricks. Inside were two articulated, standing, male equids—facing west. Each showed signs of having been worked from a

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2. My thanks to Dr. Bezuidenhout of the College of Veterinary Medecine of Cornell University, Ithaca, NY. He examined the teeth in question, and explained the problems with grazing that an equid wearing a lip ring would experience.

3. Wither’s heights are averages of the greatest length of individual longbones multiplied by the “corrected” factors of Johnstone (2004, p. 156), following Kiesewalter (1888) and May (1985). While those figures may not present an accurate height for this particular taxa—due to potential differences in the orientation of the bones—, the variation between the equids is still valid.

4. Identification of those human remains was provided by Trey Batey, of the University of Arkansas.

young age. The southern individual, in particular, had heavy exotoses on its hind extremities (*fig. 3*). The individual in the northern chamber stood *ca* 1.24 m at the shoulder, while the individual in the southern chamber was a bit larger at 1.27 m.

The skulls and pelvises were missing from both skeletons. The skeletons were otherwise intact and it is not clear how the pelvis bone was removed. There were no butchery marks found on the femorae, but these were fairly fragmented. Two equid skulls, a spouted vessel, and a human infant were found somewhat mixed with the stones of the southern wall of Tomb 1. I suspect this was actually part of Installation C, where the elevated heads and skulls of the equids were disturbed when the walls of Tomb 1 were placed on top of them. One skull showed a distinct overbite, and indicated an aged animal, approaching 20 years of age. The other animal was a bit younger.

The skeleton of an adult dog was found between the equids. It was deposited following their interment.

Fig. 3—Metatarsus, first phalanx, and sesamoids from southern individual, Installation C.

Installation D

Immediately south of Installation C, but later than it, was Installation D. The *ca* 3.10 m by 2.25 m divided chamber abutted Tomb 1, to its south. However, the relationship between Installation D and Tomb 1 is not clear. Each of the mud-brick chambers contained a complete, standing male equid, facing west. The northern animal was the very old, most likely over 20 years of age. Its teeth were worn to pegs, and what was left of its upper, central incisors showed labial abrasion into the roots. It is suggested that this animal, too, wore a lip ring. Heavy biceps development suggests that this animal was used for pulling. The complete equid in the southern compartment was between *ca* 15-20 years of age, and had been a draft animal for most of its life. Its teeth showed a malocclusion problem and evidence for "crib wear". The northern individual stood *ca* 1.25 m at the shoulder, the southern individual stood *ca* 1.21 m.

In addition to the complete skeleton, the northern chamber had extremities from two more equids. One set had been deposited before the standing animal, and the other after. These also showed skeleto-muscular stresses from draft activity. The southern compartment also contained bones from additional animals—at least one interred before the standing equid and one after. The "extra" elements included four skulls from older individuals, all with malocclusions. Bones of the extremities were recovered, as well as a few limb bones.

Following the emplacement of the southern equid, the skull of a human infant and a spouted vessel were deposited near the equid skull.

Installation E

Installations C and D were built on top of an earlier installation, E. This large chamber—3 m by 3 m, and square in shape—was built with both stone and mud-brick walls. Four complete, standing, male equids faced west, their bodies divided between 8 narrow chambers, between 30-40 cm wide, and varying in length from 55-80 cm. The skeletons were thus bisected; each of the 4 western chambers held the fore limbs, ribcage and most of the vertebrae of a single equid, while each of the 4 eastern chambers held hindlimbs —including pelvis—and the sacrum and caudal vertebrae. Skulls of three of the equids were separated from the remainder of their skeletons by a mud-brick shelf, while the fourth (individual B) had its skull still attached to its cervical vertebrae. All of the animals were young, roughly 5 years of age. They ranged in height at the withers between *ca* 1.21 m-1.28 m.

The articulated hind extremities of an additional individual was recovered from each of the eastern chambers of the northernmost individual (A), and the individual (B) just to its south.

Stone Platform and individual animals against Tomb 8

Beneath and to the west of Installation E was a stone platform that abutted the eastern wall of Tomb 8, and contained the bones of at least four equids. This feature has not been completely excavated, and the skeletons were heavily disturbed by stones that fell from the wall of the tomb. Fragmentary skulls and teeth from three individuals have been recovered—though more were visible beneath the tumbled stones. The presence of well-formed canines indicates that these, like all of the other animals, were males. But, these individuals were younger than most of the other animals. Of the excavated skulls, one individual had unerupted permanent canines and LPP4, and erupting LPM3; this equates to roughly 3.5 years of age.

In this same area were a few bones of one—or possibly two—juvenile equids, heavily disturbed by Installation E. A right-symmetry humerus with an unfused proximal epiphysis was found, as was one from the left side that was in the process of fusing. A tibia with a nearly-fused proximal ephiphysis was also recovered. All three of these bones had fully-fused distal epiphyses. In addition, an ulna with an unfused olecranon was found, along with a distal radius that was fully fused. Fusion timing for horses (based on Silver 1969) indicates these bones belong to an animal younger than 3 1/2 years of age at death. If they all belong to a single individual, whose two humeri are not in precisely the same stage of fusion, then this animal is probably *ca* 3 years of age. Though still growing, the humerus and tibia were among the longest of each element found in the complex.

In a previous season, before either the Stone Platform or Installation E had been recognised, bones of a single, juvenile equid were excavated from the northern limit of the eastern wall of Tomb 8. The proximal epiphyses of its femorae were unfused, as were all of its vertebral epiphyses. Its proximal calcanea and the one distal humerus recovered were fused; these are both bones that fuse *ca* 3-3 1/2 years of age, which is the likely age at which this animal died. Despite the fact that this individual was a juvenile, its bones were the longest yet recovered, and indicate an animal that stood *ca* 1.31 m at the withers. The skull of this animal was not recovered, and a few of its longbones were missing. The skull may have disappeared due to disturbance by a massive Late Bronze Age pit that skimmed the surface of the burial complex in this area. The "missing" post-cranial bones are likely to be those described above that were disturbed by Installation E. The elements recovered from there are complementary to those missing from this individual, and the age-data derived from fusion status suggests the bones from each area originated from animals killed around the same age. The sex of the animal is unknown but, given its large size, it was most likely male.

Grey-lined Pits

Further to the east from this main north/south, and north of Tomb 6, three pit-like structures were found that were defined by a hard, grey soil. None of these were completely excavated, as they were located just east of a major baulk through the burial complex. As a result, no skulls from any these animals—whose heads were all to the west—were recovered.

The earliest pit held a single, adult equid, laying on its left side, with its head oriented to the west. All of its post-cranial bones were recovered, but its skull was in the western baulk. The animal stood *ca* 1.28 m at the withers. Overall, its bones were long and robust. This individual was probably older, and certainly was a draft animal; its tarsals were beginning to fuse together. Given the similarity in size (or greater size) to the other individuals, this animal was probably also male.

Just above this pit, but a bit further west, was another one that held at least four individuals. These were laying on their left sides, with their heads to the west. Only the pelvic limbs were east of the baulk.

Just above this pit, and further to the west, was the latest pit. It was almost entirely within the baulk and only the hind extremities of two individuals were accessible. Their orientation was not clear, and it seems that the bones were more mingled, and possibly disturbed. The skull of one of the animals was visible in the western baulk. The hind extremities were of different size and proportion to the remainder of the animals in the burial complex.

Demography of the skeletal population

All of the equids found so far appear to have been male. They varied in size between *ca* 1.21-1.31 m at the shoulder, and were thus rather tall. Their ages-at-death ranged from young animals at *ca* 3 years of age, to long-lived individuals possibly greater than 20 years of age. They all exhibited evidence of early and continual draft work, manifest as light to severe arthrosis on their first phalanges, tarsals/carpals, and metapodial bones. A large number of the skeletons showed heavy biceps brachii development, possibly from pulling. In order to control their movement and traction, at least four equids had evidence consistent with the wearing of a lip ring. The extent of the abrasion to the enamel that this caused increased with the animal's age, suggesting that the lip ring was continuously worn throughout his life. In addition, nearly all of the animals had dental malocclusions—typically an overbite.

MORPHOLOGY AND METROLOGY

These 26 mostly complete skeletons provide a unique population from which to examine their distinctive morphological, metrical and proportional characteristics for taxonomic identification. Excepting the skull and pelvis, the majority of the elements were excavated in quite good condition, enabling their thorough analysis. Yet, the ongoing analysis of the bones is still in its early stages, and only a brief—and incomplete—set of morphometric characteristics from a sample of elements are discussed here. At this time, I have focused on three elements: the radius, the metacarpal, and the metatarsal. Each of these elements has distinctive morphological and proportional characteristics useful for distinguishing between equine species.

Radius

Radius bones from the Umm el-Marra burial complex were, on average, long; seventeen relatively complete bones had an average greatest length of 300.8 mm (*table 1*). The majority of the bones were not straight over their longitudinal axis, but were rather slightly offset to lateral. The proximal ends were flared

laterally, and the lateral tuberosities were large. The medial portions of the proximal articulations were not flared, and were slightly rounded; medial tuberosities were large and "square" in shape. At the distal end, the facets of the articular condyles were parallel and unreduced in size. The line separating the lateral facet was complete across the dorso-volar surface, and quite distinct. These morphological traits are more consistent with hemiones than with asses (see Boessneck, Kokabi 1981, p. 97; Uerpmann 1986, p. 258). Metrical and proportional distinctions provide more objective comparisons between taxa.

	n	Mean	min	max	sd
Hemione[+]	7	73.2	69.6	79.3	3.38
Donkey[+]	8	79.6	76.5	84.5	2.90
Umm burial	27	76.2	71.0	81.0	2.76
Umm occupation donkey*	14	80.5	74.2	85.2	3.34
Umm occupation hemione*	38	73.9	66.9	77.0	3.06

[+]Measurements of modern taxa from Uerpmann 1991.
*Identified through a combination of morphological traits and assessment of normal mixtures of metrical means (Weber 2006, p. 269-270).

Table 1—Means of the Breadth to Depth ratio of the medial facet of the distal articulation of the radius.

At the distal end of the radius, Uerpmann (1991, p. 25-26) has found that the proportion of the breadth and depth of the medial articular facet (Bx100/D) is distinctive between hemiones and asses. In measurements from modern, known species, Uerpmann found means of 73.2% for hemiones, and 79.6% for asses in his collection. In general, a value below 75% indicates a hemione, and a value over 80% indicates an ass; but, this leaves a large area of overlap between 75%-80%, in which individual specimens cannot be confidently identified. While this proves detrimental to the identification of individuals, populations may be identified less ambiguously. This index was applied to 52 distal radii from trash deposits at Umm el-Marra, many of which had been identified as either ass or hemione based upon morphological traits (Weber 2006, p. 269-270). Overall, the proportions of the medial facets among these 52 radii ranged between 66.9% and 85.2%. To further separate the 2 or 3 populations from which these animals were drawn, the "normal mixtures" statistical method was used. This method distinguishes between the underlying, normal population means of multiple populations with overlapping distributions whose values are not mutually exclusive. The use of additional variables makes this multivariate method more effective, and so a second index was utilized in the normal mixtures: the breadth of the distal articulation (Bfd) divided by the depth of the distal articulation (Dfd) (Meadow 1986, p. 275)—an expression of the relatively greater elongation of ass distal radii and the greater blockiness of that of hemiones (Uerpmann 1986, p. 258). Meadow (1986, p. 275) recorded a range of 1.57-1.78 for distal radii from Çayönü—only one of which (1.78) may have been an ass. Five distal radii from Tell es-Sweyhat—identified as hemione based on their morphological traits—ranged from 1.55-1.68 (Weber 1997, p. 137). A rough division is suggested for this index at *ca* 1.70; measures greater than 1.70 being typically asses, while those less than 1.70 being typically hemiones. Using the normal-mixtures method, two populations were identified from the Umm el-Marra trash deposits, having means of 73.9% (and 1.65) and 80.5% (and 1.76). Elements identified as hemione based on their morphological traits all were found in the first population (of mean = 73.9%), while those identified as donkey were found in the second population. The results of the normal-mixtures means-clustering as applied to the Umm el-Marra trash debris thus nearly duplicated Uerpmann's results in terms of mean proportions. The same multivariate cluster analysis was applied to the distal radii from the burial complex. The mean for these 27 distal radii was 76.2%,[5] with a range between 71.0% and 81.0%. This

5. The 27 elements were from 20 individuals. Both elements were included from 7 skeletons, due to a difference of *ca* 3% between their right and left radii.

mean is almost exactly equidistant from the means for known hemiones and known asses. The range is broad, but excludes the smallest proportions from hemiones, and the largest proportions from asses. When all 79 radii (from the burial complex and the occupation debris) were figured together in the same normal mixtures plot, the burial equids were equally spread between the hemione (n = 12) and ass (n = 13) groups (*fig. 4)*; two did not have both Bfa and Dfa measurements. This equal separation into the "donkey" and "hemione" groups occurred despite the consistent morphological features of the burial-complex group. Moreover, the standard deviation for the burial equids was the smallest of any of the taxonomic groupings, further emphasizing the internal consistency of this population.

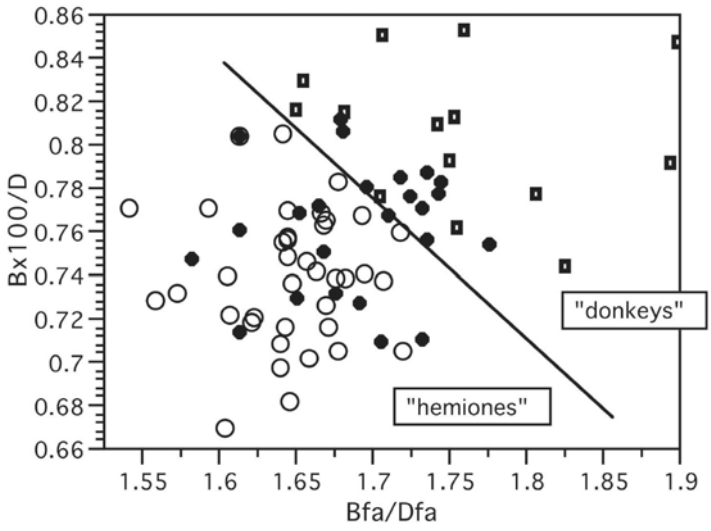

Fig. 4—Bivariate plot of distal radii.

The solid line separates the "hemiones" (O) and "donkeys" (□) from the occupation trash from Umm el-Marra, as calculated from "normal clusters" using the two indices. Equids from the burial complex (•) fall on both sides of the separating line.

A third index involving the radius is the relative proportion of the greatest length of the metacarpal to the greatest length of the radius. The metacarpal bones of hemiones are longer relative to the radius than are those of other equid taxa. When expressed as a ratio, the greatest length (GL)[6] of hemione metacarpals are greater than 70% of the GL of their radius bones, while an ass metacarpal bone is usually less than 70% of its radius (Willoughby 1974; Boessneck 1976; von den Driesch, Amberger 1981). Clutton-Brock (1986, p. 218, table 2d) reported a mean of 65.3 for 12 asses, with a range from 63%-68%, and five of the six skeletons she identified as donkey from Tell Brak (Clutton-Brock 1989; Clutton-Brock, Davies 1993) had ratios between 60.8-67.2. The sixth, a male, had a ratio of 72.2—which may have been the result of an "unusually short radius" (Clutton-Brock, Davies 1993, p. 210). Of 10 *E. hemionus* proportions given by Clutton-Brock (1986, p. 218, table 2d), the mean was 74.2%, but the range was 68%-78%. Overall, the typical upper limit for asses seems closer to 68%, at which point there is an overlap with half-asses. There were radius/metacarpus pairs from 15 animals in the Umm el-Marra burial complex that could be both matched and measured (*table 2*). Their proportions ranged from 67.5% to 73.1%, with a mean of 69.5%. These proportions are not entirely distinctive of any taxa; they are in a "grey" area between that typical for either hemiones or asses.

6. Measurement after von den Driesch 1976.

Installation	Skeleton	Radius GL	MC GL	MC slenderness	MC/RAD
A	1	299.0	208.8	12.8	69.8
A	2	280.0	196.0	13.7	70.0
A	3	308.0	208.7	12.7	67.7
A	4	314.0	215.0	13.8	68.5
B	North	300.0	202.7	13.1	67.6
B	South	299.0	210.0	14.0	70.2
C	North	286.0	209.6	13.4	73.3
C	South	303.7	210.2	13.8	69.2
D	North	296.4	208.2	13.9	70.2
D	South		196.8	16.1	
D	*		213.3	13.4	
D	*		209.1	13.7	
E	A	290.0	212.0	13.6	73.1
E	B	302.6	208.0	13.3	68.7
E	C	304.0	205.0	14.1	67.4
E	D	310.2	211.7	14.5	68.2
T8, SP	*		215.0	13.8	
T8, SP	*		210.0	14.8	
T8, SP			213.0	14.1	
T8, SP	405	318.2	216.5		68.0
GP 1	A	304.0	211.5	14.8	69.6

* Denotes a bone not matched to a particular skeleton.

Table 2—Individual measurements of radius and metacarpal bones from Umm el-Marra.

Metacarpus

Metacarpal bones from the burial complex displayed morphological traits of both asses and half-asses, and as a group were not as consistently similar in their morphology as were other elements. At the proximal end, most of the bones have irregular volar edges, though in some cases this is very slight; this trait is characteristic of asses (Uerpmann 1986, p. 257). Yet, others have very straight edges with no irregularity, a trait associated with hemiones (*ibid.*). Most shafts have a distinct bow at their distal ends—consistent with hemiones. But there were others that were very straight and ass-like. There is an unusual correlation between these two sets of traits, as those with straight volar edges on their proximal articulations tend to have straight shafts, while those with irregular volar edges have bowed shafts. Individual bones thus show mixed characteristics, of *both* asses and half-asses.

In terms of size, these bones are characterized by their long length and their robusticity (*table 2*). For the 21 metacarpal bones for which the measurement could be taken, the greatest length averaged 209.1 mm, and ranged between 196.0-215.0 mm; only two had greatest lengths below 200 mm. The mean for this population was compared to those of known species (*fig. 5*). In figure 5, each dot on the y-axis represents a single greatest length measurement, each of which is divided into its respective taxon along the x-axis. The circles on the right-hand side of the graph represent the means of each respective population—the smaller the circle, the tighter the mean and smaller the standard deviation. The circle for the burial-complex equids from Umm el-Marra is the smallest—befitting of a single, same-sex population. The Umm el-Marra mean was compared to the mean of each of the other populations using a Student's t-test at 95% confidence level. Circles in black are those that are not significantly different to the test population, while those in grey *are* significantly different. Comparison of the means of the greatest length of the metacarpal thus suggests that the burial population is *not* the same as *E. asinus* (including archaeological specimens from Tell Brak), *E. przewalskii, E. h. hemippus*, or modern examples of the mule (*E. caballus* x *E. asinus*). These are not statistically differentiated, however, from *E. hemionus* or from an example each of an *E. hemionus* x *E. caballus* cross, and an *E. hemionus* x *E. asinus* cross. The circle that represents the hybrid mean is the largest due to the small sample, and thus is also the least reliable.

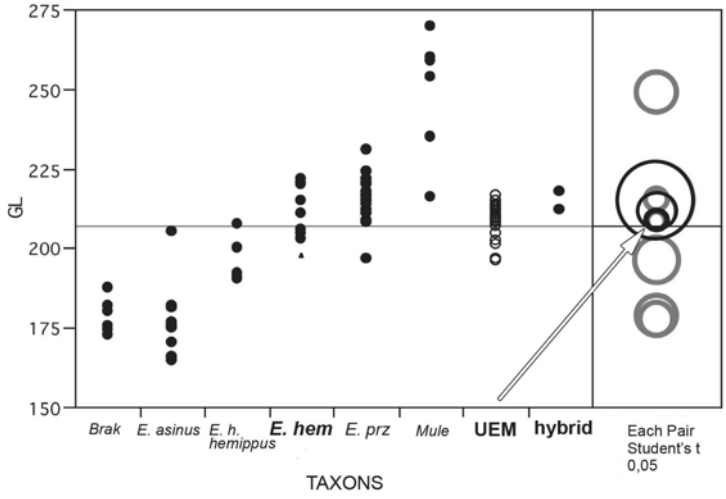

Fig. 5—Means comparison, Greatest Length of the metacarpus. Measurements from Eisenmann, Beckouche 1986; Clutton-Brock 1989; Clutton-Brock, Davies 1993.

Relative slenderness is a major distinguishing characteristic among equid species (Hilzheimer 1941; Eisenmann 1986, p. 77), with horses having the most robust—and hemiones having the most slender—metapodiae. This is measured via the slenderness index (SDx100/GL). The robusticity of the metacarpus bones from the burial complex suggests different affinities for this population than does the greatest length. The average slenderness index for 20 independent metacarpal bones was 13.8, with a range between 12.8-14.8, with an outlier of 16.1 (*table 2*). The mean for this all-male population is nearly exactly the same as the average for the bones of a group of male asses measured by Willoughby (1974, p. 425, table 32), which was *ca* 13.7-13.9. The male and female "donkeys" from Tell Brak had slenderness indices between 13.4-13.9 (Clutton-Brock, Davies 1993, p. 21, table 6). When the mean slenderness for different populations of equid are compared with that from the Umm el-Marra burial complex (*fig. 6*, the chart type is the same as *fig. 5* described above), asses—including the Tell Brak "donkeys"—are not significantly different.

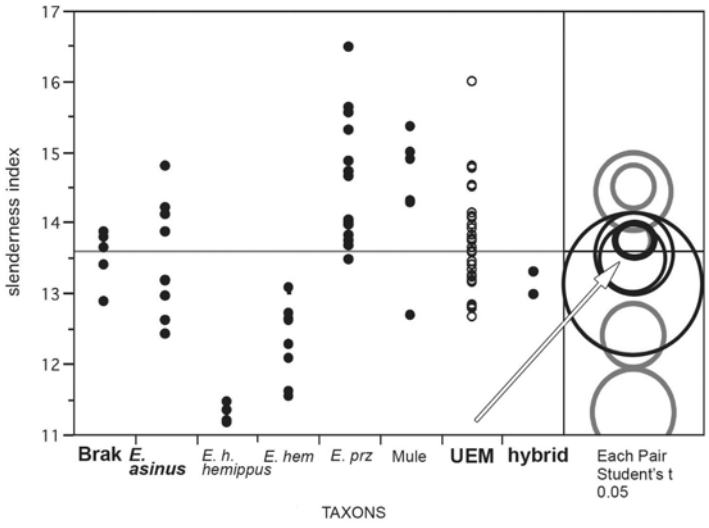

Fig. 6—Means comparison, Slenderness Index of metacarpus.

Nor is the mean for the hybrids (described above). But, the mean slenderness for hemiones—whose mean for greatest length was not significantly different from that of the burial equids—is significantly different. The two different measures show similarity of the equids from the burial complex to differing taxa. Only the two hybrid specimens are admitted as similar through both comparisons. Conversely, horses, mules and *E. h. hemippus* are significantly different in both cases.

Greatest length *and* robusticity of the metacarpal bones of equids from the burial complex were compared to those from occupation trash at Umm el-Marra, as well as measurements from modern animals of known taxa (from Eisenmann, Beckouche 1986). The resulting scatter plot (*fig. 7*) of that comparison shows separation of the equids from the burial complex from either the ass or the hemione bones from the occupation debris from Umm el-Marra. This is best demonstrated by their relationship to density ellipses around each taxon that encompass 95% of the variation of the population's mean. Those from occupation trash are clearly divided between the known asses or the known hemiones. On the other hand, the burial complex bones are clearly distinct from the asses, and occupy an area on the graph that is within and between known hemiones and horses—and the two hybrid specimens.

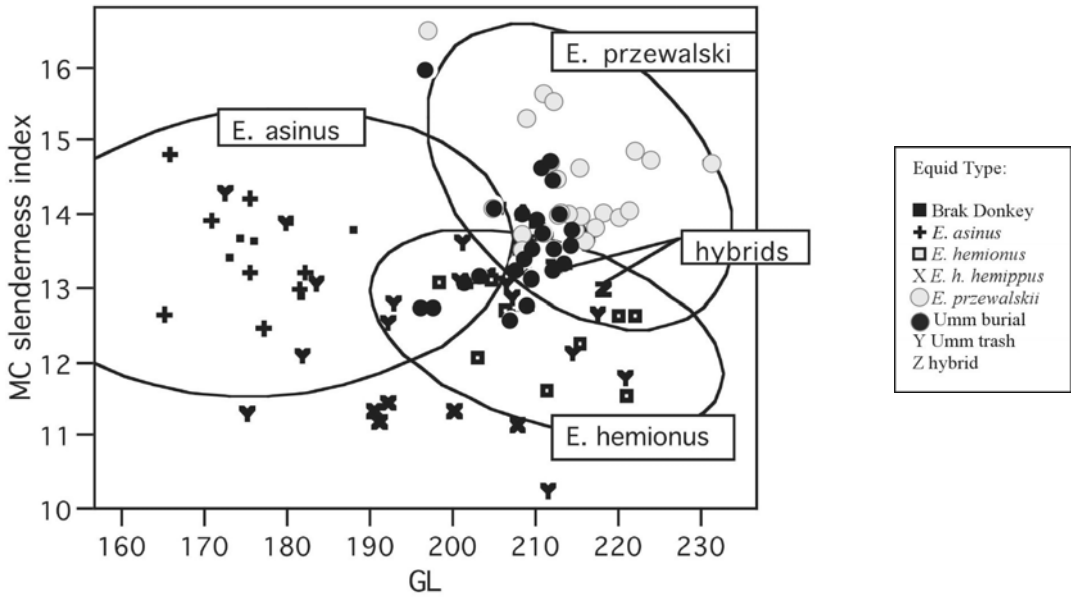

Fig. 7—Bivariate plot, Slenderness Index and Greatest Length of metacarpus.

Finally, the shape of the metacarpal bones from the burial complex were compared to that of others using the log difference method (*fig. 8*) described in Eisenmann and Beckouche (1986). Each point along the x-axis represents the difference to a standard (in this case *E. hemionus*) of the base 10 log value of the population mean of a given measurement (correlating to Eisenmann and Beckouche 1986, from which the measurements were also obtained). The slope of the line between point then log expresses the variations in shape and proportion between taxa. For instance, the slope between point 1 (GL) and 3 (SD) reflects slenderness. All of the examples below have an inclined slope between those points, indicating that each taxon is less slender (SD relative to GL is greater) than *E. hemionus*. Based on log differences, the burial equids (the solid line in *fig. 8*) differ from the hemione standard in a way that is quite different from *E. przewalskii*, but that shares some affinities to all of the other taxa presented. Yet, the similarities are not so exact as to be indicative of taxa.

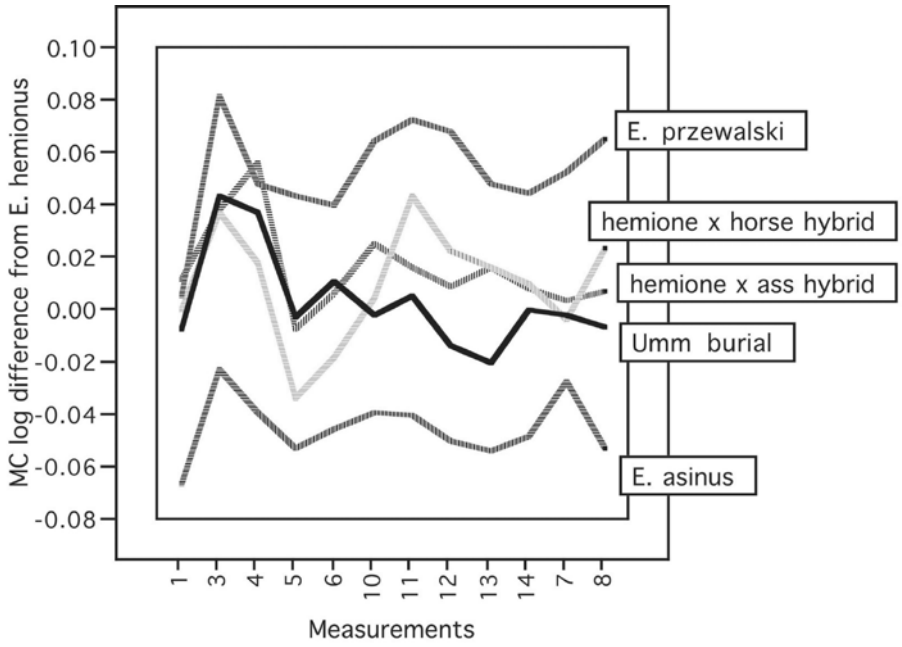

Fig. 8—Log difference chart, metacarpus.

Metatarsus

Only one morphological trait of metatarsal bones has been examined, and that is the orientation of the distal articulation on the shaft. All of the metarsal bones from the burial complex have a distinct tilt to plantar at their distal ends, though the degree to which this is the case varies by individual. Such an orientation is associated with hemiones (Bökönyi 1972, p. 15; Meadow 1986, p. 276-277).

The metatarsal bones were long and robust from the burial complex (*table 3*). They were examined in many of the same ways as were the metacarpal bones—save the comparison of greatest lengths to that of

Installation	Skeleton	MT GL	MT slenderness
A	1	252.8	10.9
A	2	233.6	10.3
A	3	242.0	10.5
A	4	255.0	10.6
B	North	241.0	11.2
B	South	251.0	11.2
C	North	241.5	12.0
C	South	245.0	11.6
D	North	242.8	11.4
D	South	234.2	12.4
D	*	248.4	10.9
E	A	241.4	11.8
E	B	242.0	10.2
E	C	236.0	11.1
E	D	(250)	

Installation	Skeleton	MT GL	MT slend
T8, SP	*	248.0	11.1
T8, SP	*	244.5	12.9
T8, SP	*	245.0	11.9
T8, SP	*	252.5	10.9
T8	405	250.5	11.5
GP1	A	249.5	12.4
GP2	A	250.0	10.9
GP2	B	247.0	10.8
GP2	C	247.0	11.7
GP2	D	245.0	11.2
GP3	A	232.0	11.2
GP3	B	240.0	12.0

* Denotes a bone not matched to a particular skeleton.

Table 3—Measurements of metatarsal bones of equids from Umm el-Marra.

the radii. The results of comparisons of greatest length, slenderness, and shape of the metarsal bones were quite similar to those of the metacarpal bones. Means comparison of the greatest length of the metatarsus (*fig. 9*) correspond to those in figure 5. The mean greatest length from the burial complex (244.7 mm) is significantly different—at 95% confidence—from populations of ass and horse. It is not significantly different from hemiones (except *E. h. hemippus*) or hybrids. Results for slenderness (*fig. 10*) are similar—but not exact—to those in figure 3. The average slenderness of the burial equids (11.3) is significantly different only from the mean for hemiones, but not asses, hybrids or, in this case, horses.

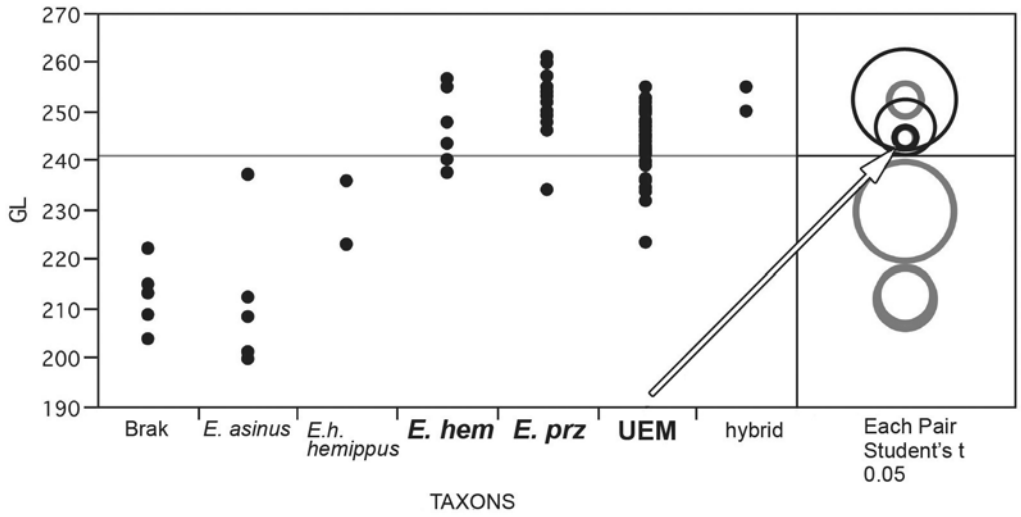

Fig. 9—Means comparison, Greatest Length of metatarsus.

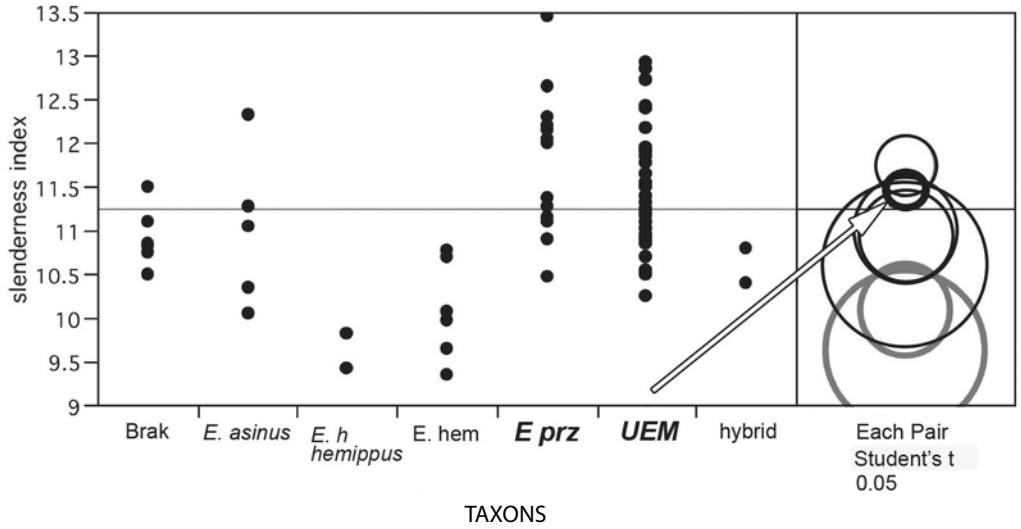

Fig. 10—Means comparison, Slenderness Index of metatarsus.

The greatest length and the slenderness were plotted against each other (*fig. 11*). The results are quite similar to those resulting from the metacarpal bone scatterplot (*fig. 7*). That is, the burial equids occupy rather liminal space between several taxa, rather than associating with any one in particular.

Finally, the metatarsal bones were compared in a log difference graph (*fig. 12*). The standard animal for this graph is *E. asinus*. In figure 12, the equids from the burial complex share greater affinities with hemiones and their hybrids in terms of their differences in shape to *E. asinus*; horses do not appear to differ from *E. asinus* in similar fashion to these others.

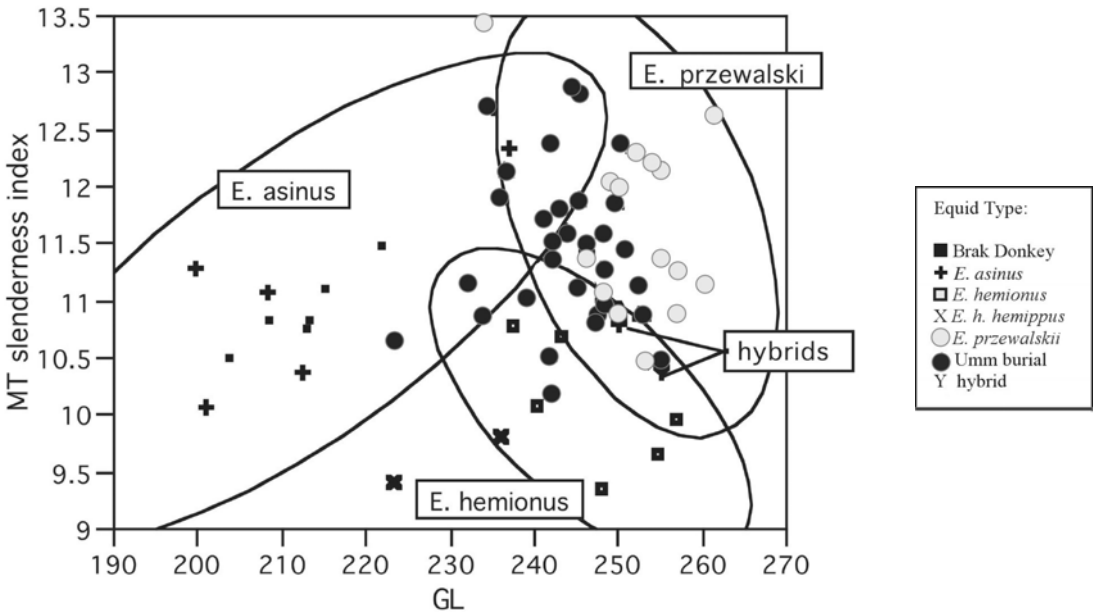

Fig. 11—Bivariate plot, Slenderness Index and Greatest Length of metatarsus.

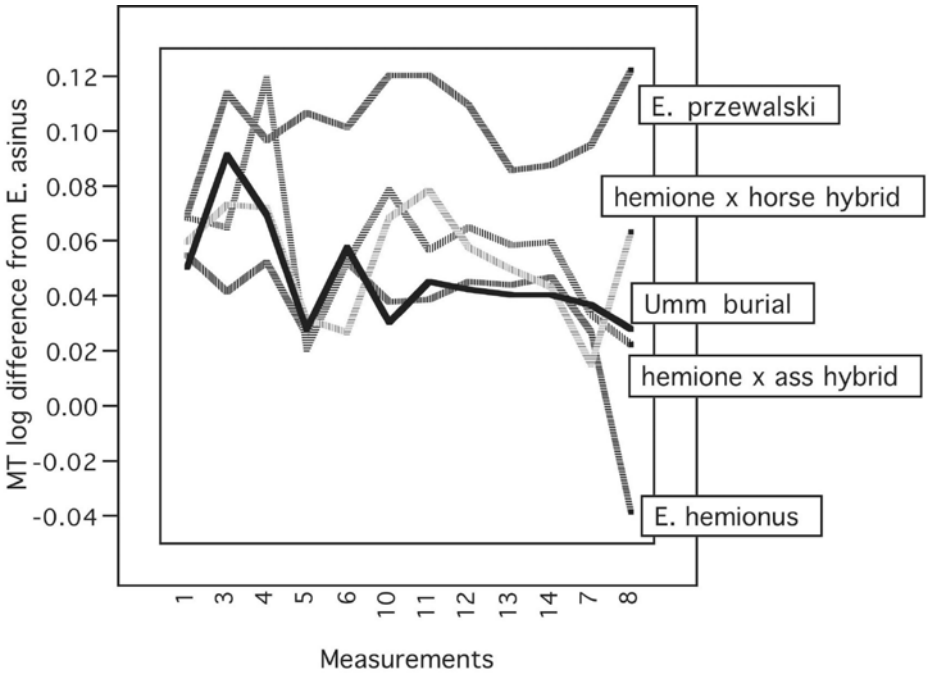

Fig. 12—Log difference Chart, metatarsus.

IDENTIFICATION OF THE EQUIDS FROM THE BURIAL COMPLEX

The three elements discussed above—radius, metacarpus and metatarsus—do not conform in morphology or metrology to any single taxon. Morphologically, individual elements—sometimes even the same element—show characteristics of both asses and half-asses. Metrically, the bones are long and robust, such as might be expected of *E. przewalskii*. But, as a population, they are neither as long nor as robust as that taxon. In absolute size, the skeletons are closer to hemiones. The bones are larger than those of modern and ancient donkeys; a clear size difference between archaeological materials identified as donkey and hemione can be seen in occupation material from Umm el-Marra and other sites of the 3rd and 2nd millennia (Boessneck 1987, p. 133; Boessneck, von den Driesch 1989, p. 124; Clutton-Brock 1989; Clutton-Brock, Davies 1993; Weber 2006, in prep.). But, the bones are more robust than is typical for hemiones. Slenderness indices suggested greater affinities with asses (and even horses) than with hemiones. Thus, the population from the burial complex is not entirely like or unlike hemiones, asses, or horses. Overall, they cannot be identified on morphological or metrical bases as *E. asinus*, *E. hemionus*, or *E. przewalskii*. or hybrids. As a group, the bones from the burial complex are also quite distinct from the large quantities of hemione bones, lesser amounts of donkey bones and the very few horse bones found in the occupation debris at the settlement of Umm el-Marra (*e.g.* Schwartz *et al.* 2000; Weber 2006). The two examples of hemione hybrids (crossed with *E. asinus* or *E. przewalskii*) did share strong similarities with the burial equids. Statistically, neither hybrid was significantly different from the burial population. Yet, with only two examples, certainty cannot be placed on that association.

So, what are these equids? Clues to reduce the ambiguity of their taxonomic status may be found in the context of their burial and in demographic features of the equid population.

In the midst of an elite, possibly royal, burial complex was architecture specially constructed and devoted to the burial of male equids. This group of 26+ skeletons were used as draft animals during their lifetimes. Certain of the bones suggest that pulling, rather than loading, was performed by them. Evidence for the use of a lip ring indicates that foddering would have been necessary, as an equid is probably not capable of grazing while wearing a lip ring.[7] Discrepancies in wear between the incisors and cheekteeth of some of the equids indicate that grazing was a rare occurrence.

An equid that satisfies the above criteria was the *kunga*—written BAR.AN. This animal was listed in textual documents from Syro-Mesopotamia from *ca* 2600-2000 BC (Zarins 1976, p. 447; Postgate 1986, p. 197), part of which spans the use of the Umm el-Marra burial complex. The *kunga* was a valuable animal; texts from southern archives suggest it was up to six times more expensive than a donkey (Zarins 1978, p. 14), while texts from northern Syria indicate the *kunga* cost up to 5 minas of silver (Archi 1998, p. 9). Probably in part due to its high cost, the *kunga* resided within the institutional and aristocratic domain of Syro-Mesopotamia. In general, *kunga* were used to pull wagons and chariots associated with messengers, soldiers and officials (Zarins 1976, p. 450-461; Heimpel 1994, p. 25), much to the exclusion of donkeys (Zarins 1976, p. 412). Female *kunga* were typically put to the plow (Maekawa 1979, p. 130, n. 35), but the male was particularly prized for pulling the ceremonial and war chariots of "nobility and gods" (Heimpel 1994, p. 11). Indeed, the ruler of Nagar (modern Tell Brak)—in whose kingdom high-quality hybrids were bred—had his chariot pulled by *kungas* (Lerberghe 1996; Archi 1998, p. 5). He was constantly asked to send more of the animals to the ruler of Ebla , who used them himself and also provided them as gifts to other elites (Archi 1998, p. 9).

While many types of equids received fodder in lieu of—or as a supplement to—grazing, *kunga* were often foddered daily, year round, and uniquely received "extra" grasses in addition to their barley fodder (Zarins 1976); this may have been a result of the particular nutritive needs of animals that never grazed—perhaps due to their wearing lip rings (see above, "Installation A").

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7. Littauer and Crouwel (1973, p. 118) rejected the possibility that equids could have worn lip rings due to the mistaken notion that this would prevent them from *eating.* They would, however, only be prevented from grazing. See note 2, above.

Numerous images of equids were made in the mid- to late 3rd millennium whose iconography is characteristic of the traits of the *kunga* that are denoted in texts, in particular in their capacity as royal steed. Thus, teams of male equids are commonly depicted pulling wheeled vehicles (*e.g.* Littauer, Crouwel 1979). These are often in the context of war or ceremony, as in the case of the Standard of Ur (*fig. 13*; Woolley 1934, p. 266), and sealings from Tell Brak (ancient Nagar) and Tell Beydar (ancient Nabada) (see Jans, Brentschneider 1998; Oates *et al.* 2001: fig. 1; Oates 2003, p. 116, fig. 9.2). A messenger or some other type of official may be portrayed on the three-dimensional copper model from Tell Agrab of a team of equids pulling a wheeled vehicle (Frankfort 1943: pl. 58, 60). Upon examination of that model, Frankfort (1943, p. 13) determined that the team of equids were controlled by lines strung through rings through the animals' upper lip. In the close-up of the Standard of Ur (*fig. 14*), reins are shown strung through a ring in profile, below clearly depicted nostrils and through the lip.

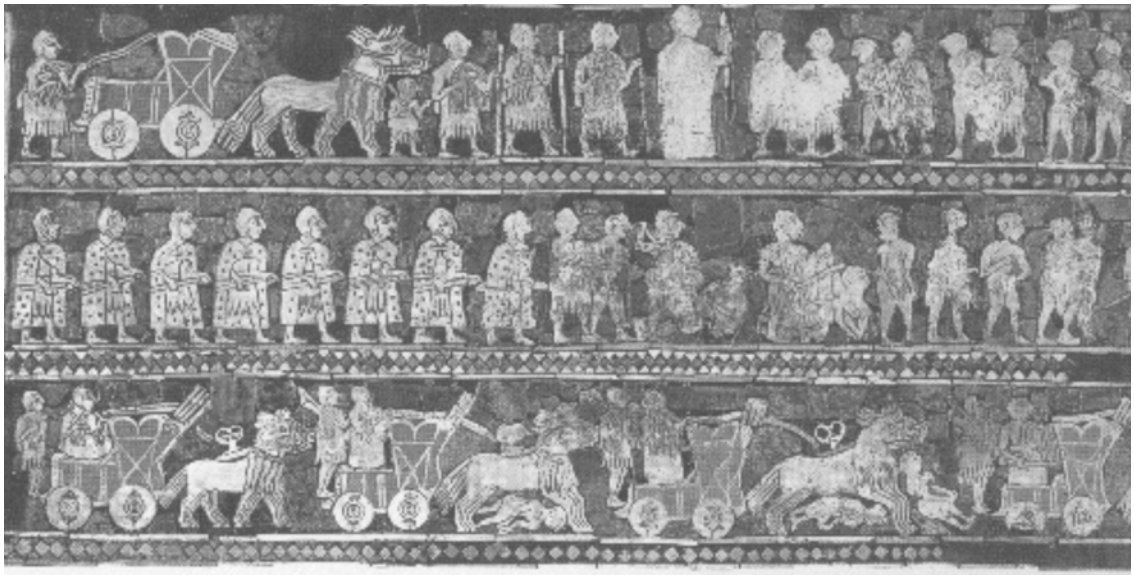

Fig. 13—Standard of Ur (photo after Zettler, Horne 1998, p. 44, fig. 36a).

Fig. 14—Close-up of figure 13*, Standard of Ur.*

There is no sure way to identify equids portrayed in glyptic, and I do not propose to do so here. However, their discussion in texts makes clear that these animals were considered those most appropriate in the ceremonial realm of the aristocracy and the gods—particularly as royal and divine steeds. It is also quite likely—but by no means certain—that this was realized in contemporary iconography. Male *kunga* were idealized as animals for conveying kings, and that animal is quite possibly the equid that is portrayed pulling a war vehicle on the Standard of Ur (see above), and on sealings from Tell Beydar showing equid-pulled vehicles in ceremonial context (Jans, Brentschneider 1998, pl. 1, Bey. 1).[8] Political rhetoric was such that one may expect *kunga* to be portrayed in the propagandistic display that is elite glyptic. The very public setting of the burial complex at Umm el-Marra—and the central location of the equid burials within that complex—suggest that their disposal and display was an overt act of ceremony; elites there were attempting to utilize this political rhetoric. In other words, this was visual propaganda by the politically-based aristocracy. As such, ceremonial images of equids, chariots and kings—which were contemporaneous to the burial complex at Umm el-Marra—are analogous features of political display to the central consumption of the equid burials at Umm el-Marra.

If the Umm el-Marra burial equids are *kungas*—and it does seem likely that they are—then what is their taxonomic identification? There is general agreement that the *kunga* most likely represents a hybrid of the hemione and the donkey (Postgate 1986; Heimpel 1994, p. 10, note 23; Archi 1998, p. 9, note 48). However, Zarins (1976, 1978) suggests that it is probably a horse x donkey hybrid (mule), while Maekawa (1979, 2006) maintains that the *kunga* is the Persian onager, whose tamed offspring were harnessed. Identification of the skeletons from the Umm el-Marra burial complex will thus help clarify equid taxonomy in cuneiform texts from Syro-Mesopotamia between *ca* 2600-2000 BC. The preponderance of the evidence presented here indicates that the skeletons cannot be identified as *E. hemionus*, *E. asinus*, or *E. przewalskii*. However, the mixture of hemione and asinine morphological and metrical traits does suggest these were hybrids of the hemione and the ass.

Regardless of its ultimate taxonomic identification, the *kunga* was a high status animal that emblemized power and royalty. These animals at Umm el-Marra, buried in their own chambers, were elite equids whose burial in the central complex reflected their integral position in the royal domain.

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8. While the greatest evidence for use of the BAR.AN dates to texts of the Akkadian period, they were already attested in pre-Sargonic texts (Maekawa 1979, p. 35-38)—thus making possible their portrayal in the Standard of Ur (J.N. Postgate, personal communication, November 2006). The Standard of Ur dates to the ED IIIa (Zettler 1998, p. 21) and is thus contemporary to the earliest attestations of BAR.AN in pre-Sargonic texts (Maekawa 1979, p. 46, note 2). The sealings from Beydar date slightly later (Jans, Brentschneider 1998, p. 155), but are contemporary to numerous references to their sale, breeding and use in archives from Ebla (Archi 1998) and Tell Beydar (Lerberghe 1996; Sallaberger 1996). Moreover, the earliest attestation of a term in the sparse textual record does not qualify as evidence for the genesis of the actual behavior.

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