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Small numbers, large potential – new prehistoric finds of elephant and beaver from the Khabur river/Syria

Números pequeños, un gran potencial – nuevos hallazgos prehistóricos de elefantes y castores en el río Khabur/Siria

KEY WORDS: Elephant, beaver, former environment, Khabur river, Syria, Bronze and Iron Age.
PALABRAS CLAVE: Elefante, castor, entorno anterior, río Khabur, Siria, Edad del Bronce y del Hierro.

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ABSTRACT

In this paper remains from two rare species, beaver and elephant, are described. They were discovered in the slaughter refuse from two prehistoric sites at the Khabur river in north-eastern Syria. Today, this region is characterised by a highly degraded vegetation and a steppe environment. This contrasts sharply with the biological demands of beaver and elephant: an abundance of water and a rich and diverse vegetation. Archaeobotanical investigations from the Khabur region and the occurrence of other mammal species with similar environmental needs support the view that during the second and first millennium BC a more bountiful environment must have existed. Furthermore, the question is discussed of whether overhunting, the demand for ivory and/or the destruction of the natural environment led to an extinction of these "keystone" species.

RESUMEN

El presente artículo describe los restos de dos especies poco habituales, el castor y el elefante, descubiertas entre los restos de las matanzas de dos yacimientos prehistóricos del río Khabur en el noreste de Siria. En la actualidad la región se caracteriza por una vegetación muy degradada y un entorno esteparío que contrasta de forma aguda con las demandas biológicas de ambas razas de animales: abundantes fuentes acuíferas y una vegetación rica y diversa. Las investigaciones arqueobotánicas realizadas en la región de Khabur y la existencia de otras especies de mamíferos con necesidades medioambientales similares apoyan la idea de que durante los dos milenios A.C. existió allí un entorno más generoso. Además se analiza la cuestión de si el exceso de caza, la gran demanda de marfil y/o la destrucción del entorno natural provocaron la desaparición de estas especies "clave."

LABURPENA:

Artikulu honetan ohikoak ez diren bi espezien hondakinak aztertzen dira: kastorea eta elefantea. Sarraski-hondakin horiek Siriako ipar-ekialdean dagoen Khabur ibaiko bi aztarnategi prehistorikoetan aurkitu dira. Gaur egun eskualde hartan landaredia nahiko narriaturik dago, gainera inguruak esteparen ezaugarriak ditu, hau da, bi animali horiek behar dituzten egoera biologikoekin bat ez datozenak: ur-iturri ugariak eta landaredi aberatsa eta oparoa. Khabur inguruan egindako ikerketa arkeobotanikoek eta antzeko ingurugiroa behar duten ugaztunak egoteak argi adierazten dute K.a. bi milakoan zehar eskualde hura nahiko oparoa izan zela. Gainera, gehiegizko ehizak, marfilaren eskari handiak eta/edo ingurunea desegiteak espezie "gako" hauen desagertzea ekarri ote zuten ere aztertzen da.

INTRODUCTION

The discovery of bone finds from elephant and beaver in the slaughter and consumption residue of prehistoric sites which are situated amid a dry steppe environment, raises a number of questions: Could the meat and the bones of these animals have been brought here from a distant region or were these species hunted in the proximity of the sites? If the latter was the case, these animals must have formed a lively part of the natural fauna in the local surroundings and would constitute excellent indicators for a specific vegetational cover which in this case differed considerably from the ecological status quo of today. Despite the potential of such species for an ecological approach, we should ask critically how valid a handful of beaver remains and some fragments of postcranial elements from elephants in fact are to the elucidation of such a far-reaching interpretation.

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The beaver and elephant bones mentioned above were unearthed during excavations at Tell Sheikh Hamad and Tell Bderi. Both sites are located at the eastern bank of the Khabur river in north-eastern Syria (fig. 1). Today, the lower Khabur valley is almost devoid of natural vegetation, apart from some limited areas with reed and a handful of fast-growing poplars. The steppe, too, is almost bare of natural plant cover except during the rainy winter season when a thin carpet of herbs and grass covers the soil. Some fields with cotton, maize, barley, wheat, millet, sesame and sugar beet which are irrigated by a motor-pump system, brighten up the monotonous view. This applies in particular for the region around Tell Sheikh Hamad, which lies south of the 200 mm isohyet. Rain-fed agriculture is not possible here, in contrast to the region around Tell Bderi. This site lies 90 km further to the north, where the environmental conditions seemed to have been rather more benign (WIRTH 1971; VAN ZEIST 1999/2000).

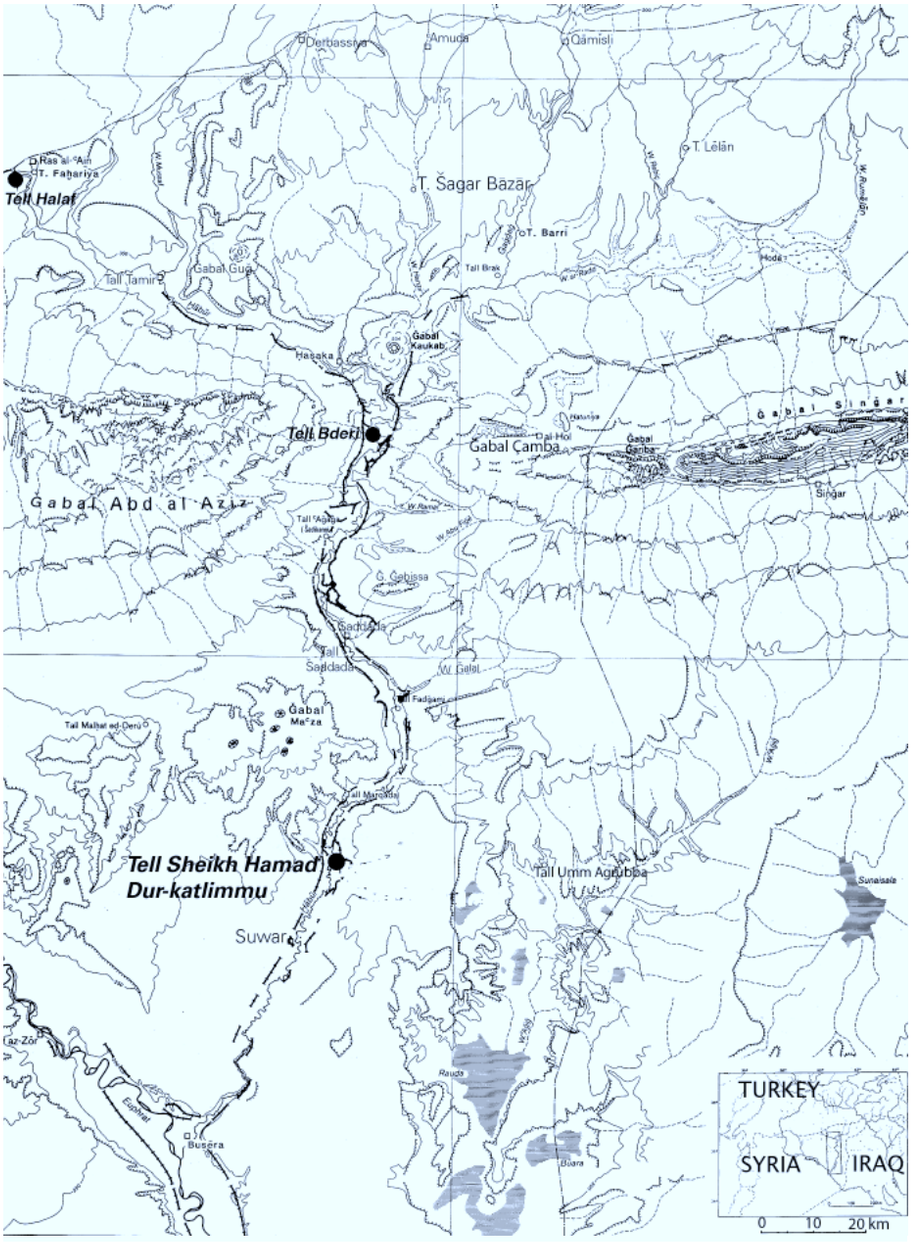


Fig. 1 Map of the Khabur river and surrounding landscape/Syria;
location of Tell Sheikh Hamad (TSH)/Dur-katlimmu, Tell Bderi and Tell Halaf (from: ERGENZINGER & KÜHNE 1991, 167).

THE SITES AND THEIR BONE MATERIAL

Tell Sheikh Hamad is a huge artificial mound more than 25 m in height, surrounded by a vast settlement area. It attracted the attention of archaeologists when, after a severe flood, dozens of cuneiform tablets were washed out from the Tell. This discovery enhanced a major archaeological project under the guidance of H. KÜHNE, Institute for Near Eastern Archaeology, Free University Berlin. Excavation campaigns were carried out over 25 years and continue today. Surveys and the documentation of today's flora and fauna were also undertaken (cf. KÜHNE 1991a, with full references; see also KÜHNE 1993/94). All this provided a huge amount of data and materials, including about 100,000 animal bones. A sample of 56,129 specimens has been analysed and interpreted to date (BECKER forthcoming, cf. tab. 1).

The main occupation phases at Tell Sheikh Hamad span the Middle and the Late Assyrian period, represented by material excavated at the citadel (13th century BC) and in suburban parts of

Species/Category	***Citadel***	***Suburban Area***	***Finds, Total***
Ovis aries, Capra hircus	4,281	11,446	15,727
Bos taurus	264	1,864	2,128
Sus domesticus	429	701	1,130
Equus caballus	-	2	2
Equus asinus	6	130	136
Mule	-	1	1
Donkey-Onager-Hybrid	2	1	3
Camelus dromedarius	-	246	246
Camelus bactrinanus	9	5	14
Canis familiaris	96	156	252
Domestic mammals (total)	**5,087**	**14,552**	**19,639**
Bos primigenius	-	16	16
Gazella subgutturosa	117	140	257
Cervus elaphus	7	8	15
Dama mesopotamica	228	85	313
Capreolus capreolus	-	2	2
Equus hemionus	249	195	444
Sus scrofa	11	8	19
Canis lupus	-	2	2
Vulpes vulpes/V. rueppelli	6	7	13
Ursus arctos	-	2	2
Vormela peregusna	1	-	1
Felis silvestris	-	4	4
Panthera leo	-	1	1
Elephas maximus	1	4	5
Castor fiber	1	4	5
Lepus capensis	69	27	96
Erinaceus europaeus concolor	-	6	6
Wild mammals (total)	**690**	**511**	**1,201**
Aves (total)	15	78	93
Egg-shells *Struthio camelus*	1	19	20
Pisces (total)	12	15	27
Trionyx euphraticus	119	34	153
Potamon mesopotamicum	2	5	7
Mollusca (total)	10	23	33
Non-mammalian remains (total)	159	174	333
Finds, indet. (total)	**9,687**	**25,269**	**34,956**
Total	**15,623**	**40,506**	**56,129**

Tab. 1 Tell Sheikh Hamad/Dur-katlimmu. Frequency of species and categories from Middle (citadel) and Late Assyrian contexts (suburban area). Basis: number of specimens.

the town (9th – 6th century BC). From particular pieces of information deciphered from the cuneiform texts, the site could be identified as an important garrison and administrative centre on the western flank of the Assyrian empire. It was of major economic and military importance and was named *Dur-katlimmu*. In the Late Assyrian period, *Dur-katlimmu* enlarged to over more than 100 ha in extent. The number of inhabitants can be estimated at several thousands (KÜHNE 1991b). As was indicated by the architecture and a diversity of archaeological finds, people of differing social status lived here, a fact that was also reflected in the bone refuse and in the contrasting repertory and quality of meat that was consumed (cf. tab. 1). Considering the large number of inhabitants, one may ask in which way the subsistence of all these people could have been assured. The provision with food and all kinds of raw material was based on well organised livestock management and a sophisticated agricultural system, as we know from the texts (RÖLLIG 1993) and, of course, from archaeozoological analyses (BECKER forthcoming). Pivotal to all economic activities was the construction of canals which brought water from the Taurus mountains, 200 km through the steppe to Dur-katlimmu (see lines marked in fig. 1; ERGENZINGER & KÜHNE 1991). Particularly in the hot summer months, this water was necessary for humans and beasts and, above all, for irrigation of the fields.

Osteological analysis has identified a large variety of domestic animals such as sheep, goat, cattle, pigs and dogs, donkeys, horses and equid hybrids as well as dromedaries and Bactrian camels. In addition, seventeen wild mammal species are recorded (tab. 1). The beaver, *Castor fiber*, is among the rare species. Five bone finds have been unearthed. One of these - a molar from the lower jaw - was discovered in a Middle Assyrian context. The other remains represent fragments of long bones (femur, tibia, ulna, radius) and stem from the Late Assyrian period. In total, two individuals of adult age are represented.

The second site with beaver remains to be focussed upon here is Tell Bderi (site location see fig. 1), a settlement mound of 12 m in height and 310 x 245 m in extent. Excavations were carried out from 1985 to 1990 (field director P. PFÄLZNER, Tuebingen University). The occupation of the site dates from the late 4th millennium (Uruk phase) to the Late Bronze Age (15th/14th millennium BC) with the main settlement activities in the Early Bronze Age (3rd millennium BC). Apart from a series of archaeological reports (PFÄLZNER 1990 with further references), some preliminary archaeobiological research has already been completed, notably on plant cultivation (VAN ZEIST 1999/2000), the

Species/category	***1985 sample (EBA/LBA)***	***1985-1992 sample (EBA)***	***Total***
Ovis aries/Capra hircus	918	1,402	2,320
Bos taurus	39	118	157
Sus domesticus	3	3	6
Canis familiaris	7*	8	15*
Equidae	31	-	31
Bos primigenius	-	2	2
Cervus elaphus	1	1	2
Dama mesopotamica	1	1	2
Capreolus capreolus	3	-	3
Gazella subgutturosa	12	60	72
Castor fiber	-	5	5
Lepus capensis	2	4	6
Carnivora, indet. (total)	-	1	1
Mammal bones, indet. (total)	215	243	458
Aves (total)	-	15	15
Pisces (total)	6	9	15
Bivalvia (total)	11	38	49
Gastropoda	-	20	20
Mixed material** (total)	-	30	30
Total	**1,249**	**2,138**	**3,387**

* part of dog's skeleton
** (see Becker 1988, Tab.1).

Tab. 2 Tell Bderi. Spectrum and frequency of species from Early Bronze Age (EBA) and Late Bronze Age (LBA) contexts. Basis: number of specimens.

exploitation of timber and firewood (ENGEL 1996) and on livestock keeping and hunting activities (BECKER 1988). Further investigations on a broader sample of faunal remains have been carried out by the author (Becker unpublished results; cf. Tab. 2) and will be continued in a study at the University of Tuebingen under the guidance of H.-P. Uerpmann.

From a sample of 3,387 finds, a total of five beaver bones could be identified (tab. 2). Chronologically, they originate from contexts of the 3rd millennium BC. Two heavily fragmented mandibles of adult beavers were found in two houses of the settlement in addition to a pelvis, an ulna and a humerus from a third house (fig. 2). The distal epiphysis of the ulna was not fused - this bone was from a young-adult individual (between 3 and 7 years of age) - while for the pelvis and humerus, a fully adult age of the animal could be presumed (which means older than 7 years; after FREYE 1978, 194). The measurements of the bones are as follows: pelvis LA23,0mm; humerus GL84,5mm, Bp27,5mm, Dp20,1mm, Bd28,6mm, BTr20,5mm (measurements according to VON DEN DRIESCH 1976).

Elephant remains are only indicated at Tell Sheikh Hamad. With five specimens in total, they are similarly scarce as were the beaver finds. Four of them were dated to the Late Assyrian period. These finds are two fragments from a femur diaphysis which were counted as "1" and 24 pieces of a rib, counted as "1" as well. Two further rib fragments were discovered in two locations in the north-eastern corner of the suburban area. The excavation at the citadel has provided only one fragment from the diaphysis of a tibia. It should be added that from Tell Sheikh Hamad not only bone remains of elephants have been recorded but also ivory products. These were either magnificently carved pieces of furniture, ornaments and the like or half-finished items which point to local manufacture.

Why these elephant bones are neither considered as being from animals imported alive nor as being from meat portions carried from far-distant places has already been discussed in detail elsewhere (BECKER 1994). Questions of transport facilities, preservation of meat in this hot climate, supply and demand as well as the possible keeping of elephants in enclosures or wild reserves in the Late Assyrian period have been taken into consideration (ibid.). It was concluded that the bones mentioned here came from elephants, which indeed were hunted and killed in their natural biotope somewhere along the Khabur river.

The same question may be asked with reference to the beaver remains. As has already been argued by LEGGE & ROWLY-CONWY (1986, 472), the trade or transport of living or dead

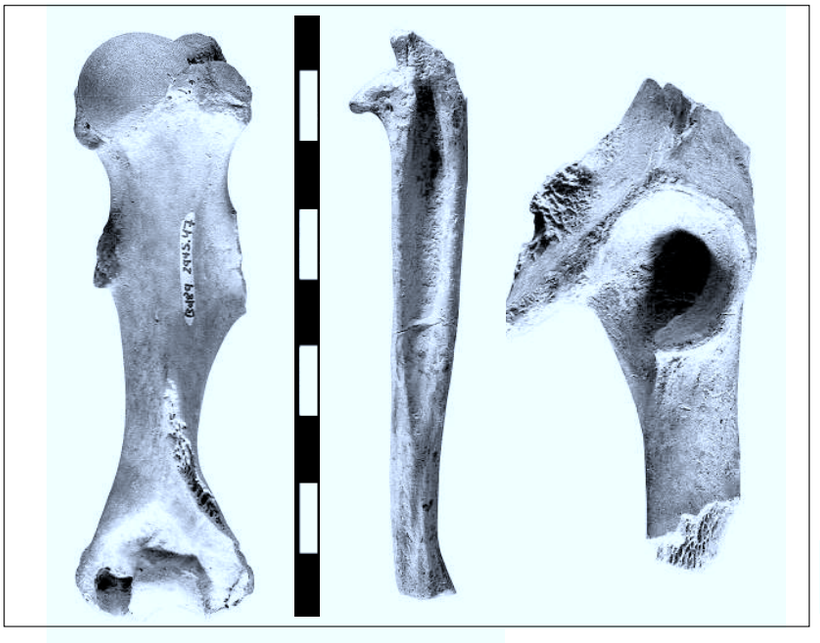


Fig. 2. *Castor fiber*, Tell Bderi. Bone remains. Scale in cm. Photo: O. THIEL.

beavers far beyond their natural habitats seems less plausible, considering the climate in Mesopotamia. In a trade with furs, no bones -which would spoil the pelt - are to be expected. The import of *castoreum* could have been managed, too, without leaving behind archaeological traces. So, the finds presented here, in fact display locally killed and carcassed animals.

BEAVER AND ELEPHANT – SOME BIOLOGICAL AND ZOOGEOGRAPHICAL DATA

Beavers once occurred throughout the whole of Eurasia, from Ireland to Mongolia, from the northern tundra to the southern steppe regions. These large, dark brown rodents of about 75-90 cm length have a scaly tail, horizontally flattened and paddle shaped, small ears and eyes, and large chestnut-coloured incisors. They inhabit rivers, streams, lakes and ponds (FREYE 1978). The level of these waters should not fall below 2 m in depth. Beavers feed on herbs, grass, aquatic plants, rhizomes, barks, twigs and leaves. They build dams and lodges of intertangled twigs and sticks and plaster these lodges with mud, making a solid concrete layer that no predator can break. Predators include wolves, bears and other large carnivores; raptorial birds may be dangerous for the beaver kids. The kids leave their monogamous parents in their second year and mature in the 3rd or 4th year of life. Beavers live in small families which occupy territories of 100 to 300 m along the course of a river. *Castor fiber* has a very complex ethology and because of its – at least for man - almost invisible way-of-life, they are not easy to capture. Nevertheless, they have been hunted in great numbers, in Europe as well as in the Near East. The flesh and tail of the beaver were considered tasty, but in particular the pelt was a most valuable commodity and from its scent glands, the famous *castoreum* was sought after.

Our knowledge about the former distribution and the development of local beaver populations in the Near East is much less satisfactory than for Europe (FREYE 1978; SMIT & WIJNGAARDEN 1981, 34ff.) and mostly based on few facts and much speculation (BOESSNECK 1974; KUMERLOEVE 1967). From older evidence we know that beavers formed part of the natural fauna in Asia Minor and in the northern part of Mesopotamia. Historical evidence suggests that the beaver might have survived even into the 19th century (BODENHEIMER 1960, 45). Unfortunately, most – if not all – 19th and 20th century reports lack credibility. An intermingling with otters, *Lutra lutra*, seems quite often to have been the case, as has been critically reviewed by LEGGE & ROWLY-CONWY (1986). There is virtually nothing left from historical reports about Syrian beavers. For prehistoric periods, however, the situation is rather different. Beaver bones are registered for a number of sites, scattered over a major time sequence (ibid.). Meanwhile, more pieces of evidence have been collected. Beaver remains are published from the Syrian sites of Sheik Hassan and Jerf al Ahmar (GOURICHON & HELMER 2004, 435); VILA (1998) lists two beaver bones from Mulla Matar; VON DEN DRIESCH (1996) mentions the beaver for Sirkeli Höyük in south-east Anatolia and from Besik-Yassitepe near Troy (ibid. 1999); WEBER (1997) quotes beaver bones from Tell es-Sweyhat from the Middle Euphrates and, last but not least, the finds from Tell Sheikh Hamad and Tell Bderi at the Khabur add further weight to our picture.

Beyond the osteological record, two terms can be found in Akkadian texts that might stand in context for the beaver: *garidu* and *kalab mê*;

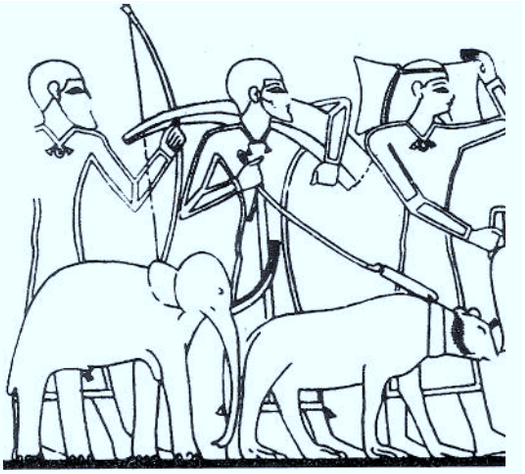
Fig. 3. *Castor fiber*. Appearance (taken from CORBET & OVENDEN 1982, 45) and its depiction on an orthostat from Tell Halaf (taken from BRENTJES 1964, 184; redrawn by A. HELMUTH).

according to BUTZ (1977, 285) and LANDSBERGER (1934, 85) it was not the animal itself that meant here, but the castoreum which was well-known in those times. These texts also mention beaver dams which occasionally hindered the shipping on the Euphrates (ibid. 86). The single and often cited depiction of a beaver-like animal, accompanying a stag, can be found on an orthostate relief from Tell Halaf (for the site location, see fig.1; OPPENHEIM 1931, 142). It is dated to the Neo-Hittite period (850-830 BC). Many of these stone slabs carved in low relief had traditionally decorated the walls of palaces and temples during that period. Although the animal is carved with few descriptive details, the characteristic appearance of a beaver, in particular its tail, is well represented (fig. 3).

The Indian elephant, *Elephas maximus*, was once distributed over large parts of the Near and Middle East. As indicated from literary, pictorial and osteological evidence this distribution included also parts of Mesopotamia. On zoogeographical grounds it has been maintained that a subspecies, *Elephas maximus asurus*, roamed the Mesopotamian countryside, as was plausibly argued by HOFMAN (1974) and VON DEN DRIESCH (1996). However, these elephants disappeared completely from that region; the question is, how long did they survive and how far to the West did they range? Today, *Elephas maximus* is indigenous to Asia and still enjoys a wide distribution including India, Sri Lanka, Cambodia, Indonesia, Laos, Nepal, Malaysia, Vietnam and China (BECKER 1994, 179f. with further literature). They are most remarkable animals with a unique variety of biological features and abilities. Indian elephants weigh from 3 to 5 tons, the height at the shoulder is between 2 and 3,5 m. They are characterised by a massive body and a convex or level-outlined back. They are endowed with a versatile trunk with only one finger-like tip, cylindrical pillar-like legs and a large skull in order to sustain the weight of the tusks. Indian elephants have small ears which contrast with the great, fan-like ears of African elephants, and smaller tusks, while those of the cows are very small indeed, if they have any at all. The elephant's life-expectation approximates closely that of man and is restricted by sequences of tooth eruption and wear. They display six sets of high-crowned molars on each side of the upper and lower jaw, which erupt successively from behind, one tooth at a time. The final set finishes growing at about the age of 40. Many elephants do reach the age of 60; few achieve 70, since teeth are generally in an advanced state of decay by that time, resulting in the death of the animals by slow starvation. Asian elephants are highly social creatures which remain together as an integrated family group (females and their offspring) over several generations. They are characterised by a complex communication system; they may even differentiate between individuals and exchange information and experiences.

Elephants can be found in a wide variety of habitats, even in deserts and mountainous regions, particularly during their migratory phases.

a



b

Fig. 4 *Elephas maximus*.
a. Depiction on the Black Obelisk (taken from CLUTTON-BROCK 1987, 118); ç
b. depiction from the grave of Rechmire/Egypt, 18th dynasty (taken from BOESSNECK 1988, fig. 75).

They need vast areas over which they range. Their distribution in general is limited by the daily need for water (about 80 to 100 litres per day) and a huge amount of green fodder. Elephants are herbivores, browsers whose preferred habitats are lush wooded jungles and forests, although they tend to avoid large forests with closed canopies. They spend up to 20 hours a day eating anywhere from 150 to 300 kg of fodder (leaves, twigs, grass, bark, rhizomes etc.), which corresponds to 6 to 8 % of their body weight. For decades, it was unclear to zoologists and archaeologists as to how far to the west the former distribution of *Elephas maximus* could have extended (cf. HOFMAN 1974). From sources other than bone material it was obvious that these animals had always stirred the human imagination, although it was noticed that in Mesopotamia representations of elephants were surprisingly scarce. Only one visual depiction exists: that on the Black Obelisk (fig. 4a), representing a tribute sent to Salmanassar IIIrd, who reigned from 858 to 828 BC. Another illustration is found in Egypt, from the grave of Rechmire (18th dynasty), displaying tribute carriers from Syria with an elephant and a bear (fig. 4b). In the 15th century BC elephants are attested near the Euphrates by the hunting expedition of Thutmosis; Tiglath-pileser Ist (1115-1077 BC) slaughtered ten mighty male elephants and took four alive at the Khabur and in the region of Haran (SCULLARD 1974, 28f.). From inscriptions on clay tablets not only hunting parties of the kings and ivory products but also biological features such as the build and shape of elephants were described (BARNETT 1957, 1982; SALONEN 1976, 175f. and 232ff.; SCHMÖKEL 1959, 29). Even a ridden elephant is mentioned (SCULLARD 1974, 28). Yet, we may critically ask how reliable these documents are as to the true number of elephants hunted or even seen in the wild.

The somewhat selective impression of the Syrian elephant from iconographic and written sources is substantially supported by bone finds. The number of Near Eastern sites with elephant remains currently amounts to fifteen. The sites are located over the entire Euphrates region and beyond, stretching from the estuary of the Euphrates to the Orontes river in Lebanon (fig. 5). Amongst the most westerly finds are those from Sirkeli Höyük (no. 2 on the map in fig. 5). Although the network of evidence is scattered and in its chronological cover rather limited, the existence of *Elephas maximus asurus* in Mesopotamia seems to be indisputable. On the other hand, any attempt to quantify these data as to the real number of elephants that might have survived in the wild is doomed to failure, because the number of remains per site is much too small for such an undertaking (cf. BECKER 1994, tab. 1).

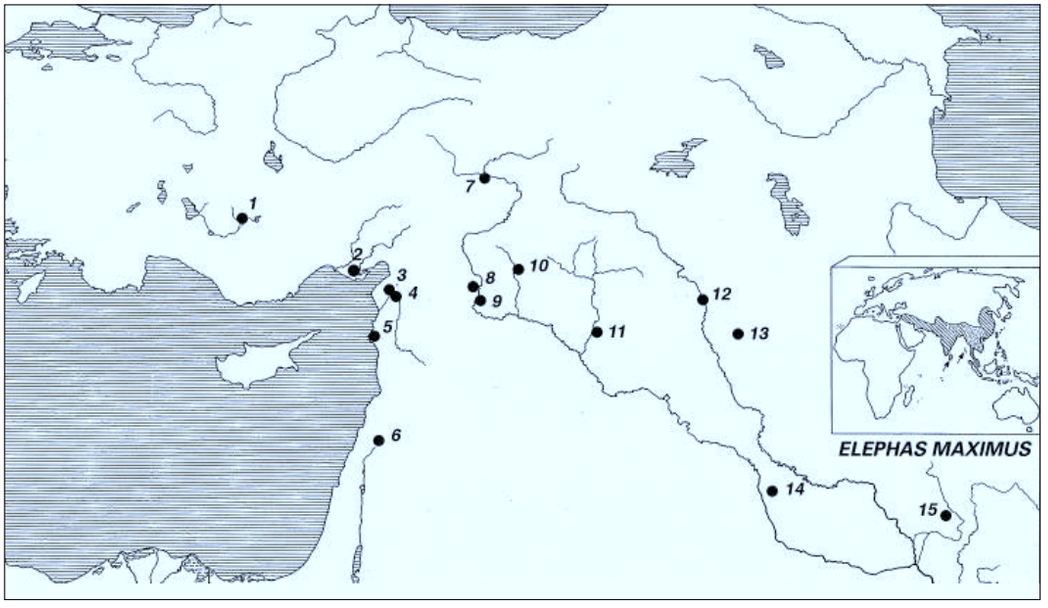


Fig. 5 Map of the Near East. Distribution of sites with elephant remains:
1 Chatal Hüyük, 2 Sirkeli Höyük, 3 Tell Tainat, 4 Atchana-Alalakh, 5 Ras Shamra, 6 Kamid el-Loz, 7 Arslantepe, 8 El Quitar, 9 Munbaqa, 10 Tell Sabi Abyad, 11 Tell Sheikh Hamad, 12 Nimrud, 13 Nuzi, 14 Babylon, 15 Haft Tepe.

One may ask whether hunting of elephants was a privilege of the kings or whether it was also allowed to other people. That the meat of these large animals was consumed by people from differing social status, is evidenced in the Dur-Katlimmu results. The bones found in the suburban part of the town, display cut-marks and typical fragmentation patterns (cf. fig. 6). Hunting elephants was a rather time-consuming and labour-intensive task, demanding a major number of people. Live elephants could be trapped by means of pitfalls or lassoes, hunting by ambush or being driven into stockades with the help of tamed animals used as decoys. Furthermore, elephants tend to venture into agricultural zones at night under cover of darkness. In such a situation the animal might also be followed and killed by local people.

ENVIRONMENTAL CONSIDERATIONS

If we turn now to the pivotal question that was propounded at the beginning of this paper and if we subsume all the information given above, it becomes clear that a specific biotope must have existed along the Khabur river: reed jungle, bushes and trees where beavers and elephants could find an adequate habitat. There are other mammal species in the faunal record of Tell Bderi and Tell Sheikh Hamad which would support the existence of such an environment even more so, because their bones are found in greater numbers, particularly at Tell Sheikh Hamad/Dur-katlimmu. That is true of fallow deer (NISP = 313), aurochs (NISP = 16) and boar (NISP = 19; tab. 1). In Tell Bderi, fallow deer and aurochs are represented with two specimens each (tab. 2). The ecological demands of all three species are quite similar to what we have learned for beaver and elephant: they also need a major supply of water and a dense and varied vegetation with trees, bushes and reed jungle for food, living and protection. The animals follow the courses of the rivers, where dense growth of tamarisks, willows and poplars characterise the habitat which they share (CHAPMAN & CHAPMAN 1975; FRÄDRICH 1993; WÜNSCHMANN 1993).

Fig. 6 *Elephas*. Bone remains from Tell Sheikh Hamad. Scale in cm. Photo: D. WOLF.

Even more powerful arguments can be deduced from (archaeo-)botanical considerations. It should be mentioned here that the pollen diagram taken from a salt marsh area 50 km south-east of Tell Sheikh Hamad suggested that during the last six millennia the climate in that part of Syria has not changed dramatically (GREMMEN & BOTTEMA 1991). This contrasts sharply with the development of the vegetation. Investigations concerning the potential vegetation in the greater Khabur area during the last millennium BC have led to a reconstruction of a biotope that includes three main vegetational zones (FREY & KÜRSCHNER 1991): first, a vast steppe area with *Artemisietea herbae-albae mesopotamica*; second, a steppe-forest with pistachio and other trees which could be found further to the North at the Gebel abdal-Aziz and Gebel Singar (cf. fig. 1); and third, a girdle of gallery forest with *Populus euphratica, Platanus orientalis, Tamarix* spec., *Ulmus* spec. and with *Phragmites australis* and *Typha* spec. in the more swampy parts. A similar scenario was reconstructed from the botanical analysis at Tell Bderi (ENGEL 1996): the largest part of wood species that were used as timber and firewood in the settlement, derived from hydrophytic riverine forests which grew along the Khabur and the Euphrates. In addition to *Populus, Platanus* and *Tamarix* which were already listed for Tell Sheikh Hamad, *Fraxinus syriaca, Ulmus minor, Eleagnus angustifolia* and *Acer monspessulanum* were the accompanying species (ibid. 106). An impression of how the landscape at the Khabur might have looked like is given in fig. 7: it represents an almost perfect habitat for all the mammal species named above.

Fig. 7 Gallery forest by the Jordan river. Photo taken from FREY & KURSCHNER 1991a, 102.

CONCLUSIONS

The Khabur river is the largest tributary of the Euphrates and traverses in a course of about 300 km from the Taurus mountains into the steppe region near Busara three different ecological zones with different precipitation levels. In the driest southern part, one would not expect the occurrence of wild mammal species that have a high demand in water and green fodder. However, the identification of bones from beaver and elephant, but also from aurochs, fallow deer and boar dated to the Early Bronze Age (Tell Bderi) and to the Middle and Late Assyrian period (Tell Sheikh Hamad) underline the assumption that these animals could in fact have survived until the first millennium BC in this part of Mesopotamia. This was due to a rather different environment than can be observed today. The banks of the Khabur river must have been bordered by a broad green girdle with lush jungles of all kinds of trees, bushes and reeds where all these species found appropriate conditions.

The question is whether such a scenario can be assumed for the entire course of the river or – as seems more plausible – only for some remote parts which can be found at a greater distance to provincial towns such as Dur-katlimmu. It seems to me that the gallery forest in the direct proximity of Dur-katlimmu had already been cleared and trees cut down for agrarian purposes, to make way for traffic routes and canals (cf. BECKER 1994, fig. 4). At what distance the less disturbed environment may have been found is open for speculation. There is another factor that has to be viewed critically: from the scattered evidence of beaver and elephants remains, the population density of these animals is difficult to assess. By the Late Assyrian period, however, an unambiguous depletion of natural resources appears already to have begun and populations may have been reduced already during the era of the last Assyrian kings.

A number of reasons may be postulated:

a. The killing of elephants for their ivory tusks was common and the trade with this precious raw material well established. Under Salmanassar III[rd] (858-824 BC) several campaigns through Syria brought a rich booty of thousands of ivory items and tons of raw material a part of which had been stored in a huge magazine at Kalach/Nimrud (NISSEN & HEINE 2003, 111). Until the ninth and eighth centuries BC vast quantities of ivory were used for the production of decorative elements in the palaces, amongst which the most famous were those from the palace of Nimrud. It is not known how much of this ivory came from Syrian elephants and how much from Indian or even African elephants.

b. Considering the logistical background of the Assyrian economy at that time, there are good

reasons to suspect a successive increase of human impact in general on the natural environment, in addition to the massive over-hunting of elephants. A first step might have been when the migration routes of the elephants were cut off by growing settlement activities. An increase in trade and traffic as well as military activities could have resulted in the fragmentation of herds of elephants and finally led to the complete extinction of the species. Some indication of the rapidity of these changes can be gained by focussing on Assyrian and Egyptian sources that fail to mention live elephants beyond the second half of the 9th century BC, while tusks and hides continue to be registered until the 7th century BC (HOFMANN 1974, 230). In following centuries no further skeletal remains of elephants were noted at archaeological sites on Syrian territory.

For the beaver a similar development can be outlined. Only with the growing devastation of this age-old landscape through forest clearing for agriculture and in gaining wood for building activities and charcoal production, was this biotope consistently destroyed until *Castor fiber* too vanished from the scene. Although the riverine "Eden" survived at least in part during the last millennium BC, this millennium seemed to have formed a watershed - a period of fundamental, irreversible ecological change.

However, given the scattered source material, archaeozoological studies from two sites form an inadequate basis for quantifying the relative scale of this change vis-à-vis a more widespread development. Major amounts of bone material from settlements dating to this sensitive period of ecological development are needed in addition to a large-scale multidisciplinary investigation, which would provide data for a better understanding of the environmental dynamics that quite evidently held sway during the first millennium BC in Mesopotamia.

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