CHAPTER 19
USING LINGUISTICS TO RECONSTRUCT AFRICAN SUBSISTENCE SYSTEMS: COMPARING CROP NAMES TO TREES AND LIVESTOCK

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INTRODUCTION

Reconstructing the history of agriculture in Africa, or indeed any area of the world where written documentation is sparse or non-existent, is inevitably a multi-disciplinary exercise. Although the volume of archaeobotanical data available for Africa is gradually increasing, coverage remains extremely patchy and concentrates on a few species, notably sorghum, millet and finger-millet (see review in Neumann 2003). It is safe to say that most plants cultivated in Africa today are nowhere represented in the repertoire of plant remains recovered from the archaeological record. In the case of domestic animals, particularly cattle, sheep, goats and chickens, the situation is marginally better, with some materials for most species in much of the continent (see individual reviews in Blench & Macdonald 2000). African arboriculture or the intentional planting of trees, an ancient characteristic of many agricultural systems in the Old World, is a poorly understood and little-documented area; linking the sparse archaeobotanical material from trees with present-day management systems has hardly begun. Indirect indicators of agriculture in the past and the present, such as agricultural tools, settlement patterns, field systems and animal pens, remain understudied.

Two tools other than archaeology are available for the reconstruction of agrarian history; historical and comparative linguistics and DNA (deoxyribonucleic acid) studies. The use of DNA to determine taxonomic relationships between or within wild and cultivated crops and trees has yet to be undertaken even for major species. In contrast, studies of nuclear and

mtDNA in livestock have begun to produce intriguing results (eg Loftus *et al.* 1994; Bradley *et al.* 1994, 1996; Freeman et al. 2004 on cattle; Hiendleder *et al.* 1998 on sheep; Giuffra *et al.* 2000 on pigs; Luikart *et al.* 2001 on goats). The origins of the domestic dog have recently been the subject of renewed interest (Savolainen *et al.* 2002; Gallant 2002) but many African breeds of ruminant and other minor domestic species are still unsampled. DNA studies tend to show multiple origins for well-known species, with the consequence that classical phenotypic or osteometric work (eg Epstein 1971; Grigson 2000) in archaeozoology must be rethought.

Historical linguistics can be defined as the analysis of the relationship between languages, in particular those assumed to be genetically related and to have 'sprung from some common source'. Historical linguists establish rules that explain how individual languages evolve from this common source through the reconstruction of hypothetical proto-forms. Usually they base this on the comparison of two or more languages, but the 'internal reconstruction' of a single language is also possible, using indications such as dialect variation or fossil morphology to create a picture of an earlier stage of that language. In principle, historical linguistics can provide essentially two sorts of insights relevant to the prehistory of agriculture:

a. describing patterns of loanwords that track the introduction and diffusion of new or innovative cultivated plants and animals, management techniques and related socio-economic institutions; and,
b. reconstructing individual lexical items to a hypothetical proto-language that make it likely that they were known to speakers of that language.

The first author to point to the potential of this method was probably Julius von Klaproth in 1830. He observed that the names for 'birch tree' linked European languages with those of India and therefore had implications for prehistory:

> Il est digne de remarque que le *bouleau* s'appelle en sanscrit *bhourtchtcha,* et que ce mot dérive de la même racine que l'allemand *birke,* l'anglais *birch* et le russe, *берeза* (bereza), tandis que les noms des autres arbres de l'Inde ne se retrouvent pas dans les langues indo-germaniques de l'Europe. La raison en est, vraisemblablement, que les nations indo-germaniques venaient du nord, quand elles entrèrent dans l'Inde, où elles apportèrent la langue qui a servi de base au sanscrit, et qui a repoussé de la presqu'île,

> les idiomes de la même origine que le malabar et le télinga, que ces nations, dis-je, ne trouvèrent pas dans leur nouvelle patrie les arbres qu'elles avaient connu dans l'ancienne, à l'exception du bouleau, qui croît sur le versant méridional de l'*Himâlaya*[1] (Klaproth 1830: 112-113).

Max Müller (1864:222 ff.) may well have been the first to link etymological data with archaeological finds and by a fortunate chance his example refers to flora and environment. He argued that linguistic interchanges between the names of 'fir', 'oak' and 'beech' in early Indo-European can be interpreted in the light of the changing vegetation patterns deduced from visible strata in Danish peat bogs. Although this type of correspondence is now a longstanding tradition in Indo-European scholarship and is now very much part of the reconstruction of Austronesian prehistory, elsewhere in the world it has had a less enthusiastic reception. In Africa in particular, reconstructed proto-forms for the major language phyla are at best controversial (see Blench 2002 for a discussion of the controversy over Nilo-Saharan reconstructions) and are often marked by an unwillingness of linguists to engage with archaeobotanical and archaeozoological databases. Although linguistics can provide information on topics on which archaeology has little to say, including social organisation, music, religion and vegetative crops, it can only ever provide relative dates or estimations. Only archaeology can provide absolute dating.

Another aspect of this is the contrast between archaeological visibility and linguistic salience. This works in two ways; something may have high archaeological visibility and low linguistic salience, and, conversely, something may be prominent as a reconstruction or a loanword, but be invisible archaeologically. Table 19.1 presents some examples of fields that illustrate the potential mismatch between archaeological visibility and linguistic salience.

[1] Translation by author: 'It is worth saying that the *bouleau* is called *bhourtchtcha* in Sanskrit, and that this word derives from the German *birke,* the English *birch* and the Russian береза (bereza), although the names of other India tree species do not occur in the Indo-Germanic languages of Europe. The likely reason is that the Indo-Germanic nations were coming from the north, and when they cane into India they brought the language which became the basis for Sanskrit, thereby pushing down the peninsula the speech-forms of the same origin as Malabar [Malayalam] and Telinga [Telugu]. These peoples did not find the same tree species in their new homeland as those in their former location, with the exception of the birch which grows on the southern slopes of the Himalayas'.

Table 19.1. Contrasting archaeological visibility and linguistic salience

Example	Archaeological visibility	Linguistic salience	Comment
Fish-bones	high	low	Fish spp. are too numerous and diverse to generate widespread reconstructions
Tuber crops	low	high	Tubers are not easily identified in African sites with present techniques, although analyses of starch grains may change this. Phytoliths may be valuable in detecting fruits such *Musa* spp.
Recently introduced crops	low	high	Neotropical introductions have transformed African agriculture, but too recently to be reflected in archaeological materials
Livestock	high	high	Bones are well-preserved and vernacular terms highly salient. Also the only area where modern DNA work exists
Humid zone artefacts	low	specific to individual artefacts	Acid soils make preservation in humid forest much less likely
Large predators	low	low	Predators are not eaten, hence their bones are rarely found at settlement sites. They are subject to linguistic taboo, hence reconstruct poorly despite high anthropological salience

Linguistics may also sometimes produce only banal, circular inferences, such that fish-names will be salient in fishing communities or that savanna populations will have names for common useful trees. Despite this, salience clearly varies from one era of prehistory to another and this leaves its traces in vernacular names.

Nonetheless, a body of linguistic evidence for African crops, economic plants, trees and livestock has now been compiled and some examples of the way linguistics, archaeology and genetics can be linked now exist (eg Banti 1993; Blench 1993, 1995, 1998, 2006; Blench et al. 1997; Heine 1978; Philippson & Bahuchet 1996; Portères 1958; Skinner 1977; Williamson 1993, 2000). But the linguistic evidence shows curiously patchy results; it seems that some categories reconstruct much better than others and that this variation is not necessarily connected with either their salience or their antiquity. An intriguing asymmetry with important consequences for African economic history is the difficulty of reconstructing crop names compared with domestic animals. Given that dates for agriculture in Africa are highly controversial (see discussion in Neumann 2003), it would clearly be of great interest to

establish secure reconstructions for major cultigens such as yam (*Dioscorea spp.*), sorghum (*Sorghum bicolor*), millet (*Pennisetum glaucum*), finger-millet (*Eleusine coracana*), fonio (*Digitaria exilis*) and others in the different language phyla. But attempts to do this have been generally unsuccessful, somewhat in contrast to livestock, where terms for cattle, sheep and goat have well-attested reconstructions in both the Niger-Congo and Afroasiatic language phyla.

By contrast, tree names remain a little-explored topic, although some important economic species can be reconstructed to median levels of Niger-Congo, others are only notable for the extreme diversity of their vernacular names. Although the biodiversity of African trees remains to be fully documented, the level of floristic biodiversity is relatively high[2] (Groombridge 1992: 66 & Table 8.1). There are perhaps 60,000 species of vascular plant of which 35,000 are endemic (Davis et al. 1994). Almost all species of tree are potentially of use; but many have only scattered importance and have not made any impact on the linguistic repertoire of tree names. However, individual species may develop local or zonal importance for a variety of reasons; their medicinal value, fruit, charcoal, contribution to soil fertility, etc. which in turn mesh with evolving production systems, for example, the capacity to survive bush-fires. As they gain a high degree of salience, strategies for exploiting them diffuse and, consequently, a vernacular term for a particular species is recorded over a wide area. This salience is reflected in the existence of widespread linguistic cognate terms[3] that can be taken to mark the point in the evolution of African language phyla at which human society began to attribute significant economic and cultural value to a particular species. This will in turn be interpretable in terms of the archaeobotanical profile of particular regions of the continent. This usually does not reflect biogeography, but rather assumed cultural significance, as the examples of African mahogany (*Khaya senegalensis*), the shea (*Vitellaria paradoxa*), the locust (*Parkia biglobosa*), the baobab (*Adansonia digitata*), and the silk-cotton (*Ceiba pentandra*) show (Blench, In press a).

The situation in Africa contrasts quite sharply with the Pacific. In Oceania, few economic tree species have a 'natural' distribution and indeed indigenous tree floras of individual islands

[2] Although the diversity is concentrated in a number of 'hotspots', notably Madagascar, the Eastern Arc mountains of Tanzania and the Cape in South Africa.
[3] The editors suggest I avoid the normal linguistic term 'root' in order to avoid confusion with its botanical sense, hence this paper adopts this slightly unnatural periphrasis.

may be quite depauperate (Walter & Sam 1994). Individual species were moved from island to island as the Papuan and Austronesian phyla expanded and the very fact that they were moved guarantees their linguistic salience. Blench (2005) reviews the broader literature on Pacific arboriculture and shows that the rich lexical base available for Pacific languages makes possible quite a detailed reconstruction of the human restructuring of its tree flora. Reconstructions of tree names have also proven important in the identification of the Algonquian homeland in North America (Goddard 1994).

The movement and manipulation of trees in African history can be divided into general categories that broadly correspond to historical epochs but also to the production system of particular groups. Arboriculture, defined as the intentional planting of trees, was an ancient characteristic of many agricultural systems in the Old World, but was unknown until very recently in sub-Saharan Africa, with the exception of Ethiopia. Although economic species spread through the opportunistic transport of seeds and the selective protection of individual species, trees and their products played an important role in African subsistence systems because of their relative abundance. Fire is a key element in determining the pattern of African vegetation and species that survive annual burning, such as the locust tree, become more prevalent in savannahs with high-density occupation. Only a highly schematic view of the correspondences between production system and the spread of particular tree species is possible (Table 19.2).

Table 19.2. A general scheme for determinants of tree salience in African prehistory

Production system	Characteristic	Example species	
		English	**Latin**
Forager	Transporting economic fruits	Bush-candle	*Canarium schweinfurthii*
Pastoralist	Transporting economic fruits	Baobab	*Adansonia digitata*
Settled agriculture	Bush-burning with protection of economic trees	Shea	*Vitellaria paradoxa*
	Selective economic extraction	False locust	*Prosopis africana*
	Ritual prohibitions on cutting	West African ebony	*Diopsyros mespiliformis*
	Trade in economic fruits	Locust	*Parkia biglobosa*
Urbanism	Sale of tree products	Cola	*Cola acuminata*
Colonial era	Intentional diffusion of fruit trees	Citrus	*Citrus spp.*
	Selective economic extraction	Tropical hardwoods	*Milicia excelsa*
Post-colonial	Agroforestry, plantation economies	Teak	*Tectona grandis*

Prior to the development of agriculture, foragers intensively exploited a wide variety of fruit trees including species that are only considered of limited value today. It is generally assumed that LSA (Late Stone Age) foragers were highly mobile and would therefore have actively spread the endocarps of economic fruits. However, this is hard to prove without clearer distributional data and some hypotheses as to the 'natural' environment of particular species. Nonetheless, finds of endocarps, as distinct from the identification of the presence of a tree from anthracological (ie charcoal from accidentally or intentionally burnt woody vegetation) data, do suggest human intervention.

This paper[4] explores the conflicts and synergies between archaeology and historical linguistics in reconstructing African agricultural history. It presents examples of the link between

[4] This paper expands on many themes dealt with in Blench (2006) and represents a compilation of data from many sources. I would particularly like to thank Valentin Vydrine, Guillaume Segerer and Kay Williamson (†) for unpublished language materials. Kay Williamson (†) also read and commented on the whole text and Dorian Fuller has kept me up to date with ethnobotanical findings. Stephanie Kahlheber generously made available her database of African archaeobotanical records. Han Jian-Lin and Olivier Hanotte at ILRI, Nairobi kindly gave me access to recent findings of the genetics of domestic animals in late 2004, subsequent to the first version of the paper.

reconstructions and dated materials in some major economic species, but also highlights lacunae, noting important species with an ambiguous linguistic record.

BACKGROUND TO AFRICAN LANGUAGE PHYLA

African languages are conventionally divided into five phyla, Niger-Congo, Nilo-Saharan, Afroasiatic, Khoesan and Austronesian (Malagasy) (see Blench 1999). Two of these phyla have significant numbers of speakers outside Africa; Afroasiatic, because of the expansion of Arabic northwards and eastwards into Eurasia and Austronesian, which is mainly centred on SE Asia and Oceania. Using the estimates from Ethnologue (SIL 2005), the number of African languages spoken today is ca. 2000. Language numbers are distributed very unevenly across the phyla (Table 19.3).

Table 19.3. Numbers of African languages by phylum

Phylum	Number	Location	Source
Niger-Congo	1,514	West, Central and Southern Africa	SIL (2005)
Nilo-Saharan	80	Southern edge of the Sahara from Mali to Ethiopia, southern extension into Tanzania	Bender (1996)
Afroasiatic	341	North Africa, Ethiopia, southern edge of the Sahara in Central Africa and Ethiopia	SIL (2005)
Khoesan	70	Southwestern Africa, possible outliers in Tanzania	Güldemann & Vossen (2000)
Austronesian	1 (in Africa)	Madagascar, Comores	SIL (2005)
Unclassified	5	Scattered	Author

*Arrived at by deducting 34 Arabic dialects from total

In the case of Khoesan, numerous languages have become extinct in historic times and only inadequately transcribed data remains. Although Khoesan speakers are predominantly hunter-gatherers, reconstructions for domestic animal names in Central Khoesan are indicative of the date of their interactions with pastoralists, an encounter also reflected in the archaeological record. There are several poorly documented language isolates such as Hadza, Jalaa, Bangi

Me and Laal (Blench 2006). These are current and former hunter-gatherer populations and are unlikely to contribute significantly to the reconstruction of the prehistory of agriculture, since as single languages they do not provide the comparative results that makes the Khoesan data so valuable.

Documentation of African languages is highly variable and is certainly not adequate in the technical field of names for crops, livestock, trees or other fields associated with farming, such as agricultural tools. Linguists are poor botanists (and vice versa) and rarely collect more than the names of a few very common species. As a consequence, the reconstruction of tree names is not well developed in any of the language phyla of Africa. Reference sources such as Burkill (1985 *et seq.*) do sometimes constitute important compilations of vernacular names but the transcriptions are highly variable in quality and are often difficult to use. Nonetheless, information about the most important species is rich enough to make possible the mapping of linguistic and archaeological data.

CROPS

The reconstruction of crop names

The earliest writing on centres of agriculture and domestication of crops tended to ignore Africa, although Vavilov (1931) identified Ethiopia as a centre of domestication for wheat (*Triticum spp.*) and peas (*Pisum spp.*). The notion that West Africa was an important world centre for crop domestication dates from Murdock (1959), whose proposals have been largely confirmed by later work. The largest language phylum in Africa, Niger-Congo, is generally believed to have originated in West Africa and its speakers would have initiated agriculture by the time the Bantu expansion began in southern Cameroun some 3-4000 years ago. As a consequence, names for domestic plants that occur in the Benue-Congo languages of Nigeria and have Bantu reflexes can be assigned to the early period of agriculture (Blench 1996). We should therefore seek linguistic evidence for the origins of agriculture in West Africa. Ethiopia represents quite a different agrarian nucleus, with a blend of indigenous species and those brought from the Near East, which are in turn reflected in the predominant Afroasiatic languages.

Many of Africa's indigenous crops remain poorly known and few enter into world trade. Ethnobotanical research into crop plants in Africa has tended to focus on those considered most commercially significant. Thus, although there exists a substantial body of research on the taxonomy and local use of sorghum, plantains (*Musa* spp.) or Guinea-yams (*Dioscorea rotundata*), cereals such as fonio and iburu (*Digitaria spp.*), and tubers like the aerial yam, *Dioscorea bulbifera*, and the Sudan potato, *Solenostemon rotundifolius*, remain almost unknown. This leads to an unbalanced picture of the cultigen repertoires in traditional agriculture and a tendency to underestimate the significance of 'minor' crops in prehistory.

If we depended solely on well-dated finds, our picture of African agriculture would be severely impoverished. The identification of centres of origin for most species is based, not on archaeobotany, but on plant geography and analysis of modern-day cultivars and their wild relatives. Neumann (2003) has reviewed the archaeobotanical evidence for agriculture in Africa, in support of her contention for its late origin. The evidence is best for cereals; vegetative crops such as yams and potherbs are poorly represented or not at all. It is possible to use phytoliths and starch grains to detect starchy roots, but until now only phytoliths have been adopted and are yet to be widely used (cf. Mbida et al. 2000, 2001 on *Musa* phytoliths in Cameroun, a report which has remained highly controversial[5]). The dichotomy between cereals and vegetative plants is very marked; with cereals it is possible to compare and contrast linguistics and archaeobotany; with other crops, linguistics is presently the only tool available for reconstruction of their history. As a consequence, agriculture tends to be seen from a semi-arid perspective; better data on forest-zone crops might well transform existing models.

A major difficulty in the reconstruction of plant names in African languages is the transfer of names between wild and cultivated varieties of plants, as the Niger-Congo terms for 'yam' and 'sorghum' illustrate. Yams, ie the Dioscoraceae, occur between the semi-arid and humid zones throughout sub-Saharan Africa. Wild ancestors of the present-day cultivated yams, such as *Dioscorea rotundata*, would have been exploited from an early period, as indeed are many species today, especially in periods of famine. At an unknown period, the cultivated yam was

[5] De Maret (pers. comm.), one of the co-authors, remarked that it was rejected by referees for several journals, because of the difficulties of distinguishing wild enset (*Musa gilletti*, indigenous to Africa) from introduced Musa spp.

developed from the wild *Dioscorea* through a gradual process of protecting, transplanting and then selection. Although a reconstruction of something like *#-ji* is reasonable at the level of proto-Benue-Congo (Williamson 1993) this is no guarantee that speakers of this proto-language were cultivating yams, as opposed to simply exploiting wild forms. Proto-Bantu clearly had several terms for yams or tubers but again we cannot know they were cultivated (Maniacky 2005). Therefore, no amount of work on reconstructing the basic lexeme for 'yam' can clarify its relative antiquity in cultivation. Similarly, with sorghum, there is a widespread cognate term in Niger-Congo languages, something like #kVN- (Table 19.6), but archaeobotanical evidence for sorghum (Table 19.5) is persistently late for such a reconstruction to refer to cultivated forms. Failure to recognise this has led to somewhat exaggerated claims about the reconstructibility of both cultigens and by extension, agriculture.

There is a possible way around this dilemma; the reconstruction of lexical items associated with cultivation (Williamson 1993; Connell 1998). There could, for example, be a specific word for a tool to uproot yams, for seed yam or yam-heap. If these were shown to reconstruct to the same time-depth as the yam itself, this would be a good indication of the antiquity of cultivation. Although semantic shift remains a possibility, for example a general word for mound becoming 'yam-heap', it is unlikely that the same shift would take place in all groups simultaneously. In the case of the Guinea yam, lexical items associated with its cultivation are not reconstructible to anything like the same level as the plant itself (eg Connell 1998 for the Cross River languages in SE Nigeria). From this we can conclude that speakers of Niger-Congo languages knew about wild yams and began to exploit them for food long before they adopted current cultivation techniques. Even this strategy is only useful in some contexts; for example, it might seem that looking for reconstructions of words such as 'field' would provide evidence for the relative antiquity of agriculture. But in most African languages, 'field' is simply the same word as 'bush, uncultivated land' and not a distinct lexeme. This is informative about the fuzzy conceptual boundaries of land classification but not very helpful in uncovering the antiquity of agriculture.

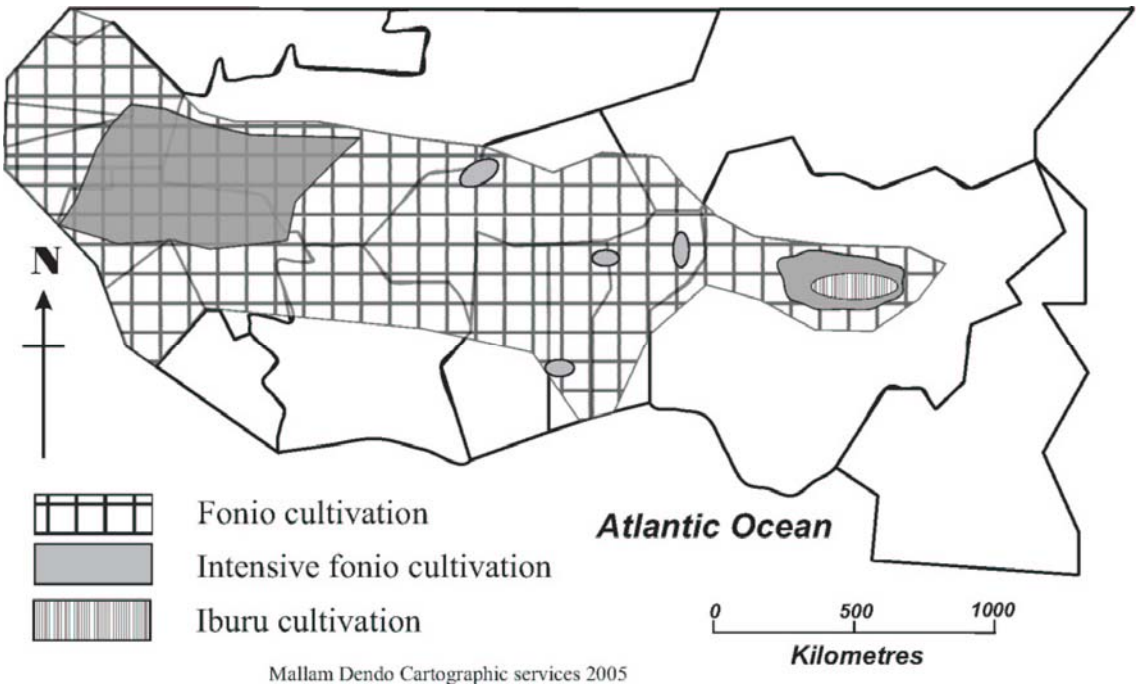
The remainder of this section looks at the evidence for the reconstruction of some African cereal crops, fonio, sorghum, finger-millet and wheat, since these can be compared with archaeobotanical data.

Individual crop species

*Fonio, fundi, hungry rice (*Digitaria exilis*)*

Fonio is a short, grass-like cereal derived from a wild species, *Digitaria longiflora,* cultivated between Guinea and the Nigeria-Cameroun border (Chevalier 1922; Portères 1955; Hilu *et al.* 1997). It is only slightly differentiated from its wild relative and fonio fields are often invisible to unpractised observers[6]. Its rather disjunct distribution in West Africa at present suggests that it was anciently spread over a much wider area, but that it has yielded to larger more high-yielding crops (Figure 19.1). The Arab geographer Al-'Umari, writing in 1337-8 says '[*funi*].. is a downy pod, from which, when crushed, there issue seeds like those of mustard, or smaller and white in colour' (Levtzion & Hopkins 1981: 263). Ibn Baṭṭuṭa, who travelled in Sahelian West Africa a decade later, in 1354, also mentions the cultivation of fonio in Mali. Fonio has been retrieved from the site of Cubalel in Senegal dated to the Late Iron Age, ie last few centuries BC (Dorian Fuller pers. comm.). Iburu, *Digitaria iburua*, is a lesser-known relative of fonio confined to Central Nigeria.

Figure 19.1. Fonio and iburu cultivation in West Africa



[6] See the website http://fonio.cirad.fr/ for further bibliography and more detailed information

There is a widespread cognate term for fonio (? #fundi) in West African languages spoken in the heartland area between Guinea and Mali (Table 19.4). This area is where the cereal is likely to have been domesticated (Portères 1976: 419 ff.).

Table 19.4. Cognate terms for fonio in West African languages

Phylum	Language	Attestation	Language	Attestation
Niger-Congo	**Mande**		**Atlantic**	
	Mende	**póté**	Wolof	**fini**
	Loko	**pénî**	Fulfulde	**fonyo**
	Looma	**pɔdɛ**	Jola-Fonyi	**finya**
	Kpelle	**miniŋ**	Bedik	**fɔndéŋ**
	Jallonke	**fúndéń**	Basari	**funyáŋ**
	Soso	**fundeɲ**	Manjaku	**findi**
	Mandinka	**fíndi**	Kisi	**kpendo**
	Xasonka	**fúndi**	Bulom	**peni**
	Bamana	**fíni**	Balanta	**fénhe**
	Maninka	**fónĩ**		
	Soninke	**fuɲaN/fuɲaŋŋe**	**Gur**	
	Bobo	**fẽ *pl.* fã̃**	Kurumfe	**peŋfe** *pl.* **peŋi**
	Dan	**pʂ̋ʂ̋ŋ̋**	Nawdm	**figm**
	Guro	**fní**		
	Mona	**fn̋n̋ĩ**	**Kwa**	
	Wan	**fẽŋ̀**	Anufo	**ǹfôni**
	Dogon		**Kru**	
	Dogon	**põ**	Wobe	**pohim**
Nilo-Saharan	**Songhai**			
	Songhay	**fingi**		

Sources: adapted from Vydrine (ined.), Segerer (ined.), Burkill (1994)

A single cognate term is spread across most of Mande, Atlantic and less commonly in adjacent families, across the core area of fonio cultivation. It has thus been loaned between the branches of Niger-Congo and is not to be reconstructed to any of its proto-languages. Elsewhere in West Africa where fonio is grown, such as central Nigeria, the names are completely unrelated, which indicates that this region was cut off from the main zone of cultivation at an early period (Portères 1955, 1976; Burkill 1994: 226). This evidence suggests that the cultivation of fonio was part of a complex that evolved in the area of present-day Guinea at least 2000 years ago.

*Sorghum (*Sorghum bicolor*)*

Cultivated sorghum presents one of the more perplexing problems in African agrarian history (Blench 2003). It is crucial to African subsistence systems in the subhumid and semi-arid regions of the continent and is embedded in ritual systems, and so would appear to be ancient. But all attested archaeobotanical materials remain stubbornly recent (Table 19.5). Archaeobotanical evidence is sometimes hard to read because of the difficulties in distinguishing wild and cultivated races (Neumann 2003:77).

Table 19.5. The earliest archaeological records of domesticated sorghum

Country	Site	Type	Date(s)	Reference
Sudan	Kawa	direct AMS	400-780 BC[7]	Fuller (2004a)
Sudan	Umm Muri	direct AMS	50-230 BC	Fuller (2004b)
Sudan	Jebel el Tomat	direct AMS	245±69 AD	Clark & Stemler (1975)
Sudan	Meroe		20 ±127 BC	Rowley-Conwy (1991)
Nigeria	Elkido		340-430 AD	Magnavita (2002)
Nigeria	Daima		800 AD	Connah (1981)

There is linguistic evidence for a widespread cognate term in West-Central Africa, #kVN-, that occurs in a number of distinct language families and phyla (Table 19.6).

[7] Given that this is probably the earliest African sorghum so far recorded, it unfortunately falls within a calibration 'plateau'.

Table 19.6. Cognate terms for sorghum in West African languages

Table 11.17 A sorghum root in West African languages

			Attestation		
Phylum	**Branch**	**Language**			
Niger-Congo	Mande	Vai		**ke**	nde
		Mende		**kɛ**	ti
	Atlantic	Fulfulde	ga	**w**	ri
		Konyagi		**ko**	mbo
	Adamawa	Longuda		**kwa**	nla
		Waka		**kɔ**	ŋ
	Kwa	Krobo	ko	**ko**	
	Benue-Congo	Akpa	i	**kwù**	
		Iceve	ì-	**kù**	lé
		Igala	ó	**ko**	lì
		Igbo	o	**kì**	lì
Nilo-Saharan	Songhay	Songhay		**hà**	mà
	Saharan	Kanuri	ngà	**wú**	lì
Afroasiatic	Central	Kamwe		**xà**	
		Bole		**ku**	té
		Dera		**kú**	rè
	West	Mwaghavul		**kà**	s

Source: adapted from Burkill (1994:348 ff.) and personal research

The syllables in bold in Column 2 indicate the cognate element in the cited forms. Some Niger-Congo families, such as Ijoid and Kru, are not represented because they are confined to the humid zone where sorghum does not grow. The evidence seems to be that the underlying form is widespread, much-compounded and ancient, but also much-borrowed between phyla and families, suggesting that sorghum cultivation spread well after the establishment of the main linguistic groups in West Africa.

Philippson & Bahuchet (1996:103 ff.) discuss the terms for sorghum in Bantu languages. In much of East Africa, the common term for bulrush millet, ***-bele**, seems to have been transferred to sorghum. This implies that sorghum came well after millet was established as a cultigen. Bulrush millet was probably the cereal of the Cushitic speakers who occupied much of East Africa prior to the eruption of the Bantu into the region. Indeed, the Bantu term looks as if it is borrowed from Southern Cushitic (eg Iraqw *balaangw* 'millet' (Mous & Kießling 2004)) or indeed the Eastern Cushitic words associated with cultivation (eg Proto-Sam **bèer* 'garden' (Heine 1978: 46, 54)). To complicate matters still further, many sorghum terms are now applied to maize, which it has replaced widely as a staple.

*Finger-millet, ragi (*Eleusine coracana*)*

Finger-millet gains its name from the head of the plant which bears some resemblance to a splayed hand. Today it is primarily grown in most regions of Eastern and Southern Africa to make beer, although it probably played a greater role as a staple in the period before the introduction of maize. The exact area of domestication of finger-millet has remained controversial. Because it shows the greatest varietal diversity in India, earlier sources suggested a homeland there. Portères (1951, 1958) inclined to an African origin on the basis of a study of terms in African languages and more recent genetic work has generally supported this view (Hilu et al. 1979). Most authors have wanted to assign very old dates to finger-millet domestication, despite the sparse archaeobotanical material. Indeed, archaeobotanical records are so far very recent. Boardman (1999 quoted in Barnett 1999) records a first millennium AD find of finger-millet near Aksum in Ethiopia. In south-eastern Africa, there is a record of cultivated finger-millet at Inyanga, in modern-day Zimbabwe, where carbonised seeds are associated with late Iron Age pottery (Summers 1958). Finger-millet presumably spread westwards across the centre of the continent in quite recent times, since its western limit is in Central Nigeria.

From the point of view of linguistics, finger-millet seems to be old in Ethiopia and Eastern and Southern Africa, but is clearly recent in West Africa. Hausa *támbàà* has been borrowed into many languages of Central Nigeria. In Ethiopia, Ehret (1979: 172) notes that Amharic *dagussa*, ዳጉሳ, is borrowed from the Agaw languages, suggesting domestication prior to the intrusion of Ethiosemitic. Table 19.7 shows a cognate term recorded in a wide swathe of Eastern Africa[8]. The original shape of this word seems to have been something like #*mugimbi*, whence it was also borrowed into Nilotic languages with a loss of the prefix and devoicing of the first consonant.

[8] This is more widespread than indicated in Philippson & Bahuchet (1996: Fig. 4).

Table 19.7. Cognate terms for finger-millet in East African languages

Phylum	Branch	Language	Attestation	Gloss
Niger-Congo	Bantu	Swahili	**(m)wimbi**	
		Embu	**ugimbi**	
		Kikuyu	**ugimbi**	
		Chonyi	**wimbi**	
		Sangu	**uwugimbi**	beer
		Sena	**mulimbi**	
		Shona	**mbimbimbi**	bumper crop of finger-millet
Nilo-Saharan	Nilotic	Maa	**oloikimbi**	

Sources: compiled from Maundu (1999) and FAO (1988)

Another East African cognate term, **-degı*, occurs east of the Great Lakes[9] (Philippson & Bahuchet 1996: Fig. 4). The Southern Cushitic languages have a quite different name, *******basoróo* (Mous & Kießling 2004), suggesting that they were not the source of the finger-millet grown by Bantu-speakers.

*Wheat, soft wheat (*Triticum vulgare*); durum wheat, hard wheat (*Triticum durum*)*

Wheat is not indigenous to sub-Saharan Africa, although it has long been grown in North Africa. Soft wheat is the main *Triticum* sp. grown in the oases of the Sahara and along its southern margins, from Mauritania to Sudan, as well as in parts of Ethiopia (Chevalier 1932:75). Wild wheats grow throughout the Near East, and are still relatively common today. Wheat grains occur in tombs in Egypt throughout the dynastic period (Darby *et al.* 1977, II: 486). Although the wheats are one of the most common cereals at the oases of the Sahara (Gast 2000), they are only sparsely cultivated further south. El-Bekri, writing in 1067, mentions wheat at Awdaghost and Ibn Baṭṭuṭa recorded it at Takedda in the Sahara in the 14th century (Lewicki 1974).

Hard wheat was probably developed relatively recently from emmer wheat, *Triticum dicoccum*, as there is sparse evidence for its presence in the Mediterranean in classical times. The first Egyptian materials date from the Ptolemaic period (Germer 1985:212). Hard wheat was the principal type grown in the Maghreb by both Arabs and Berbers. Its origin is placed in the region between northern Ethiopia and the eastern Mediterranean basin (Watson

[9] Previous speculation that might be connected to the Indian name *ragi* is almost certainly false as this term has a good Dravidian etymology (Dorian Fuller p.c.)

1983:20). The linguistic evidence for wheat suggests that everywhere in sub-Saharan Africa except Ethiopia, wheat is a medieval introduction and names in African languages are borrowed from the Arabic, *al qamh*, usually with the article incorporated (eg Hausa *álkámà*). Taxonomically, it is now accepted that the Ethiopian wheats, *Triticum aethiopicum* Jakubz. are a distinct species and this is supported by the linguistic evidence (Barnett 1999). There is a widespread cognate term in Ethiopian languages, which is not adapted from Arabic, with the exception of Oromo (Table 19.8).

Table 19.8. #s-n-d, a cognate term for wheat in Ethiopian languages

Phylum	Branch	Language	Attestation	Gloss/comment
Afroasiatic	Semitic	Amharic	**sənde, ስንዴ**	
	Cushitic	Oromo	**qamadii**	<Arabic
		Somali	**sarreen**	
		Saho	**sirrey**	
		Beja	**seram/shinray**	
		Sidamo	**sinde**	
		Agaw	**səndayi**	
	Omotic	Wolayta	**sindiya**	<Amharic

Sources: **c**ompiled from Lamberti & Sottile (1997), Hudson (1989)

The embedding of the #s-n-d cognate term in Cushitic languages strongly supports the independent domestication of wheat in Ethiopia in the pre-Semitic era.

AGRICULTURAL TOOLS

Despite their importance, historical linguists have so far ventured very few reconstructions of African agricultural tools. Indeed, the mapping of existing African agricultural tools and their associated terminology is still in its infancy. There are, however, a variety of ethnological descriptions and overviews which would form useful background material for this enterprise. The German ethnologists took considerable interest in this topic and Baumann (1944) published a very detailed description of the morphology and distribution of farmers' tools. Some of the descriptions signalled in Raulin (1984) point to the importance of this

technique[10]. For example, the sickle used for harvesting cereals is quite a recent introduction in West Africa, although not of European origin (cf. Raynaut 1984 esp. p. 530 ff.). In many Nigerian languages, the term is borrowed from the Hausa *lauje* and it seems likely to have been spread by the Hausa people, based on a North African model. Two edited volumes provide rich material as yet unmined by archaeologists (Seignobos 1984; Seignobos et al. 2000). Blench (in press b) presents a new overview of African agricultural tools, incorporating recent archaeological finds.

One database that can be exploited for evidence of the antiquity of agriculture is Bantu Lexical Reconstructions (BLR)[11]. This database lists forms that have been reconstructed in different regions of the Bantu zone, stretching from Cameroun to South African and the Kenya coast. Table 19.9 shows all the proto-forms in the database relating to agricultural tools as well as the zones where they occur. Figure 19.2 shows the location of traditional Bantu zones used by BLR to define the distribution of cognate terms.

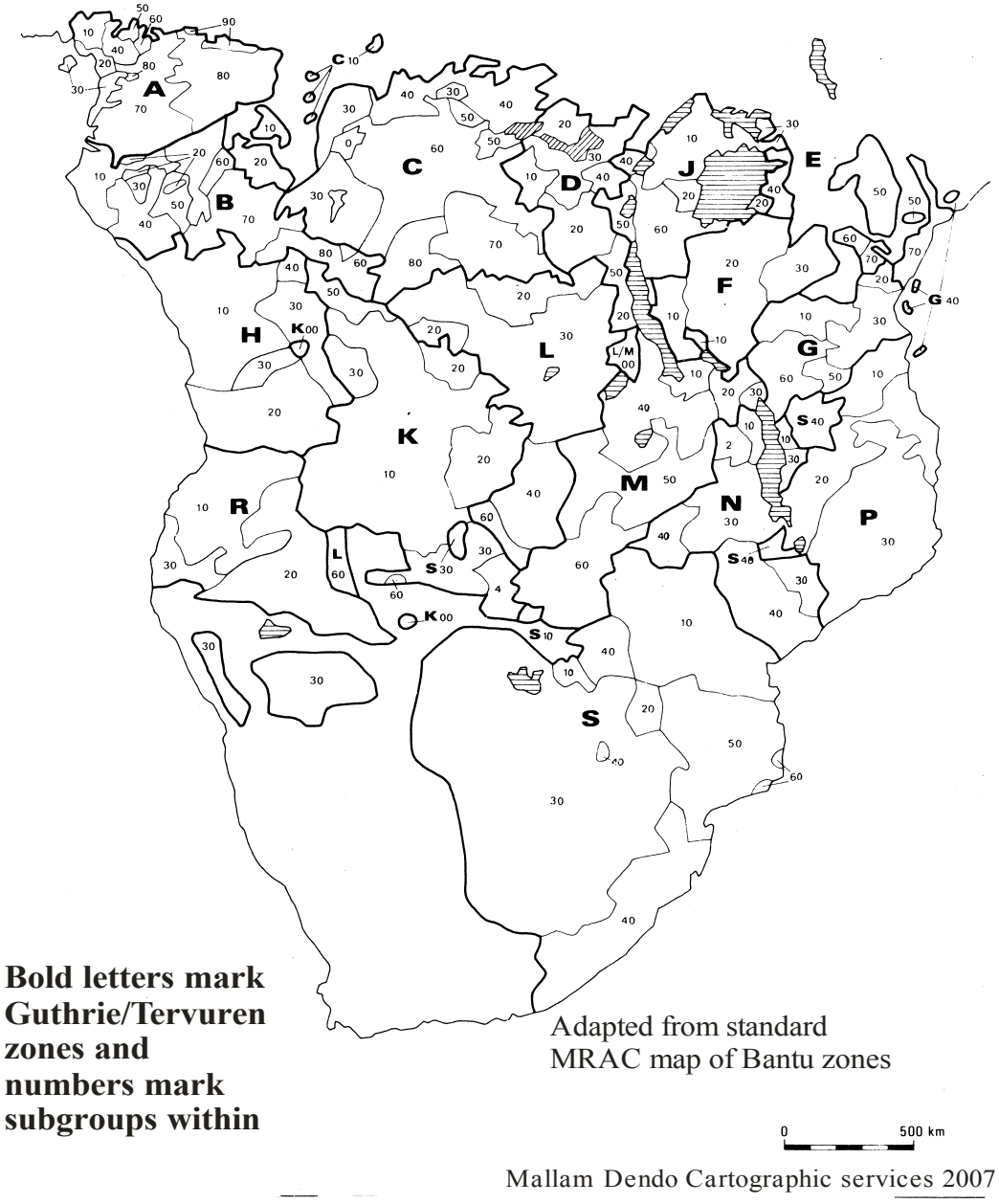
[10] Like so much in the field of material culture, documentation is urgently required, as factory-made tools and tractors are replacing traditional cultivation techniques.
[11] BLR3, the third edition, is at http://linguistics.africamuseum.be/BLR3.html

Table 19.9. Bantu reconstructions for tools implying agriculture

Root	Gloss	*form	Zones	Regions
I	hoe, axe	**bàgò**	A J P	NW NE SE
		bògà	A B	NW
II	hoe	**cúkà**	C F G J L M S	NW C NE SE
		kácù	D K L M	NC
		púkà	A J	NW, NC
III	cultivate (especially with hoe)	**dìm**	B C E F G J K L M N P R S	Throughout
	cultivated field	**dìmì**	J L M	NC
	field sp.	**dìmìdò**	J	NC
	cultivated field	**dìma**	J S	NC
	field sp.	**dìmé**	J L M	NC
	farmer	**dìmì**	J L	NC
	work	**dìmò**	C F G H J K L M N S	Throughout
IV	hoe; axe; spear-head; knife	**gèmbè**	C D E F G J M P	NW C NE SE
	shave; cut hair	**gèmb**	J	NC
	razor	**gèmbè**	D F J L	NE
	axe; hoe	**dèmbè**	S	
	axe; hoe	**jèmbè**	E G L M N S	

Source: Bantu Lexical Reconstructions 3 (BLR3)

Figure 19.2. Location of Bantu language zones



The complex of terms around farming and cultivation, attested in A and B groups close to the Bantu homeland, argues fairly convincingly that the proto-Bantu had some form of agriculture. Indeed, recent excavations in Southern Cameroun, the putative Bantu homeland, have uncovered both macro remains of savanna crops and an apparent knife and hoe-blade (Eggert et al. 2006). It is intriguing that there is an overlap of words for 'hoe', 'axe' and razor', especially partway through the Bantu expansion (C group onwards). This might reflect

the period of the introduction of iron tools, when they would have been rare and expensive and possibly there was a tendency to call them by the same name, a type of polysemy that is uncommon in the present.

Ethiopia, as so often, seems to have quite a different history from elsewhere. The plough, an implement characteristic of Ethiopia, seems to be have been introduced by the Amhara. The Amharic term for plough, *maräša*, ማረሻ, has been borrowed into all the main languages of Ethiopia. Even where this term is not used, the local terms turn out to be constructs ('hoe of cow' etc.) which indicate the recent adoption of the plough. Barnett (1999:24) canvasses ideas of introductions from Arabia or Egypt 3-4000 BP, but the linguistic evidence suggests a more recent date. Neither the design of the Ethiopian plough nor its name points to external origin and it is quite likely that it was constructed locally through stimulus diffusion, ie, after seeing a plough elsewhere and designing it for local conditions.

DOMESTIC ANIMALS

This section gives examples of three species of livestock, the camel, the sheep and the chicken for which the archaeological record is patchy and for which linguistics can make a significant contribution to hypotheses concerning their introduction and spread in sub-Saharan Africa.

The camel

Camels are spread through much of the desert regions of Africa from Senegambia to the Horn of Africa. They are the typical transport animal of Saharan caravans, but are also increasingly used for agricultural work in sub-Saharan agricultural villages. The one-humped dromedary is originally an Asian domesticate (Epstein 1971; Wilson 1984), although wild camels were known in North Africa in the Pleistocene. Camels were re-introduced from Arabia in the Graeco-Roman period (Bulliet 1990), although occasional representations suggest that the camel was brought to Egypt as an exotic significantly earlier (Brewer *et al.* 1994:104). Finds of camel-hair and ceramic models of camels confirm that camels were kept sporadically in Egypt, but the introduction of the camel in large numbers may be associated with the Assyrians (ca. 500 BC).

In the case of sub-Saharan West Africa, the camel is almost certainly more recent. Bones dating to between 250 and 400 AD have been found in the Middle Senegal Valley and bones and camel dung have been identified at Qasr Ibrim, in Egypt in the early first millennium BC (MacDonald and MacDonald 2000). Linguistic evidence for the camel in West Africa is reviewed in Blench (1995, 2000). In West-Central Africa, there are two sources of words for camel, loans from Berber and from Fulfulde. Versions of Berber **lɣm* are common from Northern Nigeria to Chad. Skinner (1977:179 ff.) discusses the history of the **lɣm* consonantal root, which was probably borrowed from Arabic *gml* (also borrowed into English) and the Fulfulde term is probably another version of the same root, also adapting Arabic *al-gml*.

More problematic is the antiquity of the camel in the Horn of Africa. Archaeological finds of camel materials from this area are summarised in Esser & Esser (1982) and Banti (1993). These authors have argued for a separate domestication in the Horn of Africa, from translocated wild camels of the Arabian peninsula. There are several studies of the linguistic evidence and terminology in the Horn of Africa (Heine 1978; Bechhaus-Gerst 1991/2). Heine (1981) points to the regular reconstruction of terms connected with camel production, for example the word for 'camel-bell' in proto-Sam, ie Somali-Boni-Rendille (Table 19.10).

Table 19.10. Reconstructed items in proto-Sam showing the antiquity of camel pastoralism

Proto-Sam	Gloss
***gaal**	camel
***áùr**	male camel
***hal**	female camel
***ìrbáàn**	milking camel
***qáálìm**	young male camel
***qààlím**	young female camel
***wàdáám**	skin watering bucket
***kor**	camel-bell

Source: Heine (1981)

The camel could therefore have spread across from Arabia in 'pre-Arabic' times and thence up the Red Sea coast to Egypt and North Africa, as well as down the Somali coast and inland

to Lake Turkana. The camel is little-known on the Ethiopian Plateau and terms in Cushitic and Omotic languages are loanwords from Oromo.

Sheep

All African sheep ultimately come from outside the continent and all sheep derive from two maternal lines in Central Asia (Hiendleder *et al.* 1998). African sheep can be divided into four main types; thin-tailed hair and wool sheep, fat-tailed and fat-rumped sheep (Blench 1993). Wool sheep are only found on the edge of the desert in Mali and Sudan and are probably marginal and late introductions, but hair sheep have a long and complex history in the sub-Saharan region. In Africa, they first occur as domesticates in the eastern Sahara at 7000 BP and at Haua Fteah in North Africa at 6800 BP (Gautier 1981:336). Muzzolini (1990) reviewed the evidence for sheep in Saharan rock art and his revision of the chronology, placing the first appearance of sheep rather later, at 6000 BP, seems generally accepted. Unfortunately, it is impossible to distinguish sheep and goat bones in most sub-Saharan sites and they are therefore listed together as ovicaprines, despite the two species having rather different histories. Table 19.11 shows selected dates for sub-Saharan African ovicaprines. The complex history of sheep is shown by a widespread and apparently ancient form, *#t-m-k*, which occurs in Afroasiatic, Saharan, and Niger-Congo languages (Table 19.12).

Table 19.11. Selected dates for sub-Saharan African ovicaprines

Region	Location	Site	Date*
Sahara	Air Massif	Adrar Bous	5000-3350 BC
Sahara	Niger	Arlit	4300-3700 BC
West Africa	Mali	Winde Koroji West	2200-950 BC
West Africa	Mali	Kolima Sud	1400-800 BC
West Africa	Nigeria	Gajiganna	1520-810 BC
Horn of Africa	Ethiopia	Lake Besaka	~1500 BC
East Africa	Kenya	GaJi 4	~2000 BC
East Africa	Kenya	Ngamuriak	1000 BC – 0 AD
Southern Africa	Namibia	Falls rockshelter°	190 BC -383 AD
Southern Africa	South Africa	Ma38	2-300 AD

*All dates normalised to a standard format °Known to be sheep
Sources: adapted from Macdonald & Macdonald (2000), Marshall (2000), Smith (2000)

Table 19.12. The #*t-m-(k)* cognate term for 'sheep' across Africa

Phylum	Family	Branch	Language	Attestation	Gloss
Afroasiatic	Cushitic	East	Oromo	**tumaamaa**	castrate
	Chadic	West	Hausa	**túnkìyáá** *pl.* **túmáákíí**	sheep
		Central	Bade	**taaman, təmakun**	sheep
			Higi of Kiria	**tɪmbəkə**	sheep
			Tpala	**tə̀mâk**	sheep
		Masa	Masa	**dímíína**	sheep
		East	Mubi	**túmák**	sheep
			Kera	**taaməgá**	sheep
	Berber		Wargla	**adəmmam**	hair sheep
Nilo-Saharan	C. Sudanic	Moru-Madi	Moru	**temélé**	sheep
	Kadu	Eastern	Krongo	**ḍéémà**	female goat
	Saharan		Kanuri	**táma**	female lamb
			Berti	**tami**	lamb
Niger-Congo	Benue-Congo	Nupoid	Ebira Okene	**atɛ́mɛ́**	ewe
	Gur		Kirma	**tumaŋo**	sheep

Source: expanded from Blench (1999)

The linguistic evidence is consistent with the introduction of the sheep some six thousand years ago, probably by Berber populations (Blench 2001). The similarities of names right across the Sahel suggests that the introduction was via a single ethnic group with a common name for sheep. This term would have gradually spread further south, passing from Afroasiatic and Nilo-Saharan into Niger-Congo.

A quite different term, #**ku**, is reconstructible for Central Khoesan, and this almost certainly is to be correlated with the early dates for sheep in Namibia. Table 19.13 shows the terms for 'cattle' and 'sheep' recorded by Voßen (1996) in Central Khoesan.

Table 19.13. Livestock terms in Central Khoesan

Group	Language	Cow	Sheep
Khoekoe	Nama	**koma**	**ku**
Khoe	//Ani	**góɛ̀**	**gû**
Naro	Naro	**góè**	**gǔ**
//Ana	/Ui	**gúè**	**gǔ**
Shua	Cara	**bé**	**gù**
Tshwa	Kua	**dzú bé**	—

Source: adapted from Voßen (1996)

All the terms for 'sheep' are cognate with one another, while there are three distinct forms for the names of 'cattle'. Central Khoesan speakers thus had sheep but not cattle when these languages began to diversify, but they acquired (or experienced) cattle after their major division into subgroups. Smith (2000:226) tabulates the archaeozoological materials from Southern Africa and sheep probably reached this region ca. 2200 BP. Dates for cattle are consistently later, beginning around the third century AD with Lotshitshi in Botswana (Smith 2000:225). The sheep kept by Khoe peoples were the fat-tailed race, better-known from Arabia and NE Africa. This links with the idea that these sheep were in the possession of Cushitic speakers practising pastoralism in what would today be Zambia more than 2000 years ago, and that it was there they encountered Khoe speakers and both the animals themselves and the practice of shepherding were transferred. Sadr (2003) has reviewed the evidence for sheep in Southern Africa in both rock-paintings and excavated sites; he establishes clearly that both sheep and pottery reached the Khoe prior to the incursions of Bantu-speakers in the area.

Chickens

Chickens are by the far the most important poultry species in Africa, both numerically and in terms of social and economic significance. Despite this, the chicken is an exotic import of relatively recent date. Macdonald & Macdonald (2000), Williamson (2000) and Blench and MacDonald (2001) examine the history of the chicken in Africa in greater detail. In a pioneering study, Johnston (1886) used the names of the chicken in Bantu languages to show that chicken *cannot* be reconstructed to proto-Bantu because of its irregular reflexes. He considered it likely that the chicken was introduced into the Bantu area from the east.

Fumihito *et al.* (1994) argued from mtDNA analysis that the chicken was domesticated just once from the races of jungle-fowl found in northern Thailand. This could be seen to fit with the archaeological data presented in West & Zhou (1988) for domestic chickens in China as early as 6000 BC. However, more recent analyses (Han Jian-Lin pers. comm.) have revealed a more complex story. Not only were chickens domesticated twice, once in the region of SW China/Thailand and once in NE India, but there has been regular introgression from wild jungle-fowl, *Gallus* sp. The pattern of mtDNA for African chickens suggests at least three distinct introductions; across the Sahara from the Maghreb, to the Horn of Africa and the Kenya coast from India, and a direct introduction on the East African coast of fighting breeds from insular SE Asia.

The documented spread of the chicken is from China across Central Asia, north of India proper, arriving in Europe by 3000 BC. A much-reproduced painted limestone ostracon from the tomb of Tutankhamun clearly illustrates a cock and several other images suggest the occasional presence of fowl as exotics in Egypt during the New Kingdom (c.1425-1123 BC) (Darby *et al.* 1977, I:297 ff.). However, there is no further evidence in the graphic record until ca. 650 BC after which they are shown in abundance (Coltherd 1966).

Osteological evidence for chicken in sub-Saharan Africa is becoming more common, but is still too sparse to be effectively linked to the mtDNA evidence. Chami (2001) has reported chicken bones from a Neolithic context on Zanzibar, dated to ca. 800 BC, although clear differentiation from wild fowl species is lacking. After this, most finds are from the mid-first millennium AD, with records from Mali (MacDonald 1992), Nubia (MacDonald and Edwards 1993) and South Africa (Plug 1996) all dating to this period. Many African languages have onomatopoeic words for chicken, usually based on the cry of the cock. Williamson (2000) identifies a number of cognate forms that suggest some of the complexities of the introduction and diffusion of the chicken suggested by the DNA evidence. But one extremely widespread cognate term, *#taxV-*, appears to plot the spread of the chicken from its original zone of domestication to the heart of Central Africa. A series of very similar terms forms a chain from Korea across Central Asia to the Near East, North Africa and south to Lake Chad (Table 19.14). This suggests that the chicken not only diffused westward from China as far as Central Africa, but it did so *after* the principal language phyla were established.

Table 19.14. A Eurasian and African cognate term for 'chicken'

Phylum	Branch	Language	Attestation	Gloss
Daic	Kadai	Hlai (Li)	**kʰai**	
	Kam-Sui	Dong	**aai**	
		Maonan	**kaai**	
	Tai	Lü (Xishuang Banna)	**kai**	
Miao-Yao	Miao	Laka (Lajia)	**kai**	
	Yao	Mien	**čai**	
Koreanic	Korean	Korean	**ta(r)k**	
Altaic	Mongolic	Buryat	**taxyaa**	
	Tungusic	Manchu	**coko**	
		Hezhen Nanai	**töqo**	
	Turkic	Chuvash	**chax**	hen
		Uyghur	**toxu**	
		Kazakh	**tawɪq**	
Sino-Tibetan	Trung	Nu-jiang	**dɑŋ^{31}gu^{55}**	cock
		Rawang	**tanggu**	cock
Indo-European	Iranian	Sarikoli	**tuxi**	
		Russian	**petux**	
Afroasiatic				
Chadic	Bura-Higi	Bura	**mtəka, təkaʸ**	
		Kyibaku	**ntɬika**	
		Njanyi	**ɗeke**	
	Wandala-Mafa	Dghweɗe	**ɣatukulu**	
		Sukur	**takur**	
	Masa	Masa	**ɬek-ŋa**	cock
	East Chadic	Mubi	**dìik pl. dàyàkà**	cock
Semitic	Arabic	Classical Arabic	**diik**	cock
	Ethio-Semitic	Harari	**atäwaaq**	
Berber		Awjila	**tẹkaʒẹ̣t**	
		Tamesgrest	**tekəʒʒit**	
		Tafaghist	**tekəʒit**	
Niger-Congo				
Mande		Ligbi	**tùgɔ́**	
Atlantic		Temne	**atɔkɔ**	
East Kainji		Jere	**bètókóró**	

Source: African language entries from Williamson (2000), Asian data from Reinhold Hahn (pers. comm.)

The astonishing conservatism that permitted a cognate term of the same shape to be retained across as much as 8000 years and virtually the whole of the Old World must say something

about the economic importance and visual salience of the chicken. Only the dog, which has Eurasian-African #kon-, with a similar distribution and probably even greater antiquity, parallels the importance of the domestic fowl (Sasse 1993).

TREES

Introduction

The reconstruction of tree names is more problematic than either crops or livestock. No terms for tree species in Africa have been reconstructed for the proto-language of any African phylum. This may reflect defective datasets but this is unlikely in the case of more common species, which are precisely those we would expect to reconstruct. The issue is probably rather different. With such a wealth of species to choose from, only those of marked and widespread economic importance are likely to show up in the linguistic record. Even there, the significance of a particular species can fade in and out. For example, the shea tree is a key species for oil production in much of West Africa proper. However, it occurs as far east as Uganda, but is of little or no economic significance from the centre of Chad eastwards (Hall *et al.* 1996). The merula, *Schlerocarya birrea*, is an important species for beer-making in Eastern and Southern Africa but of little account in West Africa, despite being present throughout the region. Bostoen (in press) discusses reconstructions for several economic tree species in the Bantu languages. Only where a tree becomes of significant economic importance over a wide area do vernacular names show widespread distributions. As a consequence, the names of these trees are cognate across patches of Africa where they are salient in the culture, rather than where they are present.

In the case of trees, the archaeobotany of West Africa is in flux. Reviews from the early 1990s, such as Stahl (1993), report species that tend to leave instantly identifiable macro-remains, typically; oil palm (*Elaeis guineensis*), bush-candle (*Canarium schweinfurthii*) and nettle tree (*Celtis integrifolia*). More focused archaeobotany and better sieving techniques have begun to produce traces of a much wider range of species, far more consonant with the picture derived from current ethnobotany (Kahlheber ined.).

Long-distance trade does not exist in isolation; it acts as a transmission route for the ideologies of the traders. This is particularly true in those parts of Africa where trade was largely in the hands of Islamic merchants. Many economic trees and crops have been spread along these routes. The lexical evidence testifies that dominant trade languages such as Hausa, Kanuri, Songhay, Chadian Arabic and Swahili diffused new plants to remote areas (eg Blench 1998; Blench *et al.* 1997). This worked in several ways; either a plant could be directly transmitted through the sale of the fruit, or an idea about its use spread through the market. For example, the baobab is indigenous to Africa, as the reconstructibility of a name for the tree itself in some Niger-Congo languages testifies. However, the idea of collecting, drying and crushing the leaves as a soup ingredient is definitely attributable to the Hausa people of Northern Nigeria and thus the Hausa name, *kúúkà*, is widely spread applied to the leaves (Burkill 1985:270 ff.). In some languages, the Hausa name has actually displaced the original name for the tree itself. This use of the leaves for soup has increased the salience of baobabs in many communities and led village communities to encourage protection of the tree.

Apart from the broad sweep of history, tree salience undergoes considerable local micro-variation, related to the interplay of economics and cultural patterns. Neumann *et al.* (1998:60) report a testa of shea from the medieval village of Saouga and note that shea-butter production was recorded by Ibn Baṭṭuṭa in the 14th century. Despite the present-day economic importance of shea, it may be that techniques for processing their fruits only spread during the last millennium. The shea, for example, demands considerable investment in ovens and thus in firewood collection etc. This is probably only worthwhile when a market opens up and processing can be conducted during the dry season. This may in turn be connected with the opening up of long-distance trade routes. Thus the shea tree, once predominant as the oil-crop of the savanna, has retreated significantly in many regions where the cultivation of groundnut has spread[12]. Once people are no longer willing to process the shea-nut, the reasons for protecting the tree itself disappear and its virtue as a wood for carving mortars becomes more apparent.

This section provides samples of reconstructions of two tree species where it is possible to compare the data with an expanded archaeobotanical database (D'Andrea et al. 2006;

[12] Shea production has recently increased again in parts of West Africa due to new demand from cosmetics companies

Kahlheber ined.). But this barely touches on the material available; the compilation and analysis of vernacular names for trees, with over ten thousand species in sub-Saharan Africa, remains a daunting task.

Oil-palm (*Elaeis guineensis*)

The oil-palm, *Elaeis guineensis*, remains today the most significant oil-crop indigenous to Africa, even if Malaysia has taken over in world production statistics in recent years[13]. Archaeobotanical finds of palm-nut husks occur from Liberia to Kenya and also in the Sudan (Stahl 1993; D'Andrea et al. 2006). Although the oil-palm is present on the Kenya coast it is not considered of any economic importance in this region (Maundu 1999). Oil-palms were not cultivated until recently, but protected and allowed to spread by preferential extraction of nearby trees and in many places the West African humid forest now consists of degraded oil-palm forest with only a few other scattered species (Beier et al. 2002). Palynological data on *Elaeis* pollen exists for Lake Bosumtwi in Ghana (Talbot *et al.* 1984:185) suggest an expansion of oil-palm at 3500-3000 BP and in the Niger Delta at ca. 2800 BP (Ṣowunmi 1999). Whether this can be described as the 'beginnings of agriculture' is dubious, but these findings *may* point to a more intensive local use of the oil-palm and also forest clearance for agriculture, since oil-palm is a typical edge-of-clearing species. Even this has been questioned; Maley (2001) considers the results from palynology simply as evidence for oil-palm as a pioneer species in natural forest succession stages. Whatever the interpretation, the linguistic evidence *does* point to increased use along the West African coast. Connell (1998) analysed terms for oil-palm and the nomenclature of processing in the Cross River languages in SE Nigeria and showed that speakers of Delta-Cross, a hypothetical proto-language spoken in SE Nigeria some 3-4000 years ago, were making use of the oil-palm. Bostoen (2005) notes that there are two terms for oil-palm in proto-Bantu, *-*bídà* for the tree, and *-*téndé* for the young tree, both of which have cognates beyond Bantu, pointing to an early awareness of the use of the tree. A further term, *-gàdí, 'palm-oil', appears to be confined to Bantu. At least one cognate term is widespread in what is now Nigeria and Cameroun (Table 19.15).

[13] Even, regrettably, exporting back to Nigeria palm-oil derived from parent material originally brought to Malaysia from Nigeria.

Table 19.15. A cognate term for 'oil-palm' in West African languages

Branch	Group	Language	Vernacular name
Yoruboid		Yoruba	**ẹ̀rẹ̀n ọ̀pẹ̀**
Edoid		Aoma	**údi**
		Degema	**ìdĩ**
		Ẹdo	**udin**
Nupoid		Gbari	**èzín**
Idomoid		Idoma	**alĭ**
		Yala	**ali**
Plateau		Koro	**ɛrɛ**
		Ninzo	**iri**
Cross River	Central Delta	Abua	**àlhè**
	Upper Cross	Akpet	**uri**
		Kukele	**ùddì**
		Legbo	**èlì**
		Iyongiyong	**dòré**
Tivoid		Iceve	**ò-vílè**
Bantu		Bafok	**elen**
		Nkosi	**melen**
Ijoid		Kolokuma	**lĭị**

Source: Burkill (1997:354 ff.) and personal field data

This cognate term is common to the Benue-Congo languages and to Ịjọ, suggesting that the perceived salience of the oil-palm began in the southern humid forests, perhaps the Niger Delta, and spread outwards from there, probably at a time when the upper limit of the forest was north of its present location.

African mahogany (*Khaya senegalensis*)

A tree nowadays important in West Africa as a timber tree, the African mahogany, must have gained regional importance several thousand years ago, presumably for its medicinal properties. The oil made from its seeds is highly valued and it is often planted around villages as a shade tree. There is a common base term #-*ko*- which has an intriguing disjunct distribution, occurring in the Gur languages in Ghana and Burkina Faso as well as in North-Central Nigeria. This points strongly to contract between these groups, rather than a reconstructible linguistic root with a great time depth and supports the hypothesis that Northern Nigeria was formerly occupied by Gur speakers, who were displaced by the Hausa expansion. Table 19.16 shows this form, as well as cognates in both Chadic and Nilo-Saharan languages, with an –m suffix that must have been added at the time of borrowing.

Table 19.16. A cognate term for mahogany in West African languages

Phylum	Branch	Group	Language	Vernacular name
Niger-Congo	Benue-Congo	Plateau	Berom	**cǒ**
			Iten	**ɛho**
			Izere	**kakó**
			Tarok	**ìkò**
		Dakoid	Samba Daka	**nəkum**
	Gur		Gurma	**koka**
			Moore	**koka**
			Dagaari	**ko**
			Tayari	**kogbu**
Afroasiatic	Chadic	West	Nimbia	**ágo**
			Miya	**kwə̀m**
Nilo-Saharan	Saharan		Kanuri	**káàm**

CONCLUSIONS

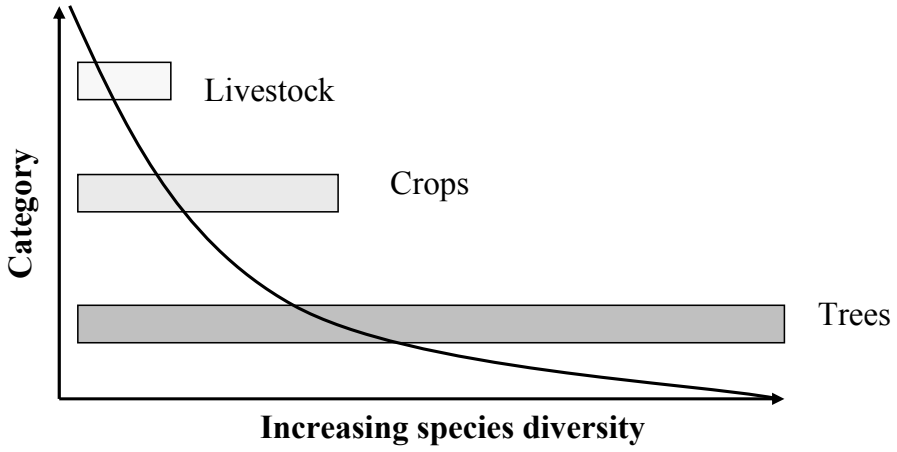
This exploration of the potential for the linguistic reconstruction of names and terms relevant to African agriculture illustrates their variability from species to species. In the case of crops, one explanation may be that a related wild form exists for all the major African cultigens that is still exploited for food. Indeed, the outcrossing of yams, the major cereals, pulses and some leafy vegetables with wild and escaped forms is a major problem for plant breeding. As a consequence, the transition between gathering or transplanting uses and cultivation proper is seamless from the terminological point of view. There was little need to adopt or invent a new term to describe an already familiar plant. Linguistic innovations only occurred when technologies began to develop that were related to cultivation and were distinct from wild gathering strategies. Bruce Connell (1998) has considered this issue in relation to oil-palm use in SE Nigeria. While basic terms for ‘oil-palm’ reconstruct to a deep level in West African languages, terms associated with its processing have a much shallower time-depth. The palm-nut is partially edible straight from the tree and this must have been known for millennia; pounding, boiling and skimming is almost certainly much more recent.

The contrast with domestic animals is evident; none of Africa’s domestic animals are indigenous to the continent except the donkey and the guinea-fowl. New terms to refer to

introduced species such as cattle, sheep and goats are recorded in Niger-Congo and Afroasiatic to high levels of reconstructibility (Blench 2006). Unlike cereals and other domestic plants, livestock are older and are apparently more linguistically stable; it is certainly tempting to reconstruct them in advance of local-level reconstructions. Species such as the chicken, introduced >3000 years ago, have created a complex trail of loanwords that clearly indicate the routes whereby it entered and diffused across the continent. In the case of domestic animals, published DNA analyses for many species make it possible to correlate evidence from three distinct sources.

This paper has focused on cases where common lexical roots are clearly indicative of the salience of a plant or animal species in a particular region. The evidence for crops, livestock and trees suggest a gradient of salience; the more salient a particular species is, the greater the likelihood that widespread cognate terms can be identified. This is in turn connected with the biological diversity with a particular category. Thus, livestock are the most restricted, with less than dozen domestic animals in use in sub-Saharan Africa. Names for these species are widespread and very conservative. Crops, where there are perhaps a hundred cultigens across the continent exhibit a sort of median level of reconstructibility, with a few relatively salient species. Trees, with as many as ten thousand species, provide a wealth of choice and speakers are only likely to identify a very few as of sufficient importance to be borrowed and inherited between languages as they diversify. This gradient is represented graphically as in Figure 19.3.

Figure 19.3. Species diversity and reconstruction potential in African languages



Comparative and historical linguistics remains a mine of little-exploited data. Linguists are not always very accurate in defining technical terms and are prone to ignore history, often through ignorance of archaeoscientific data. Archaeologists are often not willing to engage with linguistic data, perhaps due to its surface complexity. But with a topic as important as the origins of agriculture, the opportunities for an interdisciplinary enterprise should be seized.

REFERENCES

Banti, G (1993) 'Ancora sull'origine del cammello nel Corno d'Africa: osservazioni di un linguista', in Belardi, A (ed), *Ethno, Lingua e Cultura*, pp 183-223. Roma: Calamo

Barnett, T (1999) *The Emergence of Food Production in Ethiopia*, BAR International Series 763. Oxford: Archaeopress

Baumann, H (1944) 'Zur morphologie des afrikanischen ackergerätes', in H. Baumann (ed), *Koloniale Völkerkunde,* pp 192-322. N-D.: Ferdinand Berger Horn

Bechhaus-Gerst, M (1991/2) 'The beja and the camel. Camel-related lexicon in *tu-beêauwiɛ*', *SUGIA* 12/13: 41-62

Beier, P, Van Drielen, M and Kankam, BO (2002) 'Avifaunal collapse in West African forest fragments', *Conservation Biology* 16(4): 1097-1111

Bender, ML (1996) *The Nilo-Saharan Languages: A Comparative Essay,* Munich: Lincom Europa

Blench, RM (1993) 'Ethnographic and linguistic evidence for the prehistory of African ruminant livestock, horses and ponies', in Shaw, T, Sinclair, P, Andah, B and Okpoko, A (eds) *The Archaeology of Africa*. *Food, Metals and Towns,* pp 71-103. London: Routledge

Blench, RM (1995) 'A history of domestic animals in northeastern Nigeria', *Cahiers de Science Humaine* (ORSTOM, Paris) 31(1): 181-238

Blench, RM (1996) 'Linguistic Evidence for Cultivated Plants in the Bantu Borderland', *Azania*, 29/30: 83-102

Blench, RM (1998) 'The diffusion of New World Cultigens in Nigeria', in Chastenet, M (ed) *Plantes et Paysages d'Afrique*, pp 165-210. Paris: Karthala

Blench, RM (1999) 'The languages of Africa: macrophyla proposals and implications for archaeological interpretation', in Blench, RM and Spriggs, M (eds) *Archaeology and Language, IV*, pp 29-47. London: Routledge

Blench, RM (2000) 'Minor livestock species in Africa', in Blench, RM and MacDonald, KC (eds) *The Origin and Development of African Livestock,* pp 314-338. London: University College Press

Blench, RM (2001) 'Types of language spread and their archaeological correlates: the example of Berber', *Origini* XXIII: 169-190

Blench, RM (2002) 'Besprechungsartikel. The classification of Nilo-Saharan', *Afrika und Übersee* 83: 293-307

Blench, RM (2003) 'The movement of cultivated plants between Africa and India in prehistory', in Neumann, K., Butler, A. and Kahlheber, S. (eds) *Food, Fuel and Fields: Progress in African Archaeobotany*, pp 273-292. Köln: Heinrich-Barth-Institut

Blench, RM (2005) 'Fruits and arboriculture in the Indo-Pacific region', *Bulletin of the Indo-Pacific Prehistory Association* 24: 31-50

Blench, RM (2006) *Language, Archaeology, and the African past*, Lanham, MD: Altamira Press

Blench, RM (In press a) 'The intertwined history of the silk-cotton and baobab in West Africa', in Cappers, RTJ (ed) *Proceedings of the 4th International Workshop for African*

Archaeobotany, Groningen 2003. Can be downloaded at http://www.rogerblench.info/Ethnoscience%20data/paper%20Groningen%202003.pdf

Blench, RM (In press b) 'African agricultural tools: implications of synchronic ethnography for agrarian history', in Fuller, D & M Murray (eds) *Proceedings of the 5th International Workshop for African Archaeobotany, London,1-4 July 2006*. London: UCL Press Can be downloaded at http://www.rogerblench.info/Archaeology%20data/IWAA%202006%20paper.pdf

Blench, RM and MacDonald, KC (eds) (2000) *The Origin and Development of African Livestock,* London: University College Press

Blench, RM and MacDonald, KC (2001) 'Domestic fowl', in Kiple, KF and Ornelas, KC (eds) *The Cambridge History of Food, Volume I*, pp 496-499. Cambridge: Cambridge University Press

Blench, RM, Williamson, K and Connell, B (1997) 'The Diffusion of Maize in Nigeria: a Historical and Linguistic Investigation', *Sprache und Geschichte in Afrika* XIV: 19-46

Bostoen, K (2005) 'A diachronic onomasiological approach to early Bantu oil palm vocabulary', *Studies in African Linguistics* 34, 2:143-88

Bostoen, K (in press) 'The subsistence economy of early Bantu speech communities from a historical-linguistic point of view' in Fuller, D & Murray, M (eds) *Proceedings of the 5th International Workshop for African Archaeobotany, London,1-4 July 2006*. London: UCL Press

Bradley, DG, MacHugh, DE, Cunningham, P and Loftus, RT (1996) 'Mitochondrial diversity and the origins of African and European cattle', *Proceedings of the National Academy of Sciences, USA* 93: 5131-5135

Bradley, DG, MacHugh, DE, Loftus, RT, Dow, RS, Hoste, CH and Cunningham, EP (1994) 'Zebu-taurine variation in Y chromosomal DNA: a sensitive assay for genetic introgression in West African trypanotolerant cattle populations', *Animal Genetics* 25: 7-12

Brewer, DJ, Redford, DB and Redford, S (1994) *Domestic Plants and Animals: The Egyptian Origins,* Warminster: Aris and Phillips

Bulliet, RW (1990) *The Camel and the Wheel*, (2nd Edition) New York: Columbia University Press

Burkill, HM (1985) *The Useful Plants of West Tropical Africa, Families A-D*, Kew: Royal Botanic Gardens

Burkill, HM (1994) *The Useful Plants of West Tropical Africa, Families E-I*, Kew: Royal Botanic Gardens

Burkill, HM (1997) *The Useful Plants of West Tropical Africa, Families M-R*, Kew: Royal Botanic Gardens

Chami, FA (2001) 'Chicken Bones from a Neolithic Limestone Cave Site, Zanzibar: Contact between East Africa and Asia', in Chami, F, Pwiti, G and Radimilahy, C (eds) *People, Contacts and the Environment in the African Past*, pp 84-97. Dar es Salaam: DUP

Chevalier, A (1922) 'Les petites céréales', *Revue Internationale d'Agriculture Tropicale et Botanique Appliquée* 2: 544-550

Chevalier, A (1932) 'Les productions végétales du Sahara', *Revue de Botanique Appliquée et d'Agriculture Tropicale* 12*:* 669-924

Clark, JD and Stemler, ABL (1975) 'Early domesticated sorghum from Central Sudan', *Nature* 25(5501): 588-91

Coltherd, JB (1966) 'The domestic fowl in Ancient Egypt', *Ibis* 108: 217-223

Connah, G (1981) *Three Thousand Years in Africa*, Cambridge: Cambridge University Press

Connell, BA (1998) 'Linguistic evidence for the development of yam and palm culture among the Delta Cross River peoples of Southeastern Nigeria', in Blench, RM and Spriggs, M (eds) *Archaeology and Language II*, pp 324-365. London: Routledge

Darby WJ, Ghalioungui, P and Grivetti, L (1977) *The Gift of Osiris*, [2 vols] London/New York/San Francisco: Academic Press

Davis, SD, Heywood, VH and Hamilton AC (1994) *Centres of Plant Diversity: A Guide and Strategy for their Conservation*, Cambridge: IUCN-World Conservation Union and World Wildlife Fund

Eggert, MKH, Höhn, A, Kahlheber, S, Meister, C, Neumann, K & Scheitzer, A (2006) 'Pits, graves and grains: archaeological and archaeobotanical research in Southern Cameroun', *Journal of African Archaeology* 4(2):273-298

Ehret, C (1979) 'On the antiquity of agriculture in Ethiopia', *Journal of African History* 20: 161-177

Epstein, H (1971) *The Origin of the Domestic Animals of Africa*, [2 vols] New York: Africana Publishing Corporation

Esser, M and Esser, O (1982) 'Bemerkungen zum Vorkommen des Kamels im östlichen Afrika im 14. Jahrhundert', *Sprache und Geschichte in Afrika* 4: 225-238

FAO (1988) *Traditional Food Plants*, Rome: FAO

Freeman, AR, Meghen, CM, Machugh, DE, Loftus, RT, Achukwi, MD, Bado, A, Sauveroche, B, and Bradley, DG (2004) 'Admixture and diversity in West African cattle populations', *Molecular Ecology* 13: 3477–3487

Fuller, DQ (2003) 'African crops in prehistoric South Asia: a critical review', in Neumann, K, Butler, A and Kahlheber, S (eds) *Food, Fuel and Fields: Progress in African Archaeobotany*, pp 239-272. Köln: Heinrich-Barth-Institut

Fuller, DQ (2004a) 'Early Kushite Agriculture: Archaeobotanical Evidence from Kawa', *Sudan and Nubia* 8:70–74

Fuller, DQ (2004b) 'The Central Amri to Kirbekan Survey. A Preliminary Report on Excavations and Survey 2003-04', *Sudan & Nubia Bulletin* 8: 4-16

Fumihito, A, Miyake, T, Sumi, S-I, Takada, M, Ohno, S and Kondo, N (1994) 'One subspecies of the red junglefowl (*Gallus gallus gallus*) suffices as the matriarchic ancestor of all domestic breeds', *Proceedings of the National Academy of the Sciences, USA* 91: 12505-12509

Gallant, J (2002) *The Story of the African Dog,* Pietermaritzburg: University of Natal Press

Gast, M (2000) *Moissons du Désert*, Paris: Ibis Press

Gautier, A (1981) 'Contributions to the Archaeozoology of Egypt', in Wendorf, F and Schild, R (eds) *Prehistory of the Eastern Sahara,* pp 317-344. New York: Academic Press

Germer, R. (1985) *Flora des Pharaonischen Agypten*, Mainz am Rhein: Von Zabern

Giuffra, EJ, Kijas, MH, Amarger, V, Carlborg, Ö, Jeon, J-T and Andersson, L (2000) 'The origin of the domestic pig: Independent domestication and subsequent introgression', *Genetics* 154: 1785-1791

Goddard, I (1994) 'The east-west cline in Algonquian dialectology', in Cowan W (ed) *Actes du Vingt-cinquième Congrès des Algonquinistes*, pp 187-211. Ottawa: Carleton University

Grigson, C (2000) '*Bos africanus* (Brehm)? Notes on the archaeozoology of the native cattle of Africa', in Blench, RM and MacDonald, KC (eds) *The Origin and Development of African Livestock,* pp 38-60. London: University College Press

Groombridge, B (ed) (1992) *Global Biodiversity. Status of the Earth's Living Resources*, London: Chapman & Hall

Güldemann, T and Vossen, R (2000) 'Khoesan', in Heine, B and Nurse, D (eds) *African Languages: An Introduction*, pp 99-122. Cambridge: Cambridge University Press

Hall, J-B*,* Aebischer, DP, Tomlinson, HF, Osei-Amaning, E and Hindle, JR (1996) *Vitellaria Paradoxa: A Monograph*, Bangor: School of Agricultural and Forest Sciences

Heine, B (1978) *The Sam Languages. A History of Rendille, Boni and Somali*, Afroasiatic Linguistics, 6,2. Malibu: Undena Publications

Heine, B (1981) 'Some cultural evidence on the early Sam-speaking people in East Africa', *Sprache und Geschichte in Afrika* 3: 169-200

Hiendleder, S, Mainz, K, Plante, Y and Lewalski, H (1998) 'Analysis of mitochondrial DNA indicates that domestic sheep are derived from two different ancestral maternal sources: no evidence for contributions from urial and argali sheep', *Journal of Heredity* 89: 113–120

Hilu, KW, de Wet, JMJ and Harlan, JR (1979) 'Archaeobotanical studies of *Eleusine coracana* ssp. *coracana* (Finger millet)', *American Journal of Botany* 66: 330-333

Hilu, KW, Ribu, KM, Liang, H and Mandelbaum, C (1997) 'Fonio millets: Ethnobotany, genetic diversity and evolution', *South African Journal of Botany* 63(4): 185-190

Hudson, G (1989) *Highland East Cushitic Dictionary,* Cushitic Language Studies Bd. 7. Hamburg: Buske

Johnston, HH (1886) *The Kili-manjaro Expedition; A Record of Scientific Exploration in Eastern Equatorial Africa*, London: Kegan, Paul & Trench

Kahlheber, S (ined) *Database of African archaeobotanical materials,* Electronic ms. Author

Klaproth, J von (1830) Réponse à quelques passages de la préface du roman chinois intitulé: *Hao khieou tchhouan*, traduit par M.J.F. Davis', V *Journal Asiatique* 97-122

Lamberti, M and Sottile, R (1997) *The Wolaytta Language,* Köln: Rüdiger Köppe

Levtzion, N and Hopkins, JFP (1981) *Corpus of Early Arabic Sources for West African History*, Cambridge: Cambridge University Press

Lewicki, T (1974) *West African Food in the Middle Ages*, Cambridge: Cambridge University Press

Loftus, RT, MacHugh, DE, Bradley, DG, Sharp, PM and Cunningham, EP (1994) 'Evidence for two independent domestications of cattle', *Proceedings of the National Academy of Science* 91: 2757-2761

Luikart, G, Gielly L, Excoffier L, Vigne J-D, Bouvet J and Taberlet, P (2001) 'Multiple maternal origins and weak phylogeographic structure in domestic goats', *Proceedings of the National Academy of Science, USA* 98(10): 5927–5932

MacDonald, KC (1992) 'The domestic chicken (*Gallus gallus*) in sub-Saharan Africa: a background to its introduction and its osteological differentiation from indigenous fowls (Numidinae and *Francolinus sp.*)', *Journal of Archaeological Science* 19: 303-318

MacDonald, KC and Edwards, DN (1993) 'Chickens in Africa: the importance of Qasr Ibrim', *Antiquity* 67: 584-590

MacDonald, KC and MacDonald, RH (2000) 'The Origins and Development of Domesticated Animals in Arid West Africa', in Blench, RM and MacDonald, KC (eds) *The Origin and Development of African Livestock,* pp 127-162. London: University College Press

Magnavita, C (2002) 'Recent archaeological finds of domesticated *Sorghum bicolor* in the Lake Chad region', *Nyame Akuma* 57: 14-20

Maley, J (2001) *'Elaeis guineensis* Jacq. (oil-palm) fluctuations in central Africa during the late Holocene: climate or human driving forces for this pioneering species?', *Vegetation history and archaeobotany* 10: 117-120

Marshall, F (2000) 'The origins and spread of domestic animals in East Africa', in Blench, RM and MacDonald, KC (eds) *The Origin and Development of African Livestock,* pp 191-221. London: University College Press

Maniacky, J (2005) 'Quelques thèmes pour "igname" en Bantu' in Bostoen, K & Maniacky, J (eds), *Studies in African Comparative Linguistics with Special Focus on Bantu and Mande*, Human Sciences Collection 169. pp 165-89. Tervuren: Royal Museum for Central Africa

Maundu, PM (1999) *Traditional Food Plants of Kenya*, Nairobi: National Museums of Kenya

Mbida, CM, Van Neer, W, Doutrelepont, H and Vrydaghs, L (2000) 'Evidence for banana cultivation and animal husbandry during the first millennium BC in the forest of Southern Cameroon', *Journal of Archaeological Science* 27: 151–162

Mbida, Ch, Doutrelepont, H, Vrydaghs, L, Swennen, Ro, Swennen, Ru, Beeckman, H, De Langhe, E and de Maret, P (2001) 'First archaeological evidence of banana cultivation in central Africa during the third millennium before present', *Vegetation History and Archaeobotany* 10: 1-6

Mous, M and Kießling, R (2004) *Reconstruction of proto-West Rift,* Köln: Rüdiger Köppe

Müller, FM (1864) *Lectures on the Science of Language*. *Second Series,* London: Longman, Roberts and Green

Murdock, GP (1959) *Africa: Its Peoples and their Culture History*, New York: McGraw Hill

Muzzolini, A (1990) 'The sheep in Saharan rock art', *Rock Art Research* 7(2): 93-109

Neumann, K, Kahlheber, S and Uebel, D (1998) 'Remains of woody plants from Saouga, a medieval west African village', *Vegetation History and Archaeobotany* 7: 57-77

Neumann, K (2003) 'The late emergence of agriculture in sub-Saharan Africa: archaeobotanical evidence and ecological considerations', in Neumann, K, Butler, A and Kahlheber, S (eds) *Food, Fuel and Fields: Progress in African Archaeobotany*, pp 71-92. Köln: Heinrich-Barth-Institut

Philippson, G and Bahuchet, S (1996) 'Cultivated crops and Bantu migrations in Central and Eastern Africa: a linguistic approach', 29/30 *Azania* 103-120

Plug, I (1996) 'Domestic animals during the Early Iron Age in southern Africa', in Pwiti, G and Soper, R (eds) *Aspects of African Archaeology, Papers from the 10th Congress of the PanAfrican Association of Prehistory and Related Studies,* pp 515-522. Harare: University of Zimbabwe Publications

Portères, R (1951) '*Eleusine coracana* Gaertn. Céréale des Humanités Pauvres des Pays Tropicaux', *Bulletin de l'Institut Français de l'Afrique Noire* 13: 1-78

Portères, R (1955) 'Les céréales mineures du genre *Digitaria* en Afrique et Europe', *Journal d'Agriculture Tropicale et Botanique Appliquée* 2: 349-386, 477-510, 620-675

Portères, R (1958) 'Les appellations des céréales en Afrique: V. Le Millet, Teff de l'Abyssinie', *Journal de l'Agriculture Tropicale et Botanique Appliqué* 5: 454-463

Portères, R (1976) 'African cereals: eleusine, fonio, black fonio, teff, Brachiaria, Paspalum, Pennisetum and African rice', in Harlan JR, De Wet JMJ and Stemler, ABL (eds) *Origins of African Plant Domestication*, pp 409-452. The Hague: Mouton

Raulin, H (1984) 'Techniques agraires et instruments aratoires au sud du Sahara', *Cahiers ORSTOM, Séries Sciences Humaines* XX(3-4): 339-358

Raynaut, C (1984) 'Outils agricoles de la région de Maradi (Niger)', *Cahiers ORSTOM, Séries Sciences Humaines* XX(3-4): 505-536

Rowley-Conwy, P (1991) 'Sorghum from Qasr Ibrim, Egyptian Nubia, ca. 800 BC-AD 1811: a preliminary study', in Renfrew, J (ed) *New Light on Early Farming,* pp 191-212. Edinburgh: Edinburgh University Press

Sadr, K (2003) 'The Neolithic of Southern Africa'*,Journal of African History* 44: 195–209

Sasse, H-J (1993) 'Ein weltweites Hundewort', in Heidermanns, F, Rix, H and Seebold, E (eds) *Sprachen und Schriften des antiken Mittelmeerraums. Festschrift für Jürgen Untermann zum 65. Geburtstag*, pp 349-366. Innsbrucker Beiträge zur Sprachwissenschaft, 78. Innsbruck: Institut für Sprachwissenschaft

Savolainen, P, Ya-ping Zhang, Jing Luo, Lundeberg, J and Leitner, T (2002) 'Genetic Evidence for an East Asian Origin of Domestic Dogs', *Science* 298: 1610-1613

Segerer, G (ined), *Comparative Atlantic Wordlist.* Electronic ms.

Seignobos, C (ed) (1984) *Les Instruments Aratoires en Afrique Tropicale*, Séries Sciences Humaines, XX(3-4). Paris: Cahiers ORSTOM

Seignobos, C, Marzouk, Y and Sigaut, F (eds) (2000) *Outils Aratoires en Afrique*, Paris: Karthala/IRD

SIL (2005) *Ethnologue: Languages of the World (15th edition)*, Dallas: SIL International. [available online at www.ethnologue.com]

Skinner, NA (1977) 'Domestic animals in Chadic', in Newman, P and RM (eds) *Papers in Chadic Linguistics*, pp 175-198. Leiden: Afrika-Studiecentrum

Smith, AB (2000) 'The origins of the domesticated animals in southern Africa', in Blench, RM and MacDonald, KC (eds) *The Origin and Development of African Livestock,* pp 222-238. London: University College Press

Ṣowunmi, MA (1985) 'The beginnings of agriculture in West Africa: botanical evidence', *Current Anthropology* 26: 127-129

Ṣowunmi, MA (1999) 'The significance of the oil palm (*Elaeis guineensis*) in the late Holocene environments of west and west central Africa: a further consideration', *Vegetation History and Archaeobotany* 8: 199-210

Stahl, AB (1993) 'Intensification in the west African Late Stone Age: a view from central Ghana', in Shaw, T, Sinclair, P, Andah, B and Okpoko, A (eds) *The Archaeology of Africa. Food, Metals and Towns,* pp 261-273. London: Routledge

Summers, R. (1958) *Inyanga*, Cambridge: Cambridge University Press

Talbot, MR, Livingston, DA, Palmer, PA, Maley, J, Melack, JM, Delibrias, G and Gulliksen, S (1984) 'Preliminary results from sediment cores from Lake Bosumtwi, Ghana', *Palaeoecology of Africa* 16: 173-192

Vavilov, N (1931) *The Wheats of Abyssinia and Erythreae, Their Place in the General System of Wheats,* [in Russian]. Bulletin of Applied Botany and Plant Breeding, Leningrad, Suppl. 53

Voßen, R (1996) *Die Khoe-Sprachen*, Köln: Rudiger Köppe

Vydrine, V (ined), *Comparative Mande Dictionary*, author ms

Walter, AE and Sam, C (1999) *Fruits d'Océanie*, Paris: IRD

Watson, AM (1983) *Agricultural Innovation in the Early Islamic World*, Cambridge: Cambridge University Press

West, B and Zhou, B-X (1988) 'Did chickens go north? New evidence for domestication', *Journal of Archaeological Science* 15: 515-533

Williamson, K (1993) 'Linguistic evidence for the use of some tree and tuber food plants in Southern Nigeria', in Shaw, T, Sinclair, P, Andah, B and Okpoko, A (eds) *The Archaeology of Africa*. *Food, Metals and Towns,* pp 104-116. London: Routledge

Williamson, K (2000) 'Did chickens go west?', in Blench, RM and MacDonald, KC (eds) *The Origin and Development of African Livestock,* pp 368-448. London: University College Press

Wilson, RT (1984) *The Camel*, London: Longmans