ARCHAEOZOOLOGY OF THE NEAR EAST V

Proceedings of the fifth international symposium on the archaeozoology of southwestern Asia and adjacent areas

edited by

H. Buitenhuis, A.M. Choyke, M. Mashkour and A.H. Al-Shiyab

ARC-Publicaties 62
Groningen, The Netherlands, 2002

THE BIG EQUUS FROM THE GEOMETRIC KEBARAN OF UMM EL TLEL, SYRIA: *EQUUS VALERIANI, EQUUS CAPENSIS*, OR *EQUUS CABALLUS* ?

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Abstract

Remains of a very large and robust *Equus* were discovered in the Geometric Kebaran of Umm el Tlel (about 14,500 to 16,500 BP). By inference, this animal weighed more than 500 kg (greater than the largest extant equid, *E. grevyi*). This animal may have stood about 163 cm at the withers, which is more than in an average draft horse. Fossils of similar size are very rare in the Upper Pleistocene. They may be caballine as at San Sidero (Italy) and Norºuntepe (Turkey), zebrine as *E. capensis* (South Africa), or of unclear affinity such as *E. valeriani* (Uzbekistan) or the large equid from Kom Ombo (Egypt).

Résumé

Quelques fossiles exhumés dans le Kébarien Géométrique d'Umm el Tlel (Syrie) témoignent de l'existence d'un équidé robuste de très grande taille. Sa hauteur au garrot peut être estimée à environ 163cm (plus que chez un cheval de trait) et son poids à plus de 500 kg (plus que chez un zèbre de Grévy). Au Pléistocène supérieur de telles dimensions sont rares. On les trouve chez quelques chevaux vrais (San Sidero en Italie et Norþuntepe en Turquie) ainsi que chez le grand zèbre d'Afrique du Sud, *E. capensis*. D'autres grands équidés restent énigmatiques comme *E. valeriani* (Uzbekistan) et le grand *Equus* de Kom Ombo (Egypte).

Key Words: Large equids, Syria, Kebaran

Mots Clés: Grands équidés, Syrie, Kébarien

Introduction

More than fifty years ago, Gromova (1946) described *Equus valeriani* (Fig. 1), an enigmatic equid from Uzbekistan, based on very large cheek teeth. These specimens were excavated in 1938 at the Upper Paleolithic site of Samarkand, in association with a cervid (close to *C. elaphus*) and badly preserved remains of a bovid. From that period, and in that place, only true (caballine) horses and hemiones are usually found. But according to Gromova, *E. valeriani* cannot be a horse or a hemione: its lower cheek teeth have a primitive, 'stenonine' double knot (although the ectoflexids are not very deep). The upper cheek teeth have a very thin and plicated enamel and a long protocone. Gromova notes that teeth of that kind may be found in old Asian fossil equids such as *E. sivalensis*, although this latter species has smaller teeth (Gromova, 1949). Nothing is known about the rest of the skeleton.

Another large upper cheek tooth found in the Mousterian levels of the Teshik Tash cave may also belong to the same species, although it could just as well be a tooth from a caballine horse (Gromova, 1946). Spassov and Iliev (1997) consider the specimens from Teshik Tash to be from a true horse.

Thousands of kilometers from Samarkand, in the Cape province of South Africa, another equid with very large 'stenonine' lower cheek teeth was described by Broom (1909 and 1913) as *Equus capensis*. In that case, however, subsequent findings in many different localities have resulted in the collection not only of limb bones but also of a skull. The abundant material from Elandsfontein shows that *E. capensis* was probably related to plains zebras and that its body proportions were similar to those of an extant draft horse (Eisenmann, 2000). Large equid remains from South Africa and Namibia, identified as *E. capensis* are known from Sterkfontein 5 (about 1.7 Ma) up to the beginning of the Holocene (Figs. 2 – 4).

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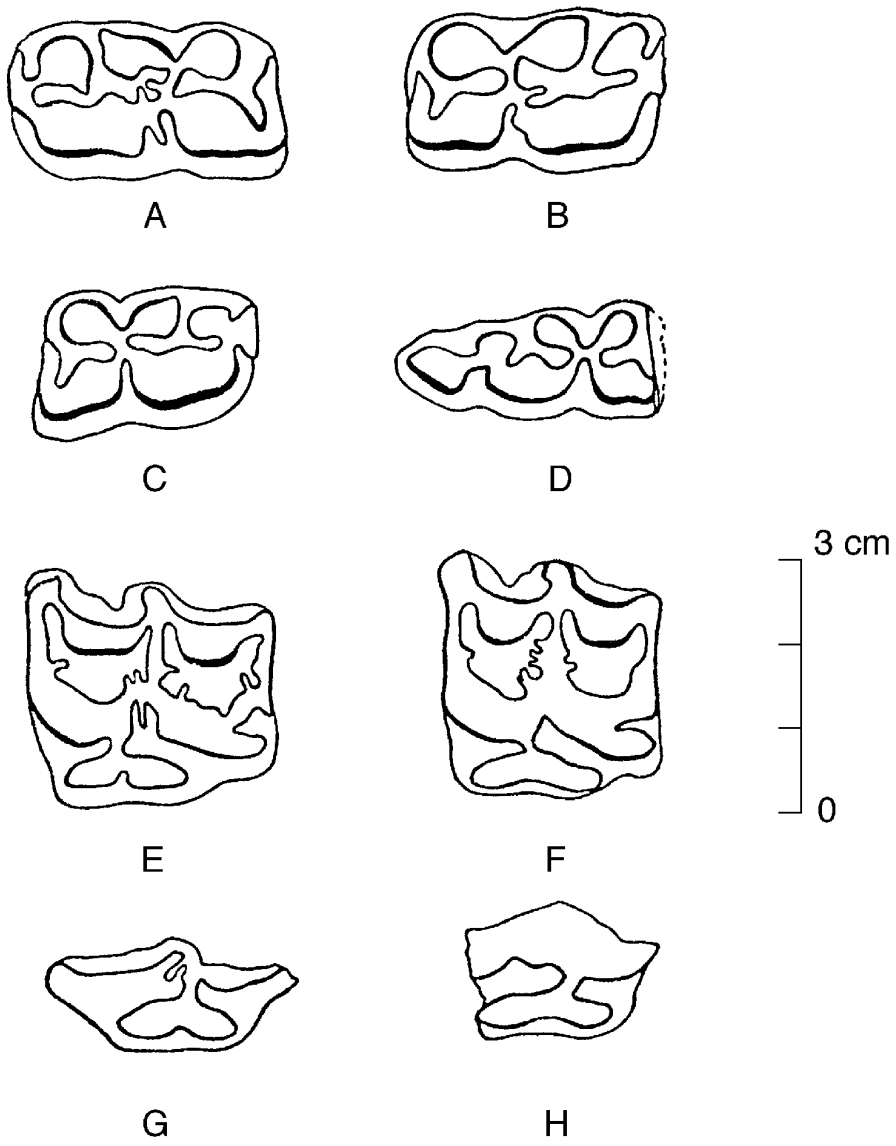

Fig. 1. *Equus valeriani*, Upper Paleolithic Samarkand, Uzbekistan, after Gromova 1949, fig. 33.
A: Type specimen, GIN 261, B: GIN 139, C: GIN 138, D: GIN 234, E: GIN 262, F: GIN 131.

Equids of the Middle East Pleistocene are in general identifiable either to caballine horses, *E. hydruntinus*, or to hemiones, although some findings suggest the possible presence of asses. In general, the remains are of small or moderate size, nothing to compare with *E. valeriani* or *E. capensis*. Thus, it came as a shock to discover a huge third metatarsal and large teeth of an *Equus* in the Geometric Kebaran of Umm el Tlel in Syria.

Umm el Tlel is located between the Euphrates river and Palmyre, 4 km east of Qdeir, and 8 km north of El Kowm. This kill site was excavated by Alcade and Cauvin who discovered a stratigraphic sequence ranging between 14,500 and 16,500 BP. Most of the fauna comes from upper levels (complex 1a). Equids (two sizes) are predominant (66%). There are also gazelles (23%), camels, cervids (cf. *Cervus*), wolves, hares, and large terrestrial tortoises. The composition of the fauna is no different from the base to the top of the sequence, although there are more gazelles in the lower levels. The environment was steppic but with some marshes in the vicinity, as evidenced by malacological studies.

Fig. 2. *Equus capensis*, Early Middle Paleolithic Pniel, South Africa (Kimberley 6755D). The scale bar is 3 cm.

Fig. 3. *Equus capensis*, Late Pleistocene, Wonderwerk Cave, South Africa. (Pretoria WW 11 and 7). The scale bar is 3 cm.

Fig. 4. *Equus capensis*, Late Pleistocene Wonderwerk Cave, South Africa. (Pretoria WW 1 and 2). The scale bar is 3 cm.

The very large equid from Umm el Tlel will be compared to some other large Late Pleistocene equids. Unfortunately, we presently have access only to casts of the metatarsal and of one series of upper cheek teeth and to a sketch of another upper cheek teeth series. The rest of the cheek teeth are not yet completely prepared and their complete description will have to wait.

Description and estimations

The upper cheek teeth

The left and right series do not appear to belong to the same individual. Both are moderately worn. The teeth are large (Fig. 5, Table 1). The parastyles and mesostyles are not grooved nor are they very wide. Due to the poor state of preservation, the degree of plication of the enamel is unclear. The plis caballins are absent or weak and the post protoconal valley is deep. The protocones are smallish and plump, with a lingual groove on the P3 and P4.

Table 1. Upper cheek teeth of the large *Equus* from Umm el Tlel. Measurements in millimeters. OL: occlusal length, PL: protocone length, OW: occlusal width, PI: protocone index = 100*PL/OL.

		BY 152-35	BY 152-57			BY 152-35	BY 152-57
	OL	39.0	38.0		OL	28.0	26.2
P2	PL	8.5	8.8	M3	PL	11.1	11.3
	OW	29.0	28.5		OW	24.2	24
	Height	47.5	38.5		Height		
	PI	21.8	23.2		PI	39.6	43.1
	OL	30.0	30.5		OL	28.0	27
P3	PL	13.0	13.2	M1	PL	11.1	11.5
	OW	32.5	31.7		OW	30.0	29.5
	(OL+OW)/2	31.3	31.1		(OL+OW)/2	29.0	28.3
	Height	61.5	58.0		Height		
	PI	43.3	43.3		PI	39.6	42.6
	OL	30.0	28.8		OL	28.0	27.5
P4	PL	13.4	12.7	M2	PL	11.1	11.5
	OW	31.0	30.2		OW	29.0	30
	(OL+OW)/2	30.5	29.5		(OL+OW)/2	28.5	28.8
	PI	44.7	44.1		PI	39.6	41.8

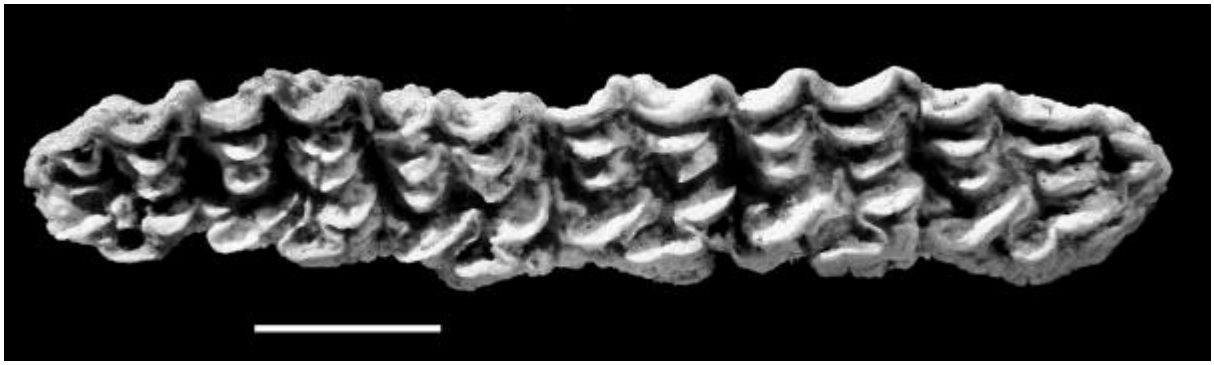

Fig. 5. *Equus sp*., Geometric Kebaran, Umm el Tlel, Syria (BY 125 n°35). The scale bar is 3 cm.

The metatarsal

The specimen is complete and allows several measurements to be taken or estimated (table 2). Its length (292 mm) is remarkable. The diaphysis is somewhat crushed and distorted. Width (transverse diameter) and depth (antero-posterior diameter) measurements are approximate. Although not precise, these estimations are sufficient to evidence the robustness of the bone. The well preserved distal epiphysis seems narrow relative to the diaphysis. The supra-articular distal width is larger than the articular one. The postero-lateral tuberosity is well developed on the proximal epiphysis.

In general, robustness is related to rather humid conditions and a not very cursorial body build. In heavy, non cursorial animals, the proximal parts of the limbs tend to be relatively long and the distal parts relatively short (Eisenmann & Guérin, 1984; Eisenmann, 1984). Because of its robustness, we assume that the metatarsal of Umm el Tlel belonged to such a form.

Body mass and shoulder height

The estimation of body mass on the basis of a single metapodial is problematic. Some estimations may nevertheless be made. Applying the equations proposed by Eisenmann & Sondaar (1988), the body mass of an equid can be calculated using one of the following formulas:

Table 2. Third metatarsals of Late Pleistocene large *Equus*.
Measurements in millimeters.

	Equus sp.	*Equus caballus*	
THIRD METATARSALS		16328-87-8	MM 1404-5
	Umm el Tlel	San Sidero 6	San Sidero 3
Greatest length	292.0	288.0	
Mid-shaft transverse diameter (DT)	44.0	40.0	
Mid-shaft antero-posterior diameter (DAP)	40.0	40.0	
DT proximal	55.0	59.0	64.5
DAP proximal	47.0		48.0
DT distal supra-articular	55.2	55.0	58.5
DT distal articular	54.0	56.0	60.0
DAP distal maximal	41.0	42.5	45.0
Medial condyle DAP minimal	30.7	32.0	34.0
Medial condyle DAP maximal	35.0	35.0	37.5
Diameter articular facet for tarsale II	49.5	53.0	55.0
Diameter articular facet for tarsale IV	16.0	13.0	14.5
	Equus capensis		
THIRD METATARSALS	ZW 2924	SH 5612	EC 946
	Swartklip	Sea Harvest	Equus Cave
Greatest length	270.0		276.0
Mid-shaft transverse diameter (DT)	45.0		44.5
Mid-shaft antero-posterior diameter (DAP)	40.0		41.0
DT proximal	59.0		61.0
DAP proximal	50.3		52.0
DT distal supra-articular	58.0	57.5	62.7
DT distal articular	58.3	56.5	60.3
DAP distal maximal	42.3	43.3	45.0
Medial condyle DAP minimal	34.0	33.0	35.7
Medial condyle DAP maximal	36.2	35.0	37.2
Diameter articular facet for tarsale II	56.0		
Diameter articular facet for tarsale IV	11.0		13.0

Ln body mass = -4.632 + 2,634 (Ln MT 10)
Ln body mass = -4.552 + 3.100 (Ln MT 13)
Ln body mass = -4.585 + 1.443 (Ln of the product of MT10 by MT 13)

(Ln is the natural logarithm)
(MT 10 is the supra-articular distal width of the third metatarsal)
(MT 13 the distal minimal depth of its medial condyle)
(MT 10 and MT 13 in millimeters; body mass in kilograms).

The corresponding estimations vary between 489 and 518 kg, thus the body mass was probably about 507 kg. This is more than the maximal value for *E. grevyi*, the biggest extant wild species.

If we are right to assume that the metatarsal belonged to a heavily built, non cursorial species, we may assume the corresponding limb bone proportions and use the corresponding indices for it to estimate its shoulder height (or withers height). In a heavy horse, in order to obtain the shoulder height, the length of the third metatarsal may be multiplied with an 'index' of 5.58 (Willoughby, 1974). This yields a value of about 163 cm for our fossil. This would be more than in an average draft horse.

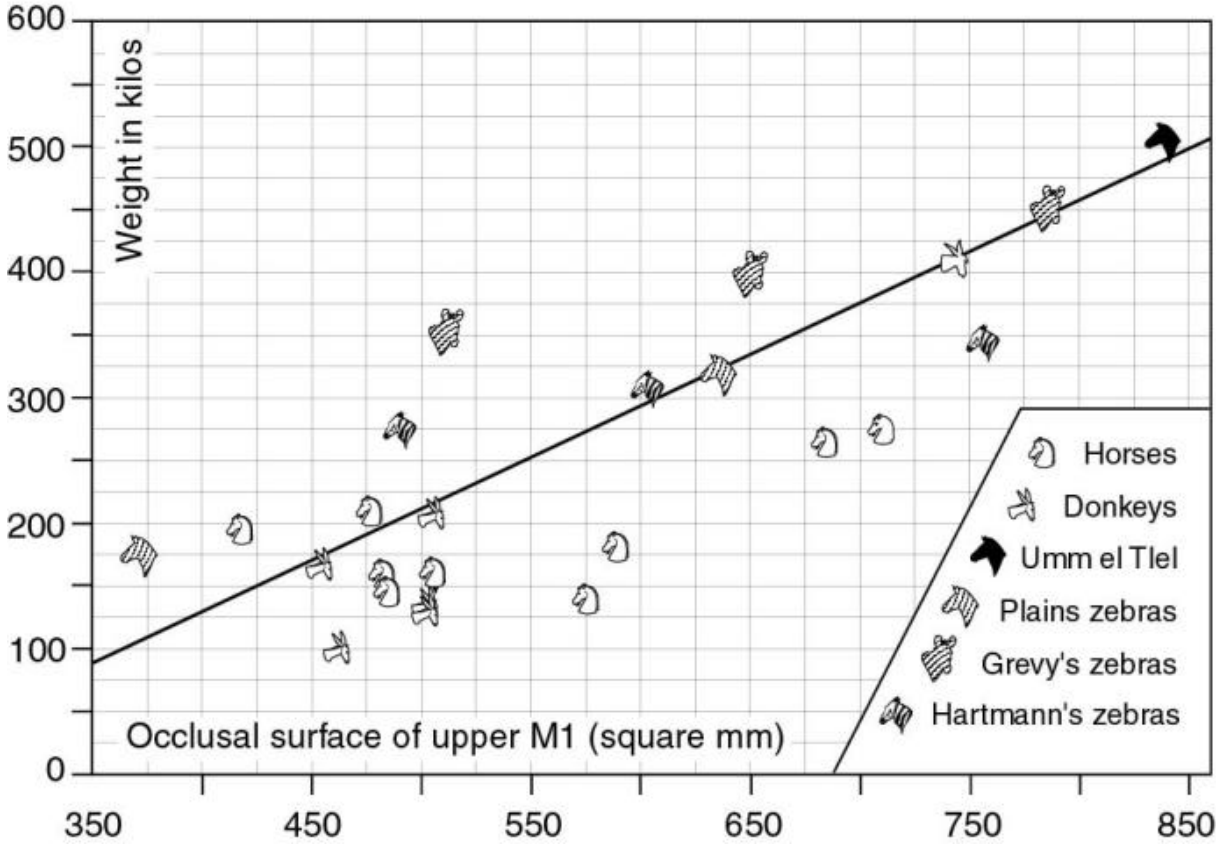

Fig. 6. Scatter diagram of weights versus occlusal surfaces of upper M1 of extant *Equus*. The weight of the equid of Umm el Tlel is estimated from the surface of the M^1 BY 152-35.

Body mass and M^1 surface

The body mass may be estimated from the surface of the M^1 using the equation proposed by Alberdi *et al*. (1995):

$$\text{Ln body mass} = -6.388 + 1.873\ (\text{Ln surface of } M^1).$$

This relationship is far less reliable than the relationship between limb bones widths (or depths) and body mass (Eisenmann & Sondaar, 1998) because some equids are 'macrodont' (like some horses) while others are 'microdont' (like Grevy's zebras).

If our estimation of the body mass is correct, the use of this equation indicates that the M^1 surface of our equid should be about 842.7 square millimeters. The actual surface of the M^1 BY 152-35 is 840 square millimeters. It is slightly smaller on the more worn M^1 BY 152-57. Thus, the equid of Umm el Tlel was certainly not macrodont (Fig. 6).

Comparisons

Teeth

The teeth most similar to our specimen in terms of their size have been found in Israel (Nahal Hessi, Tabun E, Shkul, Kebara E and Upper Paleolithic, and Wad C). They date from the Acheulean to the Aurignacian. The protocone is usually longer (Fig. 7). In the molar from Kebara E, there is no pli caballin and the post protoconal valley is deep. However, the Kebara Upper Paleolithic premolar and the other specimens have well developed plis caballins (nothing can be said concerning the unworn, fragmentary premolar of Shkul).

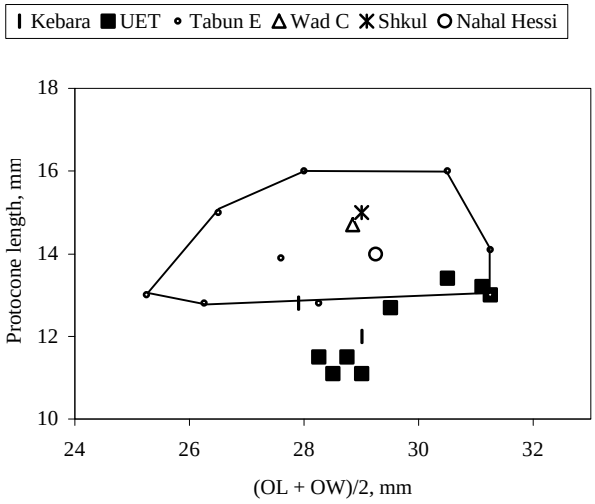

Fig. 7. Scatter diagram of protocone lengths (millimeters) versus mean diameters of upper cheek teeth (length + width/2) in some Middle Eastern equids. UET: Umm el Tlel, N. Hessi: Nahal Hessi.

Probably closer in time are the specimens belonging to the *E. valeriani* from the Upper Paleolithic site of Samarkand, the *E. capensis* from the Upper Pleistocene levels at Wonderwerk Cave in South Africa, and a molar collected (but not described) by Gaillard (1934) from Kom Ombo, Egypt (Fig. 8). The latter specimen was not mentioned by Churcher (1972) or by Peters (1990). In the Umm el Tlel equid, however, the teeth and the protocone lengths are smaller (Fig. 9); the plis caballins are less developed and the post-protoconal valley is deep, as it is often the case in hemiones.

Other recent specimens of about that size are known from a horse skeleton excavated at San Sidero 6 (Italy) of possibly Late Pleistocene date (Turbanti, 1982; Azzaroli, 1999) and from another fissure, San Sidero 3, dated to about 10,000 BP (De Giuli, 1983). The teeth are somewhat larger and the protocones much longer. Boessneck & von den Driesch (1976) have described a large upper molar from the Chalcolithic of Turkey (Nor^{o}untepe). The size is similar to our specimen but the protocone is quite a bit longer (Fig. 10) while the pli caballin is said to be present. Large teeth from a true horse are present in the Old Magdalenian of Mezin (Ukraine). They are, however, somewhat smaller and have longer protocones.

Fig. 8. *Equus* sp., Late Pleistocene, Kom Ombo, Egypt (Musée Guimet, no number, Lyon). The scale bar is 3 cm.

Metatarsals

Metatarsals of a similar length may be found in Pliocene stenonine horses but they are not common during the Pleistocene. Schematically, they may be found in:

1. Caballine horses older than 90 Ka; the horses from San Sidero 3 and 6, and from Mezin,
2. The South African *Equus capensis*.

That the metatarsal of Umm el Tlel does not belong to a caballine horse is suggested by the large size of its diaphysis associated with a relatively narrow distal epiphysis (Eisenmann & Karchoud, 1982) and by the preeminence of the supra-articular distal width over the articular one (Fig. 11). In most caballine horses, the distal epiphysis is wider and the articular width is

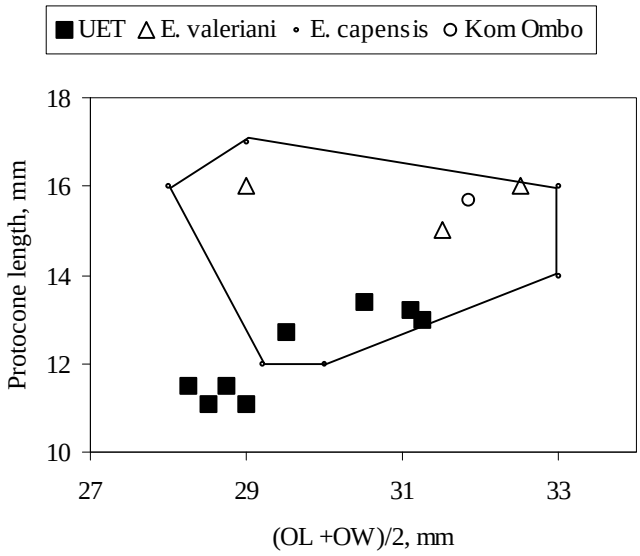

Fig. 9. Scatter diagram of protocone lengths (millimeters) versus mean diameters of upper cheek teeth (length + width/2) in some large *Equus*. UET: Umm el Tlel.

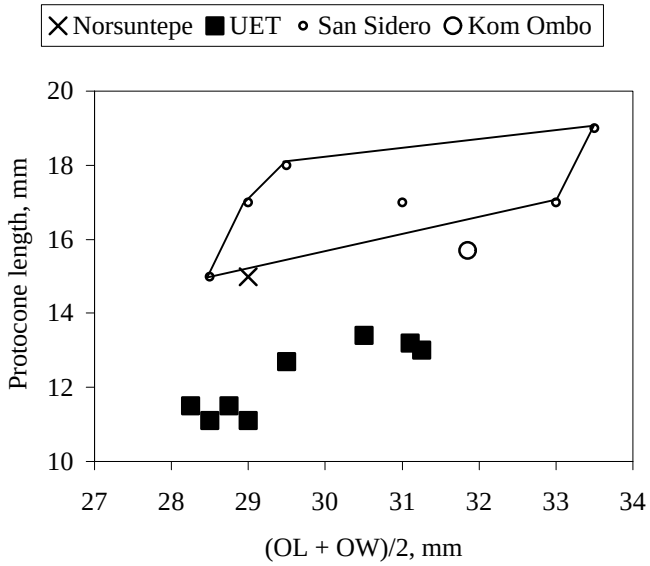

Fig. 10. Scatter diagram of protocone lengths (millimeters) versus mean diameters of upper cheek teeth (length + width/2) in some large *Equus*. UET: Umm el Tlel.

larger than the supra-articular. Stenonine metatarsals of that size are more slender. Similar lengths and degree of robustness can be found in some metatarsals of *E. capensis* (Swartklip, Equus Cave), although their distal ends are wider (Table 2).

The relatively large equids of the Middle Eastern Pleistocene are smaller. A few limb bones approach our equid in size: at Ubeidiyeh (Israel), a large and robust metacarpal and first phalanx; in the Nafud desert (Saudi Arabia), two fragmentary metapodials (Thomas *et al*. 1998); at Tabun E and D, and in the Mousterian levels at Kebara (Israel), three fragments of metatarsals. None of these seem quite as large as our Umm el Tlel equid. In the Aurignacian of Georgia (at Sagvardjile) a distal fragment of metatarsal is also as large (Gabunia & Vekua, 1989), but its length is unknown. There are no metatarsals at Nor^{o}untepe, but rather two very large and robust first phalanges and a (not so large) juvenile metacarpal.

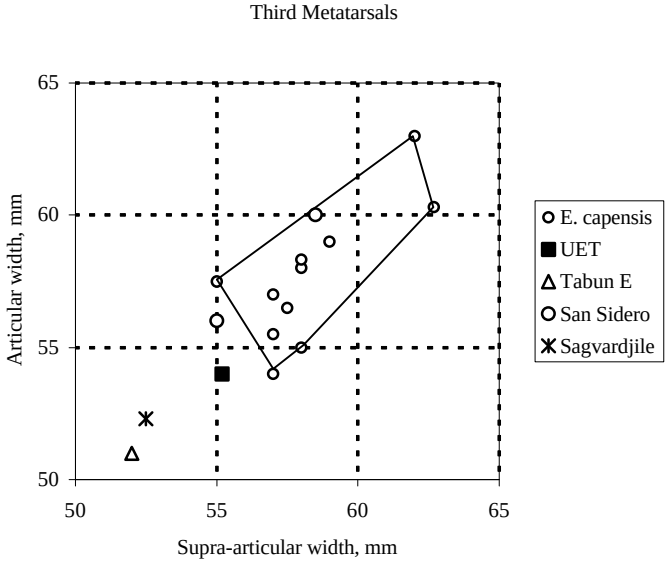

Fig. 11. Scatter diagram of articular widths versus supra-articular widths of some large *Equus* third metatarsals. UET: Umm el Tlel.

Discussion

The specific attribution of equid fossils can be very difficult, especially when the material is poor, because each supposedly specific character may be found in other species. The identification of true horses depends mostly on the presence of caballine lower cheek teeth; the identification of hemiones is based mostly on slenderness (but there are cases when even the caballine pattern and the relative slenderness or robustness are misleading). As we have seen, some metatarsal proportions and some upper cheek teeth morphologies may be of help, but they do not bring absolute certainty. Keeping these restrictions in mind, what can be said about the large Middle East Pleistocene equids and their possible relationships (Fig. 12) ? We will consider first caballine and then non caballine fossils.

In the Middle East, true (caballine) wild horses may be present from the beginning of the Middle Pleistocene (if one small lower molar from Gesher Benot Yakov indeed comes from the same level as the rest of the fossils) up until the Holocene (Neguev Natufian, Aïn Gazel PPNB). A wild horse may have lingered into the Chalcolithic at Nor^{o}untepe (Uerpmann 1987); its first phalanges nearly match our equid in size.

Wild horses are quite common during the Mousterian and are represented in the north (Quneitra) as well as in the south (Fara B) of Israel. Although identified as a zebra (Griggo 1998), several teeth from the Mousterian levels at Umm el Tlel belong probably to a true horse (they are quite similar to the Upper Paleolithic teeth from Georgia, where a second smaller species is also present). With the exception of Tabun E, possibly Sagvardjile, and Nor^{o}untepe, these horses are smaller than our equid. In Azerbaidjan (Binagady) and in Georgia (Sagvardjile, Bavra), the teeth are smaller and have longer protocones than in our sample.

Contrary to current beliefs, true horses did reach Africa: a caballine horse is present in the Aterian of La Grotte des Allobroges (Bagtache *et al*. 1984); its dimensions are moderate. The very large molar from Kom Ombo could belong to a caballine horse.

In the Late Pleistocene of Europe, it seems that the only very large caballine horse come from San Sidero 3 and 6 (Italy).

The second group of large equids includes all those which are certainly not, and those which are probably not, caballine fossils. The fossils from the Nafud Desert were dated with some reservations to an early Pleistocene time period; the fragmentary limb bones are smaller than in our equid and resemble the equid of Olduvai Upper Bed II. The robust equid at Ubeidiyeh probably belongs to the same species.

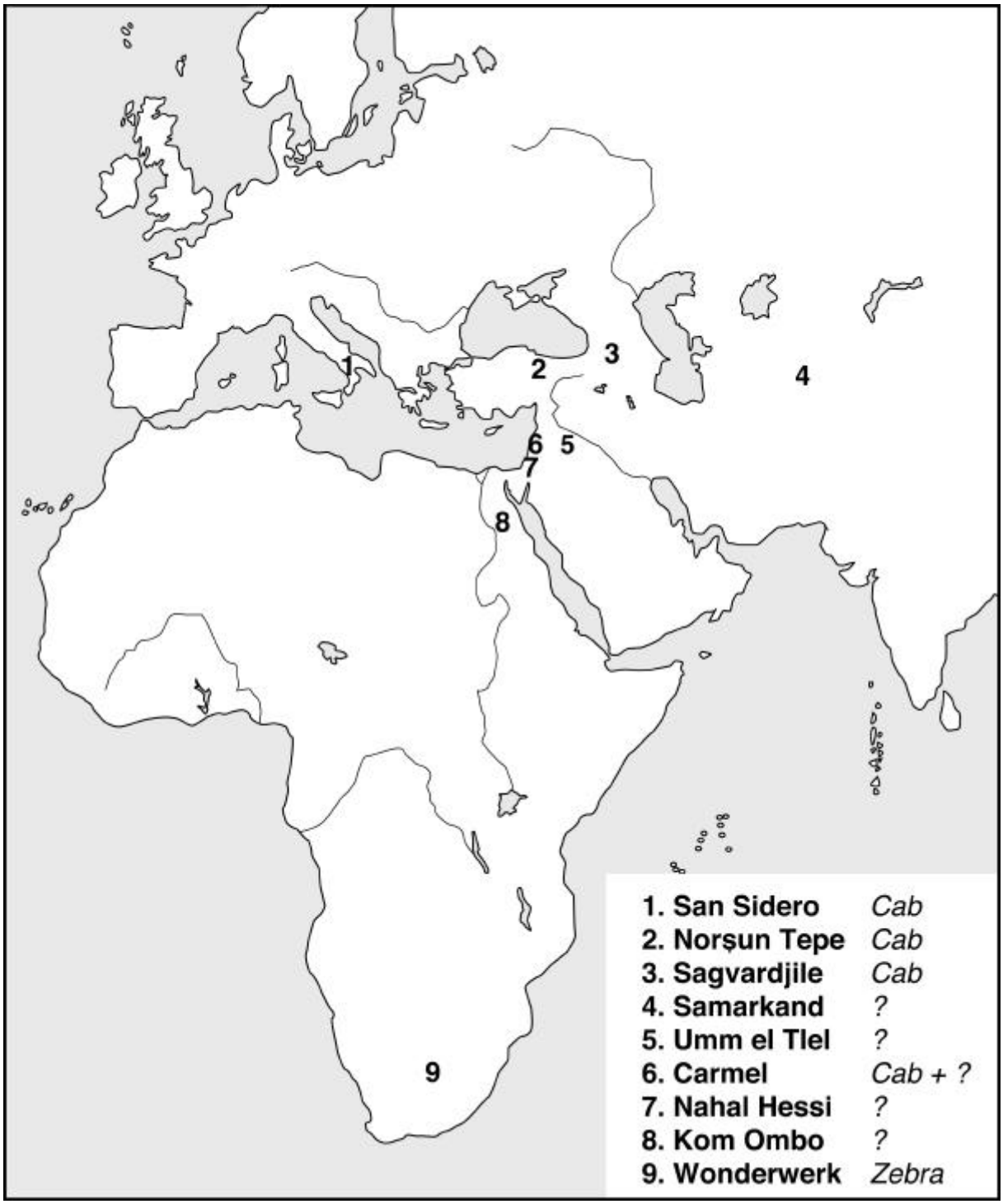

Fig. 12. Schematic map of the distribution of Late Pleistocene large *Equus*. *Cab*: caballine.

At Tabun DE, there are two large lower cheek teeth. One is caballine, the other stenonine. The fragments of MT III and the large upper cheek teeth from Tabun D and E could belong to either or both species. Since both caballine and stenonine lower cheek teeth are present at those sites, the same is true for the large framentary tooth from Shkul, one fragmentary MC III and two teeth from Kebara, and the large molar from Wad C. The Kom Ombo large molar may possibly be classified with *E. valeriani* and *E. capensis* as another example of a very large recent, non caballine equid.

Conclusions

In Syria, at the end of the Pleistocene a very large equid existed which was larger than the biggest extant wild equid species *E. grevyi*. It was probably a heavy, non cursorial species living in rather humid conditions. The geographically nearest fossils of a similar size are the true horse found in the Chalcolithic of Turkey and an equid of uncertain affinities found at Kom Ombo (Egypt). The other large Upper Pleistocene species that could be compared to the Umm el Tlel equid are geographically more distant: the caballine horse from San Sidero (southern Italy), *E. capensis* (probably related to plains zebras) of Equus Cave and Wonderwerk (South Africa) and the poorly known *E. valeriani* from Samarkand (Uzbekistan). The upper cheek teeth of our equid from Syria and its metatarsal are not typically caballine but until its lower cheek teeth are known, its identification as a true horse cannot be ruled out.

Acknowledgements

We wish to thank all those colleagues and curators who helped us during the study of their collections, and in particular: M. Philippe (Musée Guimet, Lyon, France); the late C. De Giuli (Museum of Geology and Paleontology, Florence, Italy); E. Tchernov and N. Goren (The Hebrew University of Jerusalem, Israel); P.B. Beaumont and D. Morris (MacGregor Museum, Kimberley); J.S. Brink (Florisbad Quaternary Research Department of the National Museum, Bloemfontein), J.F. Thackeray and V. Watson (Transvaal Museum, Pretoria), R. Smith and Phillippa Haarhoff (South African Museum, Cape Town) in South Africa. Hymne Laubscher (Council for Geoscience, Pretoria) showed us the unpublished material collected at Besaansklip in the Western Cape Province, South Africa. H. Lavina, Ph. Loubry, and D. Serrette were of great help with the illustrations.

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