WILD ASSES AND DONKEYS IN AFRICA: INTERDISCIPLINARY EVIDENCE FOR THEIR BIOGEOGRAPHY, HISTORY AND CURRENT USE

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ABSTRACT

The donkey is indigenous to the African continent and its wild progenitor is usually considered to be the Nubian wild ass. A very small population of African wild asses still persists in Eritrea. Cross breeding with domestic donkeys has virtually wiped out all such populations through introgression. It is likely that the domestication of the wild ass took place through a gradual process of management of wild populations across much of its ancient range. Historically, a chain of races of wild ass spread from the Atlas mountains to the Red Sea and probably as far south as the border of present-day Northern Kenya. It may well have been domesticated several times, given the semi-feral production systems under which it was managed until recently. Records of domestic asses begin in Egypt in the 4th millennium B.C. The extent to which the wild ass penetrated the interior of Africa is unknown. Some finds of equid teeth in West Africa, identified as wild asses', may well be those of the horse.

Faunal remains and rock art representations are extremely rare, as are references in historical chronicles or other textual material. This is somewhat at odds with the widespread distribution and economic importance of the donkey in Africa today. This apparent contradiction may be explained by the fact that donkeys have been of most importance to poor households and have consequently had low prestige. However, linguistic evidence points to the donkey gradually taking on great economic significance in Southern Egypt and the Horn of Africa, and evidence for large-scale caravans seeking ivory penetrating parts of Central Africa illustrates the importance the donkey achieved prior to the introduction of the camel. Archaeological evidence for donkeys remains disappointingly sparse, but by the first centuries AD, donkeys had certainly become significant in Sahelian West Africa. Their spread to other parts of Eastern and Southern Africa is almost certainly post-European, reflecting the low levels of long-distance trade.

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1. Introduction

While it is probably poor practice to award regions of the world marks for originating domesticates it is worth noting that Africa is responsible for four species of domestic animal in common use today, the donkey, the cat, the guinea-fowl and (probably) cattle. Of these, only cattle have attracted substantial attention from archaeozoologists, although the Near East lens through which much of their work is viewed has probably acted to obscure as much as to illuminate. To fill at least one of these lacunae, this paper focuses on recently available information for the reconstructing the domestication of the donkey[1].

Although donkeys are both widespread and economically important to their owners, they are rarely studied and are not usually the object of improvement, development or loan schemes. Donkeys are not conventional sources of meat or milk, and their uses as pack animals and for traction do not fit within the stereotyped perspectives of livestock agencies[2]. Nonetheless, they remain essential to the subsistence strategies of many communities in semi-arid regions, relieving families of repetitive and energy-consuming tasks. Moreover, they stay healthy on a varied and often poor-quality diet and require little management.

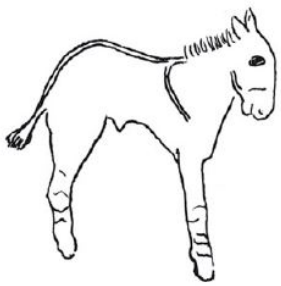
Evidence for the early history of the donkey in Africa is limited by the sparse archaeological data. Ironically, we know more about the wild ass than its domestic descendant. Recent extraction of DNA from osteological material and its comparison with synchronic collections have overturned the usual narrative of early domestication, without entirely shifting to a new paradigm. The use of the domestic donkey is well documented in Egyptian wall-paintings and other iconography. Elsewhere in the continent, although there are representations of wild asses in rock-art, evidence for the domestic donkey is notable chiefly by its absence.

One strategy to fill this lacuna is the use of linguistics. Terms for donkeys and asses have been recorded in numerous African and Near Eastern languages. Compiling these terms and tracing the links between them makes it possible to extend some hypotheses both about the process of domestication and the routes along which the donkey spread. Combined judiciously with modern ethnographic data this can be used to partially reconstruct the prehistory of the donkey in Africa.

2. Biogeography

The African wild ass (*Equus africanus* Heuglin and Fitzinger, 1866) is the ancestor of the donkey (*Equus asinus* Linnaeus, 1758). It is usually divided into a chain of subspecies spreading from the Atlas mountains eastwards to Nubia, down the Red Sea and probably as far as the border of present-day Northern Kenya (Groves 1966, 1986; Haltenorth & Diller 1980:109). The main features differentiating races of wild ass are the amount and type of stripes and the shoulder crosses. However, their characterisation may be somewhat blurred, since populations that survived into historical times have almost certainly crossed with feral donkeys.

Figure 1. Redrawn petroglyph of the putative Atlas wild ass race



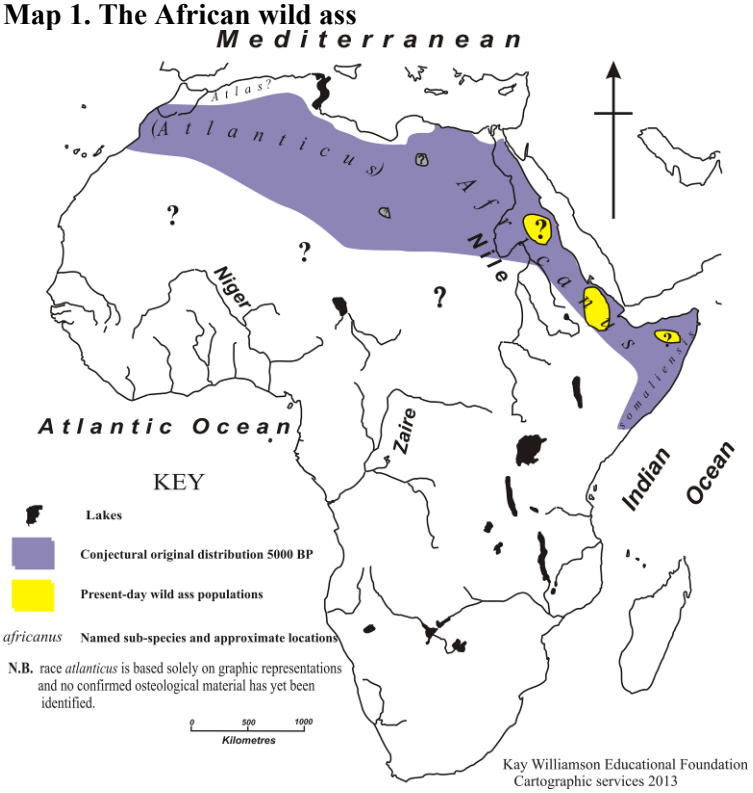
Three major subspecies existed historically. The Somali wild ass (E. *africanus somaliensis*), with striped legs and little or no shoulder cross, exists in the wild in Eritrea and northern Ethiopia today (Alhaique &

[1] I would like to thank Paul Starkey and Fiona Marshall for general discussions. Kevin MacDonald kindly helped me with the archaeological and rock-art references and Stephen Hall pointed me in the direction of the special issues of *Ethnozootechnie*. Catherine Baroin kindly send me an advance copy of her paper '*L'âne, ce mal aimé*' presented at the Méga-Tchad Colloquium, Orléans, October 1997. Fiona Marshall kindly sent on pdfs of all her most recent publications to ensure the arcaheology was up-to-date.

[2] There is also evidence that the recent spread of cheap motorbikes from China has displaced the donkey in many rural contexts in Asia and Africa

Marshall 2009). Map 2 shows the current and former distribution of wild asses in the Horn of Africa in greater detail (see Moehlman 2002; Kebede et al. 2007). The actual population of remaining wild asses may be as low as a few hundred (Moehlman et al. 1998). The Nubian wild ass (*Equus africanus africanus)* has a shoulder cross, no stripes on the legs, and was originally found in the Atbara region and the Red Sea Hills. An Atlas variety of African wild ass with a shoulder cross and striped legs may also have survived until c. 300 AD (Figure 1). The extent to which the wild ass penetrated the interior of Africa is controversial, but it is generally considered unlikely that it ever occurred in sub-Saharan regions. Groves (1986) argues that the wild ass extended into the Near East in ancient times and co-existed with the onager, *Equus hemionus*.

Map 1. The African wild ass



Map 1 shows the actual range of the wild ass in the 1990s (Kingdon 1997) superimposed on the hypothetical former distribution prior to Roman depredations in North Africa. Earlier studies distinguished four notional races, *atlanticus*, *africanus*, *taeniopus* and *somaliensis* (e.g. in Haltenorth & Diller 1980). However, two of these, *atlanticus* and *taeniopus,* have been rejected more recently and indeed it is now claimed that the proposed *atlanticus* race was based on misidentified zebra bones (Kingdon 1997:311).

There are two doubtful populations of wild ass near Siwa oasis in Egypt and further south towards the Sahara proper. Ethnographic reports cited by Groves (1986:34) appear to suggest the presence of wild asses in the Tibesti and Ahaggar, but these are probably donkeys or populations substantially interbred with the domestic donkey. The populations on the island of Soqotra are certainly feral donkeys (Haltenorth & Diller 1980). The wild ass is limited to the semi-arid regions through its susceptibility to humidity, but the southern range of the domesticated donkey can be

Map 2. The wild ass in the Horn of Africa

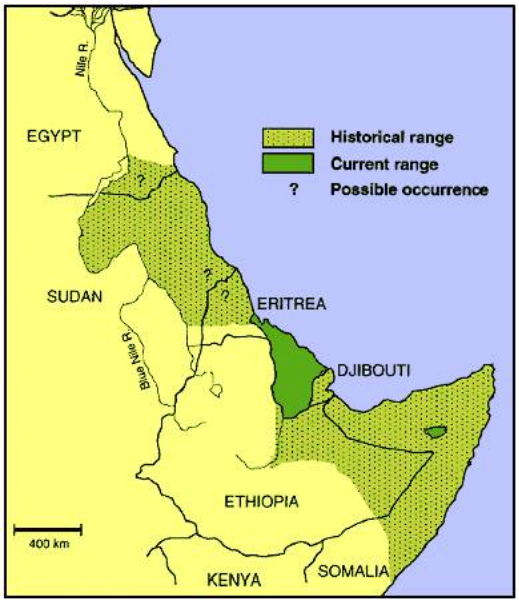


Photo 1. Eritrean wild ass

extended by careful management. There are breeding animals conserved today in Basle zoo and the Hai Bar Reserve in the Negev desert, and these may well be the last remaining genetically pure populations.

Little is known of the behavioural characteristics of wild asses; Klingel (1977) and Moehlman (1998, 2002) represent some of the few studies of wild animals. As a partial remedy, Asa, Marshall & Fischer (2011) studied the behaviour of captive asses in Saint Louis Zoo, reporting a high incidence of aggressive interactions. How far this corresponds to behaviour in the wild remains unknowable.

Bökönyi (1991) argued that domestication took place in Egypt and Clutton-Brock (1992) notes that the skeletons of three domestic donkeys have been found in an Egyptian tomb dated to 4500-4000 BC. There are comparably early skeletons in the Near East but whether these are domestic remains uncertain (Eisenmann 1995:11). Marshall (2007: 372) reviews some of the literature on finds outside Africa, in Arabia, the Levant and even Iran. It is not impossible that the ass was translocated outside Africa, domesticated and then returned to the continent, crossing with the now disappeared *atlanticus* race to produce the genetic profile of the modern donkey. Earlier writers considered that the Asiatic onager may have played some part in the descent of the African donkey, and one remarkable wall-painting from Thebes dated to the XVIIIth Dynasty does show some onagers apparently pulling a chariot (Epstein, 1971:II:397 and Epstein 1984). However, it is generally considered unlikely that this was more than an exotic curiosity, especially as onager x ass crosses are sterile.

The characteristics of the African races of wild ass do seem to correspond between local forms of the donkey and the phenotypes of the wild ass race[3]. For example, *Asinus somaliensis* is notable for the leg rings, on both fore and hind legs. The Somali donkey is described as having 'zebra markings' on the legs (Mason & Maule, 1960:14). In contrast, West African donkeys usually have distinct shoulder crosses (shown in representations of the Atlas wild ass) but rarely any leg markings.

Work on the DNA of donkeys and wild asses is in the initial stages (Beja-Pereira et al 2004; Vilà et al. 2006)), but current results are quite striking. Kimura et al. (2011) looked at DNA from ancient, historic and modern samples, representing the hypothetical range of the Nubian and Somali wild ass. They found the data shows two distinct mitochondrial DNA haplogroups, which in turn points to two separate domestication events in northeast Africa around 5000 years ago. The first clade is clearly linked with the Nubian wild ass, but the Somali wild ass is very distant from the domestic donkey, pointing to a very ancient period for coalescence. It is therefore unlikely to be the second ancestor of the donkey, and it is possible this is a now disappeared race. Kimura et al. (2011) suggest this could either be the *atlanticus* race or even the wild asses on the coast of Yemen, neither of which have yet been analysed for their DNA. This unexpected result shows how much there is still to learn about the history of an important species such as the donkey.

3. Archaeological and historical data

Wild asses and donkeys in rock art

Donkeys can only be distinguished from wild asses if they are shown in use; representations are not therefore evidence of domestication but only of their presence. Representations of asses or donkeys are sparse outside of a few scattered petroglyphs in the Saharan Atlas and the Mathendous (Southern Libya). Capderou (1995, Fig. 4.) depicts a very clear head of an ass in the Ksour mountains of the Saharan Atlas. Muzzolini (1995 Fig. 426) illustrates a female ass with her young in a rock engraving at El Richa, Saharan Atlas, assigned to the Bubaline school (c. 5000-2000 BC). At Messak in southern Libya, a rock engraving (post 1500 BC ?) shows a donkey with pointed legs (Lutz and Lutz 1995, Fig. 6). The ritual importance of the wild ass is well-illustrated in a Bubaline period engraving from Mathendous, Tassili in Ajjer (southern Libya) given by Muzzolini (1995 Fig. 436) which shows two men wearing asses' head masks apparently committing sodomy. Winkler (1938, 1939) identified wild asses in the rock-art of the Eastern desert.

[3] I am grateful to Juliet Clutton-Brock for the stimulus to pursue this point.

A review of West-Central Saharan rock-art suggests there are virtually no representations of wild asses or domestic donkeys (Muzzolini 1995) or in the Horn of Africa (Phillipson 1993:350). As usual, dating rock art is highly problematic; the following occurrences are given as a basis for further biogeographical and archaeozoological studies. The few rock art depictions and the sparsity of references to donkeys in textual records presumably relates to their low status.

Archaeology

Finds of wild *equus asinus* both within Africa and outside are tabulated extensively in Marshall (2007). Wild asses must formerly have been very abundant species in hyper-arid environments. Excavations at the site of Jebel Gharbi or Shakshuk (SJ-00-56) in Libya, which is dated to ca. 16,000 bp, show that equid bones, almost certainly predominantly wild ass, represent the largest proportion of faunal remains (Alhaique & Marshall 2009). Rossel et al. (2008) show that donkeys used by Egyptian pharaohs for transport at approximately 5000 cal BP were morphologically wild a millennium after the typical claims for the date of their domestication[4]. This further emphasises possibilities for underestimating the timing of domestication of large mammals and draws attention to species specific pathways to domestication (Marshall & Weissbrod 2011).

Osteological records of domestic donkeys begin in Egypt in the 4th millennium BC from the site of Maadi (Midant-Reynes 1992). There are clear representations of working donkeys by the middle of the next millennium (Epstein 1971:392; Brewer et al. 1994:99). Ten articulated donkey (*Equus asinus*) skeletons recently discovered in three brick tombs adjacent to the mortuary complex of one of the founder dynasty Egyptian kings (*ca*. 3000 BC) at Abydos, Egypt (Rossel et al. 2008). At about the same period there are textual records of large herds of donkeys, many of which were used for portage. Under the Pharaoh Pepi II (c. 2270 BC) trading expeditions to Punt (Ethiopia) consisted of caravans with pack donkeys (Kitchen 1993). The extent to which the donkey departs from its wild relative can be tracked through Egyptian wall-paintings, where the dark shoulder-stripe of the ass gradually disappears from the donkeys as the Old Kingdom gives way to the middle kingdom (Brewer et al. 1994:100). Donkeys from the 2nd millennium BC occur at Shaqadud in the Butana grasslands of Sudan (Peters 1991).The historical and archaeological evidence for domestic donkeys in the Maghreb is reviewed by Musso (1975) and Camps (1988). Donkeys were found in the faunal assemblages at Carthage in the Roman period (1-4th centuries AD) (Levine 1994). Kaache (1996) reviews the evidence for donkeys in Morocco; there are possible finds of ass bones at the 'Neolithic' sites of Dar-es-Soltane and Tangier but no certain representations in rock art.

Archaeologically, there are few certain records of domestic donkeys in sub-Saharan Africa. The earliest record of a donkey in West Africa is at Siouré in Senegambia (MacDonald & MacDonald 2000). The stratigraphy of this site appears to be reliable and the donkey bone is dated to 0-250 A.D. After this, the next donkey bones occur at Akumbu in Mali with a date of 600-1000 AD. However, these are extremely rare, even in sites, such as Tegdaoust, where there have been extensive finds of other domestic species. Bearing this in mind, it is curious that bones identified as *Equus asinus* at MK40 in Mali is dismissed by Gaultier (1991) as 'intrusive'. The scarcity in West Africa may relate to a problem of identification. There is considerable evidence for the widespread use of ponies in West-Central Africa, a cultural pattern which evolved from the adaptation of North African horses to the ecology of the sub-Saharan region (Blench 1993). West African ponies are extremely small and it remains to be demonstrated that they have been reliably distinguished from donkeys and mules. Eisenmann (1986) has published extensively on the distinction between horses, asses, mules and donkeys but not all archaeozoologists working on Africa have made use of the criteria she has established. Equid teeth have been recovered from excavations in Central Nigeria from rock shelters at Kariya Wuro (Allsworth-Jones 1982) and Rop. The Rop teeth, in particular, which are dated to the first millennium BC, have been identified as those of a wild ass or donkey (Sutton 1985). This seems unlikely, unless either the stratigraphy at Rop is misleading or these

[4] Donkey bones have been found at the mid-seventh millennium site at Maadi, Merimde, Hierakonpolis, some of which are reduced in size compared wild progenitors. This may indicate domestication.

are in fact pony teeth. The picture for eastern Africa is much richer. Marshall (2000) summarises the evidence which suggests that there were domestic donkeys near the Nile confluence as early as the fourth millennium bp.

Historical sources

Historical sources on the spread of the donkey are exiguous. The Arabic sources for West-Central Africa mention donkeys several times (all references from Levtzion & Hopkins 1981). Al-Bakri (p. 81) noted the use of donkeys to carry salt in the Kingdom of Ghana and Al-ʾUmarī (p. 263) commented on their small size in the Empire of Mali. However, donkeys pass unnoticed in Ethiopian historical chronicles (Pankhurst 1968). When European trading voyages begin there are a few scarce references. Donkeys and mules from Persia were apparently first landed at the Cape by the Dutch East India Company in 1689[5] (Boettger 1958). Little is known of their subsequent history, but it seems likely that the Boer farmers were the initial agents of their spread into the interior.

4. Linguistic evidence

Another way of approaching the history of the donkey is through vernacular names in the languages of sub-Saharan Africa. Two authors, Skinner (1977) and Bender (1988) have looked at the potential for reconstruction in specific language groups, respectively Chadic and Omotic. Tourneux (1987) discusses names for equids in 'Afrique Centrale' as part of an investigation of the antiquity of the pony in this region. Blench (1995) is an exploration of the terminology for donkeys in the Lake Chad area. Donkey terminology is also considered in Blench (2000, 2006, 2008). This section attempts to identify some of the principal roots for 'ass/donkey' in African languages and advances some hypotheses about the implications to be drawn from this data. Donkeys may be represented by a ramified terminology; there can be separate terms for wild ass, jenny, young donkey etc. These are often quite obscure words and lexicographers not specialised in livestock do not always record them. Further research may thus reveal connections and extensions of root forms not at present apparent.

The principal base forms in African languages are;

#kuur-	Widespread in Africa
#harre	Ethiopian languages
#d-q-r	Cushitic languages
#aɣyul	Berber
#aʒəḍ	Berber

#kuur-

Bender (1988:152) reconstructs proto-Omotic **kur* for ass, although to judge by some Omotic citations this probably had a long vowel. Words of this general formula run through Cushitic and Chadic as well as Omotic and it seems reasonable to assume that the Omotic form gave rise to the others. However, many Omotic languages also have the common Cushitic *harre*. Traces of the *#kuur-* root are found through much of Afroasiatic, notably Chadic languages. Its presence in Nilo-Saharan languages such as Kanuri, suggest that it was carried across Central Africa as part of the westward expansion of Cushitic (Table 1).

[5] A date of 1656 is given by Joubert (1995) but without supporting evidence.

Table 1. #k-r root

Phylum	Family	Branch	Language	Form
Afroasiatic	Omotic	Gimira	Benc Non	kur[2-3]
		Mao	Hozo	kuuri
		Southern	Karo	uk'ulí
	Cushitic	Eastern	Borana	bukuraº
			Saho	okáalo
	Chadic	West	Karekare	kóoróo
		Central	Vulum	kùré
		Masa	Peve	koro
		East	Nancere	kurá
Nilo-Saharan	C. Sudanic	Sara	Mbay	kòro
	Saharan		Kanuri	kóro

ºyoung donkey

There is no trace of the *ħarre* root in Chadic, which suggest that when speakers of Proto-Chadic split off from Cushitic, asses were still being managed on a semi-wild basis. *#kuur-* has remained the dominant lexeme in most of Chadic.

#ħarre

This root is extremely widespread through the Horn of Africa, and appears virtually unchanged in numerous East Cushitic and Omotic languages. This suggests that it is probably a widespread loanword and should *not* be reconstructed to Proto-Cushitic. The Ethio-Semitic languages have a different word, cognate with the Near Eastern Semitic root *ḥ-m-r*, arguing that the ancestral speakers of these languages already had a domestic donkey when they crossed the Bab el Mandeb.

The most probable source for *ħarre* are the Oromoid words for 'zebra'. Zebras are not part of the fauna of the highlands but they are widespread in the lowlands south of the Ethiopian Plateau and are very familiar to pastoral groups such as the Borana. Borana has *harre dida* for zebra, with *dida* meaning 'outdoors' or 'open air'. The term *harre* was probably originally a word for zebra in lowland Oromoid and was transferred to donkey once it was fully domesticated. The zebra would then become the 'donkey of the plains'. Formations such as Konso *harr-etita* for 'zebra' would be calques of the Borana expression, already using the borrowed word for donkey. The development of the donkey as pack animal is probably reflected in the Beja *harri* 'anything ridden, from a camel to a train'. In the Horn of Africa, an old root for the wild ass *#kuur-* was largely displaced by *#harre* when the domesticated donkey developed economic significance. The term *#harre* was probably borrowed from terms in lowland Oromoid originally applied to 'zebra'.

#d-q-r.

Surprisingly, the Agaw terms and those in West Rift (Southern Cushitic) seem to be related despite their considerable geographical separation. The dV- initial syllable is not a prefix in either group and the words look too similar for this to be merely coincidence.

Table 2. #d-q-r root

Family	Branch	Language	Form
Cushitic	Agaw	Bilin	dəxʷara
	West Rift	Iraqw	daqwaay

It has been suggested that this form is derived from S. Cushitic 'zebra', for example, Iraqw *dakeeti*, but this etymology is not very convincing.

Ancient Egyptian

The principal form recorded for Ancient Egyptian, *ḥ′* is too reduced to be certain of its affiliations. It may be related to either of the Semitic roots set out below.

Semitic

There are two widespread base forms in Semitic, *#ḥ-y-r* and *#ḥ-m-r*. These may ultimately be related, but both are attested synchronically in many languages. Table 3 and Table 4 show a short series of witnesses for these base forms;

Table 3. #ḥ-y-r root

Branch	Language	Form
	Ugaritic	pḥl
Canaanite	Classical Hebrew	ḥayr
Arabic	Classical Arabic	ḥayr
South Arabian	Mehri	ḥayr/ ḥəyeer
Ethio-Semitic	Amharic	ahɨyya

Table 4. *#ḥ-m-r* root

Branch	Language	Form	Gloss
	Ugaritic	ḥmr	
Arabic	Classical Arabic	ḥimaar	
	Shuwa Arabic	ḥumaar	
South Arabian	Epigraphic	ḥmr	wild ass
	Soqotri	ʃmálhen	
Ethio-Semitic	Gurage Caha	əmar	

These widespread roots suggest that wild ass was familiar to Proto-Semitic speakers and that it was transferred early to the donkey.

Berber

There are two principal Berber roots, *#aɣyul* and *#aʒəḍ*. Neither of these have any proven connection with any other Afroasiatic terms and probably represent ancient names for the North African wild ass transferred to the donkey at an unknown period.

Summary

The linguistic evidence suggests that individual branches of the Afroasiatic language phylum seem all to have quite distinctive lexical items for wild ass/donkey. In most cases, the speakers would have been familiar with the wild ass, and so would have named this creature in the pre-domestication era. Only the *#k-r* root is widespread in Central Africa and seems to have been carried from the Cushitic-speaking regions in the Horn of Africa to the Lake Chad Region (hence the loans into Nilo-Saharan languages). This is consonant with the hypothesis that the donkey was taken into domestication several times around the fringes of the Sahara.

5. Patterns of spread of the domestic donkey

The original motive for domesticating the donkey is unknown, and it is not certain that it would necessarily reflect its common usage today, as transport for people and goods. It may have been domesticated for its meat, for milk with its use for portage a later development. Certainly the fact that the wild ass and the donkey have remained interfertile suggests that there was little breeding and selection. This may reflect a management system based on the seasonal corralling of wild animals, rather like reindeer management among the Saami today. Such management systems were practised through much of Sahelian West Africa into the present century and were probably once considerably more common.

Map 3 shows the distribution of the domestic donkey in Africa based on information up to 2013. The spread of the domestic donkey can be divided into two key phases: the diffusion of domestic donkeys

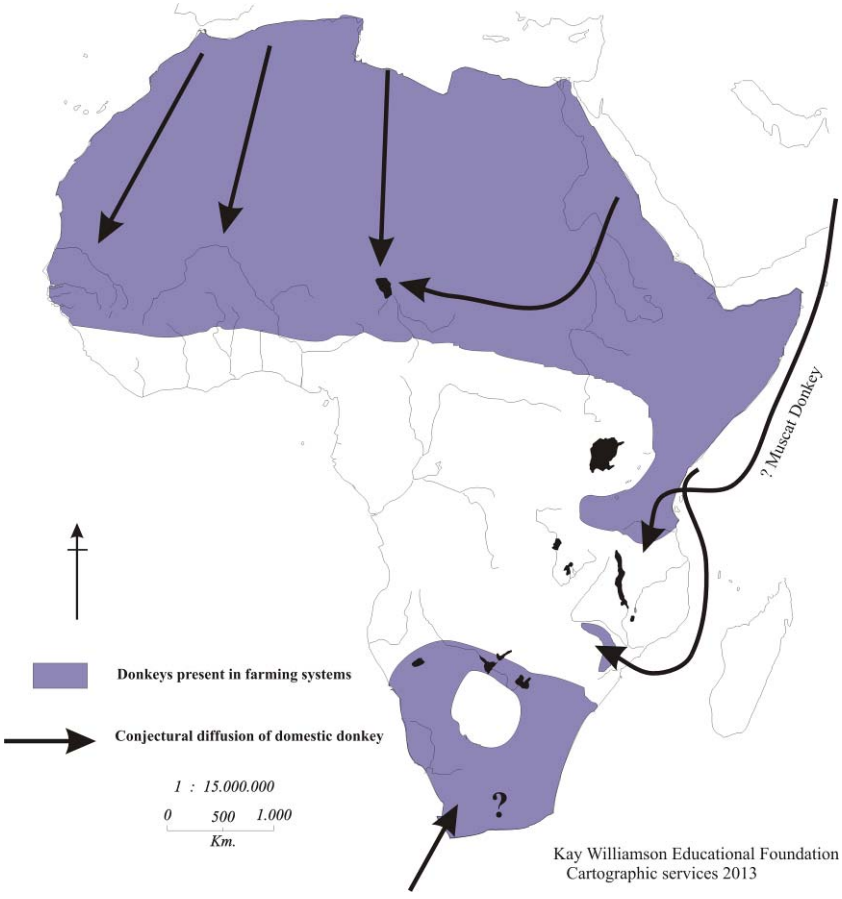
prior to European contact and the subsequent era. These two eras are not, as is common, distinguished by documentation; indeed, there are many lacunae in the historical record. The main differences are shown in Table 5.

Table 5. Patterns of diffusion of the domestic donkey

Prior to European contact	Post European contact
Sparse documentation though some graphic representation	Some historical documents
Donkeys spread only by land	Donkeys also spread by carriage in ships
Donkeys spread from farmer to farmer	Donkeys also spread through projects, state institutions etc.
Slow	Rapid

Each of these call for some comment.

Map 3. The distribution of the domestic donkey in Sub-Saharan Africa



Documentation

By and large there are no records describing the spread of the donkey in the period prior to European contact. Earlier historical references to the donkey in West African Sahel are collected together by Lewicki (1974:88-89) and Levtzion & Hopkins (1981). Arabic chronicle material describing this region refers to the donkey as already domesticated. Later texts in European languages usually refer to the presence of the donkey, not to its introduction.

Land or sea routes

The diffusion of the donkey in pre-European contact times, seems to have been strictly via land; most notably across the Sahara, but usually simply spreading gradually from area to area. However, once the donkey became seen as a productive animal for all of semi-arid Africa, it seems to have been brought to Southern Africa in ships, hence its disjunct distribution. There is a reference to so-called 'Muscat' donkeys in Tanzania in the 1950s (Mason & Maule, 1960:16). These were light-coloured donkeys associated with the Arabs and may have thus been brought from the Gulf region or from Egypt where they have a long tradition of use.

Informal versus formal diffusion

In the past, donkeys diffused principally from farmer to farmer or were sold by occupationally specialised pastoralists, as in West Africa. However, they have been spread in the present century as part of broad agricultural strategies associated either with the nation-state or with aid agencies. Most importantly, they have been recommended for traction in regions with light, sandy soils and the industrial

manufacture of axles for donkey-carts has also given their diffusion among farmers considerable stimulus. In the light of this, it is ironic in many ways that in Southern Africa today they are seen by the authorities principally as a pest (Starkey 1995).

The informal diffusion of donkeys continues even today; the clearing of savannah forest south of the Sahel and the consequent decline in tsetse challenge has permitted donkeys to spread southwards. Donkeys can survive on unspecialised diets and can find food in the peri-urban wastelands surrounding many African towns. Similarly, deforestation and land degradation leads to decreased biodiversity; donkeys can feed on the shrubs that persist under these conditions.

The use of donkeys is closely related to road infrastructure and the price of rural transport. In Nigeria, for example, the oil boom era led to massive importation of small pickups and these became to preferred means of transporting farm produce to market. Indeed prices of both vehicles and fuel were so low that many farmers sold their donkeys and breeders in the semi-arid region turned to other enterprises. However, once the recession set in at the end of the 1980s, the economics of motorised rural transport became more doubtful and farmers became anxious to acquire donkeys again. Having receded in Nigeria, the donkey is once again spreading (RIM 1992,II).

6. Donkeys in use

Donkeys are kept in Africa for four main reasons:

a) as work animals
b) for breeding
c) for milking
d) to eat

Of these, work is by far the most important. Donkeys are used mainly as pack animals, either for carrying loads or for riding (Fielding 1987; Fielding & Pearson 1991). We know that the Egyptian used large-scale caravans of donkeys, water-jars and food dumps to reach towards Central Africa as early as the Old Kingdom period (Förster 2007). Photo 2 shows an Egyptian wall-painting of pack-donkeys carrying home harvested crops.

Photo 2. Egyptian wall-painting showing pack-donkeys

Less commonly, donkeys are used in traction, for example, pulling carts or ploughs, although in sub-Saharan Africa both of these are post-European introductions. In Ancient Egypt, asses were used both for

treading seed into the furrow and for threshing, but there seem to be no modern reports of these practices. A review of some of the existing literature is given in Clutton-Brock (1992) although this focuses principally on horses. Cochin (1995) describes the use of donkeys in Senegal and Burkina Faso and Gebreab et al. (2004) represent a more up-to-date of the synchronic use of donkeys in Ethiopia. Marshall & Weissbrod (2009) focus on some of the synchronic evidence for transportation of water among Maasai in Kenya, and the implications for the use of donkeys in saving labour in prehistoric contexts.

Breeding donkeys can be a profitable business in parts of the Sahel. Below a certain isohyet, the reproduction of donkeys becomes increasingly problematic, due to humidity-related infections (RIM 1992). It is therefore more practical for donkey-users to buy animals from further north and replace them at the end of their working life. Sahelian countries such as Niger and Mali have a considerable trade selling donkeys, usually males, to communities further south.

Asses' milk has an important symbolic value due to its prominence in certain Near-Eastern texts. However, the milking of donkeys in Africa is rare and of little economic importance probably the low-management systems that obtained until recently; donkeys were not milked because of the labour of catching them regularly. The western Maasai are reported to milk donkeys (Epstein 1971, II:386) and donkeys' milk is used in magical remedies in parts of West Africa.

The extent to which donkeys are eaten is probably greatly underestimated, since this is something of a taboo area for many observers. Nonetheless, the wild ass has been hunted to near-extinction for its meat and eating equids is common in many Eurasian pastoral systems. Islam prohibits the consumption of donkey meat and many Christian and traditionalist groups also refuse to eat it. Ibn Baṭṭuṭa, travelling in the Empire of Mali in 1352 noted with distaste the consumption of donkeys (Ibn Batoutah 1893-1922, IV:423-4 also Levtzion & Hopkins 1981:297). Fernandes (1938:76) describes the Berber nomads of Mauretania as eating donkey in the early sixteenth century. Donkey meat was still eaten in the Malian Gourma at the turn of the century (Desplagnes 1907:228). In West Africa, the trade in donkeys for meat is essentially of old, sick or exhausted animals that have been used as work animals in the villages of the semi-arid zone. Because of its ambiguous status, the trade in donkeys remains poorly documented.

Further south, in the more humid regions of West-Central Africa, the donkey is an exotic to which no culinary taboos attach. In Nigeria there is a thriving trade in donkeys reaching southern markets and this is probably replicated along the West African coast (RIM 1992; Blench et al 2004). Formerly much of the trade had been in smoked meat, as donkeys bought in intermediate markets were slaughtered and skinned and the meat then prepared by drying and smoking. This practice seems to have largely disappeared, and the trade is confined to live donkeys. The meat is sold as donkey locally, but is sometimes passed off as the more expensive beef outside the area. In East Africa there are also reports of eating donkeys. The Kamba people in Kenya are recorded as actually fattening donkeys for consumption and some of the other cultivators close to the Maasai may also eat donkeys (Epstein 1971, II:387).

7. Productivity of donkeys under traditional management

Fielding (1988) has reviewed existing productivity data for female donkeys world-wide. Studies on the productivity of donkeys under traditional management in sub-Saharan Africa are sparse, consisting principally of Wilson (1980) for two different systems in Mali, Wilson et al. (1984) for the Twareg pastoral herds of Niger and Blench et al (2004) for Northern Nigeria. This latter study has the most comprehensive data and the largest sample size; its findings are therefore quoted here as indicative (Table 6).

Table 6. General Reproductive Parameters of Donkeys in Nigeria

Category	Value	SD	n
Mean age of breeding female	96.3 mths	29.0	77
Mean age at first foaling	56.9 mths	16.6	76
Foaling interval	25.5 mths	-	12
Mean number of previous parities	2.1	1.3	77

Source: Blench et al (2004)

The mean age at first foaling, 57 months, is substantially higher than in temperate countries where about three years is considered usual (Fielding 1988:163). Donkeys in Nigeria are allowed to mate freely when herded, but restrictions on access to males when jennies are used for work can mean that oestrus is overlooked. Estimates from the literature suggest that the length of the oestrous cycle is about 24 days and the length of the oestrus itself 6-7 days. Donkeys are usually seasonal breeders in temperate regions but in the tropics they come into oestrus throughout the year. Variations in the annual pattern of foaling are most likely to reflect nutritional differences. Donkeys have a gestation period of almost precisely a year (374 days in the estimates quoted in Fielding 1988). The body condition of breeding females never deteriorates so far as to inhibit fertility, and an even conception pattern reflects their ability to thrive on the poorest of diets (Borwick 1970). These figures provide numerical confirmation of many generalisations about donkeys, both in terms of their hardiness and productivity. However, they should be used with caution as they represent the system in one specific region of Sahelian Africa. The degree of variation within the Africa as a whole may be considerable.

8. Mules and hinnies

If the history of the donkey is known only very partially, the history of mules is almost completely invisible. Mules are the F_1 cross between a horse and a donkey and are valued for their hybrid vigour, but are generally infertile. Mules are usually produced from a male donkey with a female horse, and hinnies from the reverse pairing. Mules are presently used throughout North Africa and Ethiopia and are very much associated with Arab culture. The reconstruction of 'mule' in West Semitic languages suggests they represent an ancient practice in the Near East. Mules are difficult to detect archaeologically (i.e. their bones can often not be reliably distinguished from donkeys and horses). Although techniques *are* available (see Eisenmann 1986), it is safe to say that these have rarely been applied in Africa. In the light of this, only linguistics and ethnography have some potential for recovering their history.

A unique Egyptian wall-painting from the New Kingdom (ca. 1570 BC) appears to represent a pair of hinnies pulling a chariot (Brewer et al. 1994: Fig. 8.3). However, they are almost unknown in the rest of the continent. Doutressoulle (1947:264) notes that there are mule races in Senegambia and Guinea, apparently brought from Algeria. Further east, in Niger and Nigeria, mules are not bred, apparently because it is thought to be unnatural to intentionally produce a sterile animal (RIM 1992).

9. Conclusions and further research

The donkey originated with the African wild ass, although it may have been domesticated several times in regions of its former range no longer represented by its present-day distribution. This appears to be confirmed by studies of terms for donkey in various African language families. Egypt remains the most likely centre for its early development for agricultural work, although without further archaeological data from outside the Nile Valley this is uncertain.

Although at least one archaeological site appears to confirm the donkey crossed the Sahara from North Africa some 2000 years ago, it may have been as a rare exotic, since both bones and rock-paintings are otherwise scarce. It is probable that donkey use only took off in West Africa with the rise of the long-distance caravan trade. However, there appears to be strong evidence for an east-west link suggesting that donkeys could have reached Lake Chad from the Nile across the Sahel. Given the early dates for donkeys in the Ethiopia-Sudan region this would be quite reasonable.

To understand the broader parameters of donkey use and its role in the economic system of its owners, studies of productivity under traditional management such as those reported in §7. need to be replicated in other parts of the continent and stratified both according to ecological zone and production strategy. To understand the past we need to know considerably more about the donkey in the present.

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