Grappling with Diversity in Livestock-Related, Non-Agriculturist Archaeology in the Light of Genetic Research into the Lactase Persistence Allele, -14010*C, in Southern Africa

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1 Introduction

The paper by Breton *et al.* (2014) demonstrating a shared ancestry between an eastern Africa population and the Khoe-speaking Nama of southern Africa has freed archaeologists to consider once again the place of demic diffusion in the spread of the first domestic animals without agriculture, to southern Africa. This follows its unpopularity as an explanation for change amongst the southern Africanist archaeological community in the 1990s and early 2000s (Kinahan, 1991; Sadr, 1998, 2003, 2008; Orton, 2015). It is difficult to separate demic diffusion from cultural diffusion using archaeology, as evidenced in debates worldwide.

This paper looks at the livestock-related, non-agriculturist archaeology in southern Africa in the light of the new genetic insights into the distribution of the lactase persistence allele in southern Africa. We focus on the spread of livestock without agriculture, a process that is connected to Khoe-language speakers. Agro-pastoralism, the spread of farming with speakers of Bantu-languages, is occasionally mentioned for comparative purposes. We briefly review the archaeological evidence for the last 3000 years BP in southern Africa. We then present the modern day southern African distribution of lactose persistence and compare this with the archaeological evidence for livestock-keeping. Finally we consider ethnographic and historic sources for milk-drinking in southern Africa.

2 Review of the Archaeological Evidence from Approximately 3000 BP, Southern Africa

Southern Africa is here defined as countries to the south of Congo, the Democratic Republic of Congo and Tanzania. From about 2100 years ago, the

first, very slight evidence for pottery and domestic stock appears at sites that are conventionally associated with the spread of livestock-keeping without agriculture (referred to as Later Stone Age (LSA) sites in this chapter) (see Lander and Russell (2018) for a detailed review of the data from 551 BC to AD 1056). The most securely identified and directly dated sheep specimen derives from the site Spoegrivier on the western half of southern Africa and dates to around 2100 years ago (Coutu et al., 2021). The earliest appearance of domestic cattle at sites conventionally associated with the spread of farmers speaking Bantu-languages occurs from about 1750 BP onwards (referred to as farmer sites in this chapter). At around 1500 years BP livestock counts reach a peak at Later Stone Age sites, with evidence of caprines outweighing cattle, whilst in the summer rainfall area, on the eastern side of southern Africa, many farmer sites have evidence of livestock-keeping in the form of cattle bones (Figure 6.1). From 1300 years BP, the number and distribution of farmer-related sites steadily increase, whilst the number of Later Stone Age livestock-related sites remain constant from this period onwards. Notably LSA sites have consistently low numbers of domestic livestock (Russell and Lander, 2015). Cattle are rare. The total cattle count (MNI) at all LSA sites is just 21, whilst that for caprines (mainly sheep) is 365 (Russell and Lander, 2015).

FIGURE 6.1 Archaeological evidence for livestock in Southern Africa, 551 BC to AD 1058

Contemporary with the first appearance of livestock is pottery. However, attempts to link it with the spread of livestock at Later Stone Age sites based on stylistic analysis have been unfruitful (Sadr and Sampson, 2006; Sadr, 2008; see also Smith, 2008, 2017). Lander and Russell (2020) suggest that pottery spread rapidly amongst hunter-gatherers from its first appearance in a process of cultural diffusion, which might also have carried domestic livestock, particularly sheep, across South Africa along already established exchange networks (see also Sadr, 2004; Russell, 2017).

3 Distribution of the Southern African Lactase Persistence Allele, -14010*C Compared to the Archaeological Evidence for Livestock

The presence of the east African lactase persistence allele, -14010*C, amongst present-day southern African populations is important because it signifies the presence of a proto-historic, fresh-milk-drinking pastoral population in southern Africa, and in the case of the Nama, a degree of relatedness to an East African source population (Breton et al., 2014; Macholdt et al., 2014). In southern Africa, 59 ethnic population groups have been screened for the LP allele (Table 6.1 and Figure 6.2) (Coelho et al., 2009; Tornianen et al., 2009; Breton et al., 2014; Macholdt et al., 2014; Jones et al., 2015; Pinto et al., 2016). These include Afrikaans-, Khoesan- and Bantu- language-speakers from agro-pastoralist, hunter-gatherer and agriculturist communities. The geographical coverage includes parts of Angola, Namibia, Botswana, Zambia, Kingdom of Eswatini, Mozambique and South Africa (Figure 6.3).

The lactase persistence allele reflects the continuous consumption of fresh milk from one generation to the next (Tishkoff et al., 2007; Breton et al., 2014; Ranciaro et al., 2014). Its presence is thus indicative of a group that either keeps livestock and drinks fresh milk or gets fresh milk regularly from a continuous relationship with livestock-keepers.

In the review of LP -14010*C allele amongst extant southern African population groups, twelve have the allele at frequencies of 10% or above (Table 6.1). The highest incidence is found amongst the Namibian Nama Khoe-speaking pastoralists (35.7%) (Breton et al., 2014; Macholdt et al., 2014). Nine of these groups are found in northern/north-western parts of southern Africa. The remaining three are distinctive. Two are eastern Bantu-language speaking groups (Map Code 15 and 35, Figure 6.4). The third is an Afrikaans-speaking community of mixed Khoesan ancestry, sampled in the western Cape, South Africa (Breton et al., 2014) (map code 3, Figure 6.4).

TABLE 6.1 The frequency of the East African - lactase persistence allele in Southern Africa

Map code	Ethnic group	Subsistence base, language group, ref.	N of individuals
1	Nama	Pastoralist Khoë Breton <i>et al.</i> 2014	22
2	Askham Coloured	Not provided Khoë – North Breton <i>et al.</i> 2014	20
3	Wellington Coloured	Not provided Afrikaans Breton <i>et al.</i> 2014	20
4	Colesberg Coloured	Not provided Afrikaans Breton <i>et al.</i> 2014	20
5	/Gui and //Gana	Hunter-gatherer Khoë Breton <i>et al.</i> 2014	20
5	//Gana	Hunter-gatherer Khoë Macholdt <i>et al.</i> 2014	10
5	/Gui	Hunter-gatherer Khoë Macholdt <i>et al.</i> 2014	17
6	Khwe	Hunter-gatherer Khoë Breton <i>et al.</i> 2014	19
6	Khwe	Hunter-gatherer Khoë Breton <i>et al.</i> 2014	19
7	Ju/'hoansi	Hunter-gatherer Ju - Northeast - Ju/'hoan Breton <i>et al.</i> 2014	20
8	Ju hoan_ North	Hunter-gatherer Kx'a Macholdt <i>et al.</i> 2014	21

Sample region	Decimal latitude	Decimal longitude	-14010* _C freq.	Ref.
Windhoek, Namibia	-22,5624	17,06599	0,357	Breton <i>et al.</i> (2014) Macholdt <i>et al.</i> (2014)
Askham, Northern Cape, South Africa	-26,9834	20,78333	0,225	Breton <i>et al.</i> (2014)
Wellington, Western Cape, South Africa	-33,6818	19,01023	0,1	Breton <i>et al.</i> (2014)
Colesberg, Northern Cape, South Africa	-30,8388	25,07629	0,025	Breton <i>et al.</i> (2014)
Kutse Game Reserve, Kalahari, Botswana	-23,4223	24,04879	0,071	Breton <i>et al.</i> (2014)
Kutse Game Reserve, Kalahari, Botswana	-23,4223	24,04879	0,2	Macholdt <i>et al.</i> (2014)
Kutse Game Reserve, Kalahari, Botswana	-23,4223	24,04879	0,088	Macholdt <i>et al.</i> (2014)
Schmidtsdrif Northern Cape, South Africa	-28,8134	24,10132	0,029	Breton <i>et al.</i> (2014)
Rootfontein, Namibia	-19,6113	18,10939	0,029	Breton <i>et al.</i> (2014)
Tsumkwe, Namibia	-19,6009	20,50384	0,029	Breton <i>et al.</i> (2014)
North West, Botswana	-20,5814	21,67013	0,024	Macholdt <i>et al.</i> (2014)

TABLE 6.1 The Frequency of the East African - lactase persistence allele in Southern Africa (*cont.*)

Map code	Ethnic group	Subsistence base, language group, ref.	N of individuals
9	Ju hoan South	Hunter-gatherer Kx'a Macholdt <i>et al.</i> 2014	26
10	!Xun	Hunter-gatherer Ju - Northwest - /Xũu Breton <i>et al.</i> 2014	20
10	!Xun	Hunter-gatherer Ju - Northwest - /Xũu Breton <i>et al.</i> 2014	-
20	!Xuun	Hunter-gatherer Kx'a Macholdt <i>et al.</i> 2014	19
47	!Xuun	Hunter-gatherer Kx'a Pinto <i>et al.</i> 2016	-
11	Karretjie People	Hunter-gatherer and herder /Xam descendants Breton <i>et al.</i> 2014	20
12	≠Khomani	Hunter-gatherer herders Germanic Tuu Breton <i>et al.</i> 2014	20
13	Herero	Farmer and herder western Bantu Breton <i>et al.</i> 2014	14
14	Herero	Pastoralist western Bantu Macholdt <i>et al.</i> 2014	21
38	Kuvale/ Herero	Pastoralist west Savanna Bantu Coelho <i>et al.</i> 2009	
42	Kuvale	Farming with some pastoralism west Savanna Bantu Pinto <i>et al.</i> 2016	-

Sample region	Decimal latitude	Decimal longitude	-14010* _C freq.	Ref.
Ghanzi, Botswana border with Namibia	-21,1943	21,06119	0,058	Macholdt <i>et al.</i> (2014)
Schmidtsdrif, Northern Cape, South Africa	-28,8134	24,10119	0,038	Breton <i>et al.</i> (2014)
Grootfontein, Namibia	-19,6113	18,10939	0,038	Breton <i>et al.</i> (2014)
Nyae Nyae, Namibia	-19,7057	20,49703	0,053	Macholdt <i>et al.</i> (2014)
Mupa, Angola	-16,1831	15,76708	0,014	Pinto <i>et al.</i> (2016)
Colesberg, Northern Cape, South Africa	-30,8388	25,07629	0,083	Breton <i>et al.</i> (2014)
Askham, Northern Cape, South Africa	-26,9834	20,78333	0,11	Breton <i>et al.</i> (2014)
Windhoek, Namibia	-17,0624	17,06599	0	Breton <i>et al.</i> (2014)
Windhoek, Namibia	-22,5624	17,06599	0,071	Macholdt <i>et al.</i> (2014) (see Torniainen <i>et al.</i> 2009 and Breton <i>et al.</i> 2014)
Namibe, Angola	-16,0277	12,43632	0,06	Coelho <i>et al.</i> (2009) (see Alves <i>et al.</i> 2011)
Namibe, Angola [1 sample location]	-14,5436	13,10684	0,037	Pinto <i>et al.</i> (2016) (see Coelho <i>et al.</i> 2009)

TABLE 6.1 The Frequency of the East African - lactase persistence allele in Southern Africa (*cont.*)

Map code	Ethnic group	Subsistence base, language group, ref.	N of individuals
42	Kuvale	Farming with some pastoralism west Savanna Bantu Pinto <i>et al.</i> 2016	-
42	Kuvale	Farming with some pastoralism west Savanna Bantu Pinto <i>et al.</i> 2016	-
15	Sotho-Tswana and Zulu	Agropastoralist farmer southeastern Bantu Breton <i>et al.</i> 2014	16 (Sotho-Tswana) 25 (Zulu)
16	Taa-East	Hunter-gatherer Tuu Macholdt <i>et al.</i> 2014	11
17	Taa-North	Hunter-gatherer Tuu Macholdt <i>et al.</i> 2014	11
18	Taa-West	Hunter-gatherer Tuu Macholdt <i>et al.</i> 2014	20
19	ǀHoan	Hunter-gatherer Kx'a Macholdt <i>et al.</i> 2014	7
21	ǁAni	Hunter-gatherer Khoe Macholdt <i>et al.</i> 2014	11
22	Buga	Hunter-gatherer Khoe Macholdt <i>et al.</i> 2014	9
23	ǁXo	Hunter-gatherer Khoe Macholdt <i>et al.</i> 2014	19

Sample region	Decimal latitude	Decimal longitude	-14010* _C freq.	Ref.
Namibe, Angola [2 sample location]	-15,3969	12,83899	0,037	Pinto <i>et al.</i> (2016) (see Coelho <i>et al.</i> 2009)
Namibe, Angola [3 sample location]	-15,5753	12,76128	0,037	Pinto <i>et al.</i> (2016) (see Coelho <i>et al.</i> 2009)
Various regions, South Africa	-27,9865	29,86269	0,1	Breton <i>et al.</i> (2014)
Kgalagadi, Botswana	-24,3548	22,81767	0,045	Macholdt <i>et al.</i> (2014)
Kgalagadi, Botswana	-23,59	21,61049	0	Macholdt <i>et al.</i> (2014)
Kgalagadi, Botswana	-24,7803	20,10442	0,025	Macholdt <i>et al.</i> (2014)
Kgalagadi, Botswana	-24,3368	22,34	0	Macholdt <i>et al.</i> (2014)
North West, Botswana	-18,5167	21,94934	0,091	Macholdt <i>et al.</i> (2014)
North West, Botswana	-18,3716	21,85806	0	Macholdt <i>et al.</i> (2014)
Caprivi Strip	-17,9231	22,72381	0,079	Macholdt <i>et al.</i> (2014)

TABLE 6.1 The Frequency of the East African - lactase persistence allele in Southern Africa (*cont.*)

Map code	Ethnic group	Subsistence base, language group, ref.	N of individuals
24	Damara	Hunter-gatherer and pastoralist Khoes Macholdt <i>et al.</i> 2014	34
25	Haillom	Hunter-gatherer Khoes Macholdt <i>et al.</i> 2014	40
26	Naro	Hunter-gatherer Khoes Macholdt <i>et al.</i> 2014	19
27	Shua	Hunter-gatherer Khoes Macholdt <i>et al.</i> 2014	27
28	Tshwa	Hunter-gatherer Khoes Macholdt <i>et al.</i> 2014	15
29	Himba	Pastoralist west Savanna Bantu Macholdt <i>et al.</i> 2014	16
41	Himba	Pastoralist west Savanna Bantu Pinto <i>et al.</i> 2016; Macholdt <i>et al.</i> 2014	-
41	Himba	Pastoralist west Savanna Bantu Pinto <i>et al.</i> 2016; Macholdt <i>et al.</i> 2014	-
30	Kgalagadi	Agropastoralist southeastern Bantu Macholdt <i>et al.</i> 2014	20
31	Tonga	Agriculturist southeastern Bantu Macholdt <i>et al.</i> 2014	17

Sample region	Decimal latitude	Decimal longitude	-14010* _C freq.	Ref.
Kunene Region, Namibia	-20,4608	14,01402	0,044	Macholdt <i>et al.</i> (2014)
Kunene Region, Namibia	-19,6687	14,70835	0,088	Macholdt <i>et al.</i> (2014)
Ghanzi, Botswana	-22,01	21,23226	0,053	Macholdt <i>et al.</i> (2014)
Makgadikgadi, Botswana	-20,5509	25,81031	0,074	Macholdt <i>et al.</i> (2014)
Makgadikgadi, Botswana	-21,3433	26,04308	0,167	Macholdt <i>et al.</i> (2014)
Skeleton Coast, Namibia	-19,5689	13,67961	0,125	Macholdt <i>et al.</i> (2014)
Namibe, Angola [1 sample location]	-17,0017	12,43598	0,087	Pinto <i>et al.</i> (2016) (see Macholdt <i>et al.</i> 2014)
Namibe, Angola [2 sample location]	-16,8911	12,43598	0,087	Pinto <i>et al.</i> (2016) (see Macholdt <i>et al.</i> 2014)
Kgalagadi, Botswana	-24,7289	22,70295	0	Macholdt <i>et al.</i> (2014)
southern Zambia	-17,7183	26,82519	0	Macholdt <i>et al.</i> (2014)

TABLE 6.1 The Frequency of the East African - lactase persistence allele in Southern Africa (*cont.*)

Map code	Ethnic group	Subsistence base, language group, ref.	N of individuals
32	Tswana	Agropastoralist southeastern Bantu Macholdt <i>et al.</i> 2014	18
33	Nkoya	Agropastoralist eastern Bantu Macholdt <i>et al.</i> 2014	16
34	Wambo	Agriculturist western Bantu Macholdt <i>et al.</i> 2014	8
35	!Xhosa	Agropastoralist southeastern Bantu Torniaainen <i>et al.</i> 2009	109
35	!Xhosa	Agropastoralist southeastern Bantu Ranciaro <i>et al.</i> 2014	16
36	Venda	Agropastoralist southeastern Bantu Ranciaro <i>et al.</i> 2014	18
37	Ovim-bundu	Mostly agriculturists (cattle raising not crucial for subsistence) west Savanna Bantu Coelho <i>et al.</i> 2009	-
39	Nyaneka-Nkhumbi	Agropastoralist (predominantly cattle raisers) west Savanna Bantu Coelho <i>et al.</i> 2009	-
40	Guang-uela	Agropastoralist west Savanna Bantu Coelho <i>et al.</i> 2009	-

Sample region	Decimal latitude	Decimal longitude	-14010* _C freq.	Ref.
Kweneng, southern Botswana	-24,3324	25,6049	0,028	Macholdt <i>et al.</i> (2014) (see Breton <i>et al.</i> 2014)
Zambia	-14,6633	25,50005	0,031	Macholdt <i>et al.</i> (2014)
Northern Namibia	-17,7569	16,63925	0	Macholdt <i>et al.</i> (2014)
Eastern Cape and western Cape, South Africa	-33,1477	26,54454	0,128	Torniainen <i>et al.</i> (2009)
Western Cape, South Africa	-34,079	19,10157	0,1429	Ranciaro <i>et al.</i> (2014)
Thohoyandou, South Africa	-23,1016	30,59716	0	Ranciaro <i>et al.</i> (2014)
Namibe, Angola	-14,733	13,24521	0,01	Coelho <i>et al.</i> (2009)
Namibe, Angola	-15,1194	12,71634	0,03	Coelho <i>et al.</i> (2009)
Namibe, Angola	-15,44	12,92882	0	Coelho <i>et al.</i> (2009)

TABLE 6.1 The Frequency of the East African - lactase persistence allele in Southern Africa (*cont.*)

Map code	Ethnic group	Subsistence base, language group, ref.	N of individuals
43	Kwepe	Shepherd/livestock-keeper Khoekwadi (recently replaced by Kuvale) Pinto <i>et al.</i> 2016	-
43	Kwepe	Shepherd/livestock-keeper Khoekwadi (recently replaced by Kuvale) Pinto <i>et al.</i> 2016	-
44	Kwisi	Hunter-gatherer (recently cattle-keepers) west Savanna Bantu Pinto <i>et al.</i> 2016	-
44	Kwisi	Hunter-gatherer (recently cattle-keepers) west Savanna Bantu Pinto <i>et al.</i> 2016	-
45	Twa	Hunter-gatherer (recently cattle-keepers) west Savanna Bantu Pinto <i>et al.</i> 2016	-
45	Twa	Hunter-gatherer (recently cattle-keepers) west Savanna Bantu Pinto <i>et al.</i> 2016	-
46	Tjimba	Hunter-gatherer (cattle-less pastoralists) west Savanna Bantu Pinto <i>et al.</i> 2016	-
48	Yao	Agriculturist Kaskazi-speaking Pinto <i>et al.</i> 2016	-
49	Nyanja	Agriculturist southeastern Bantu Pinto <i>et al.</i> 2016	-

Sample region	Decimal latitude	Decimal longitude	-14010* _C freq.	Ref.
Namibe, Angola [1 sample location]	-15,8062	12,1081	0,044	Pinto <i>et al.</i> (2016)
Namibe, Angola [2 sample location]	-15,8274	12,45268	0,044	Pinto <i>et al.</i> (2016)
Namibe, Angola [1 sample location]	-15,7196	12,45046	0,175	Pinto <i>et al.</i> (2016)
Namibe, Angola [2 sample location]	-15,5978	12,73733	0,175	Pinto <i>et al.</i> (2016)
Namibe, Angola [1 sample location]	-15,8536	12,12054	0,194	Pinto <i>et al.</i> (2016)
Namibe, Angola [2 sample location]	-16,8092	12,50899	0,194	Pinto <i>et al.</i> (2016)
Namibe, Angola	-17,1096	12,69041	0,233	Pinto <i>et al.</i> (2016)
Northern Mozambique	-12,9998	35,30324	0	Pinto <i>et al.</i> (2016) (see Alves <i>et al.</i> 2011)
Mozambique	-14,9577	34,16792	0	Pinto <i>et al.</i> (2016) (see Alves <i>et al.</i> 2011)

TABLE 6.1 The Frequency of the East African - lactase persistence allele in Southern Africa (*cont.*)

Map code	Ethnic group	Subsistence base, language group, ref.	N of individuals
50	Makua	Agriculturist southeastern Bantu Pinto <i>et al.</i> 2016	-
51	Tswa	Mixed agriculturist southeastern Bantu Pinto <i>et al.</i> 2016	-
52	Shangaan	Mixed agriculturist southeastern Bantu Pinto <i>et al.</i> 2016	-
53	Chopi	Agriculturist southeastern Bantu Coelho <i>et al.</i> 2009	3
54	Ronga	Agriculturist southeastern Bantu Coelho <i>et al.</i> 2009	15
55	Sena	Agriculturist southeastern Bantu Coelho <i>et al.</i> 2009	2
56	Ndau	Mixed agriculturist southeastern Bantu Coelho <i>et al.</i> 2009	15
57	Chwabo	Agriculturist southeastern Bantu Coelho <i>et al.</i> 2009	4
58	Shona	Mixed agriculturist southeastern Bantu Coelho <i>et al.</i> 2009	1
59	Swazi	Agropastoralist southeastern Bantu Segal <i>et al.</i> 1987	12

Sample region	Decimal latitude	Decimal longitude	-14010* _C freq.	Ref.
Mozambique	-15,2267	39,23246	o	Pinto <i>et al.</i> (2016) (see Alves <i>et al.</i> 2011)
Mozambique	-21,4492	35,00139	o	Pinto <i>et al.</i> (2016) (see Alves <i>et al.</i> 2011)
Mozambique	-24,8958	32,98332	o,022	Pinto <i>et al.</i> (2016) (see Alves <i>et al.</i> 2011)
Mozambique	-24,792	34,37146	o	Coelho <i>et al.</i> (2009) (see Alves <i>et al.</i> 2011; Pinto <i>et al.</i> 2016)
Southern Mozambique	-26,345	32,50994	o	Coelho <i>et al.</i> (2009) (see Alves <i>et al.</i> 2011; Pinto <i>et al.</i> 2016)
Mozambique	-17,7261	34,95491	o	Coelho <i>et al.</i> (2009) (see Alves <i>et al.</i> 2011; Pinto <i>et al.</i> 2016)
Mozambique	-19,3029	34,55766	o	Coelho <i>et al.</i> (2009) (see Alves <i>et al.</i> 2011; Pinto <i>et al.</i> 2016)
Mozambique	-17,1928	36,45974	o	Coelho <i>et al.</i> (2009) (see Alves <i>et al.</i> 2011; Pinto <i>et al.</i> 2016)
Harare, Zimbabwe	-17,9233	30,95064	o	Coelho <i>et al.</i> (2009)
Mbabane, Eswatini	-26,3323	31,15249	o	Segal <i>et al.</i> (1987) (see Holden and Mace 2009).

FIGURE 6.2 Map showing the distribution of modern East and Southern African populations screened for the East African LP allele -14010*C

Three patterns in the distribution of the LP allele stand out. These are considered in relation to the archaeological evidence for livestock-keeping.

1. The lactase persistence allele occurs in its highest frequencies amongst livestock-keepers without agriculture or recent livestock-keepers without agriculture, irrespective of the language group.

People have retained the ability to digest milk in the western, drier half of southern Africa for at least the last 1300 years (Breton et al., 2014). This area is unsuitable for the cultivation of the indigenous summer rainfall crops, sorghum and millet, due to the low rainfall. This confirms Simoons (1970, 695) argument that the “Low incidence of intolerance, it is held, would develop over time in a group that has an abundant milk supply, that has alternate foodstuffs inadequate in amount and quality, and that consumes milk in lactose-rich forms.” The contemporary distribution of groups with lactase persistence matches the distribution of Later Stone Age sites with evidence of livestock (Figure 6.5) – confirming the strong

FIGURE 6.3 Map showing the distribution of the East African lactase persistence allele in Southern African

FIGURE 6.4 Map showing Southern African populations with the highest prevalence of LP Allele -14010**C*

FIGURE 6.5 Archaeological evidence for livestock-keeping with and without agriculture compared to the distribution of the lactase persistence allele

FIGURE 6.6 Archaeological evidence for livestock-keeping at approximately 1000 – 1200 BP and the lactase persistence allele overlaid on the present-day distribution of African trypanosomiasis

association of the ability to digest lactose with pastoralism (Holden and Mace, 1997). The ethnographic and historic record of milk consumption – in its fresh lactose-rich form – amongst the Khoe supports this association (Lombard and Parson, 2015).

Unique to the southernmost part of southern Africa is a winter rainfall zone that stretches from the Cape northwards into Namibia (Figure 6.1). Seasonal movement across its boundaries to the summer rainfall zone would have provided pastoralists with all year round rainfall that would be necessary for specialized milch pastoralism to flourish, mimicking the bimodal rainfall that is seen as central to the rise of pure milch pastoralism in East Africa 3000 years ago (Marshall, 1990; Marchant et al., 2018; Russell, 2020).

2. Southern Africa's Bantu-language speaking groups have a low incidence of the allele as compared to Khoe-speaking groups.

This low incidence might reflect (1) the absence of a history of livestock-keeping. The trypanosomiasis belt excludes much of tropical Africa as a cattle-keeping area (Simoons, 1974). Where it is endemic in southern Africa we find Bantu-language speaking matrilineal farmers without livestock (Holden and Mace, 2003) (Figure 6.6), or (2) the absence of *fresh* milk consumption rather than the absence of livestock. The cultural practice of drinking sour milk products is well documented amongst southern African Bantu-speaking peoples (Table 6.2). It is hard to find any record of the consumption of fresh milk by southern Bantu-language speakers with the exception of herd boys, who may drink milk directly from cows when out herding, and fresh milk sometimes given to children. Fermented, sour milk products have a reduced lactose content making them more digestible to lactase deficient groups (Holden and Mace, 1997). Segal et al. (1983), in their study of lactase persistence in southern African population groups show that raw milk, fermented in a gourd in the traditional way, contains 2.6% lactose, compared to the 4.7% lactose of full cream fresh milk. Thirdly, (3) those southern African Bantu-language speakers without the LP allele might represent a demic migration from the area of northern Angola, Gabon, and Congo in a southeastward direction towards South Africa, rather than from an origin in East Africa. The archaeological evidence, whilst fairly robust for the connection between East Africa and South Africa (Parkington and Hall, 2012), is unhelpful for tracing connections to western-central Africa. Such evidence for a western stream of demic migration from Angola to South Africa, as suggested by Huffman (2007) on the basis of pottery styles is weak and must be revisited (Parkington and Hall, 2012; Lander

TABLE 6.2 List of ethnographic and historic accounts of the consumption of milk amongst Southern African groups

Group	Country	Sour cows's milk	Fresh cows's milk	Reference
Swazi	<i>Eswatini</i>	<i>Emasi</i> (mainly drunk by children)	Herdboys in the veld milk directly into their mouths (Jones 1963: 75)	Simatende <i>et al.</i> 2015; Kuper 1986: 44; Jones 1963
Xhosa	Eastern Cape, South Africa	Amasi	Milk 'always used sour' (Hunter 1961:105)	Beukes <i>et al.</i> 2001; Hunter 1961; Shaw and van Wermelo 1974: 247, 250
Zulu	South Africa	Amasi	Hardly ever drank "green milk"	
Southern Sotho	South Africa	Mafi		Beukes <i>et al.</i> 2001
	Botswana	Madila		Ohlokpehai and Jagow 1998
	South Africa Zambia	Sethemi Mabisi		Kebede <i>et al.</i> 2007 Jans <i>et al.</i> 2017
Nharo	Ghanzi, Botswana		Fresh goats' milk	Guenther 1986
Gwi	Kutse, Botswana		Fresh goats' milk	Ikeya 1993, Sugwara 1991
Gana	Kutse, Botswana		Fresh goats' milk	Ikeya 1993, Sugwara 1991
Hunter-gatherer stock-keepers	Nyae Nyae, Namibia	Sour milk products		Marshall and Ritchie, 1984
Nama	Richtersveld, Northern Cape, South Africa	Soured milk		Schapera 1930

and Russell, 2018). The Kalundu pottery tradition of the western stream, purporting to link pottery found at the coastal midden site of Benfica, in Angola to sites in the eastern half of South Africa, includes very few sites and the basis of the argument is unclear (cf. Huffman, 2007) (Table 6.3).

And lastly, (4) it might reflect interaction and proximity with a milch pastoralist group. The high incidence of the LP allele among the Xhosa, Sotho-Tswana and Zulu agro-pastoralists is suggestive of a long history of interaction between their ancestral groups and Khoe pastoralists. These Bantu-language speaking agro-pastoralists lived close to the historically known territory of Khoe pastoralists along the natural boundary to farmer expansion, the summer rainfall boundary. This boundary is also seen in the archaeological distribution of LSA sites as compared to farmer sites (Figure 6.1) (Parking and Hall, 2012). Genetic and linguistic studies reflect a similar pattern of the long interaction of Khoisan and Bantu-speaking groups (Pakendorf et al., 2017).

3. Non-Khoe-speaking hunter-gatherers have low levels of the allele. This is not unexpected as this is one of the few examples of foragers who resisted and rejected the more labour intensive economies of animal domestication and crop production (Russell and Lander, 2015). More interesting and requiring further investigation is why *Khoe-speaking* hunter-gatherers, in particular, have the LP allele. Examples of hunter-gatherers with the LP allele, in frequencies of up to 20%, are the Khoe-speaking Gui and Gana of the Kutse Game Reserve, in central Botswana (Table 6.1). Although they live by hunting and gathering, their livestock keeping is well-documented (Ikeya, 1993; Osaki, 1984; 1990; Sugawara, 1991; Tanaka, 1969, 1976). Livestock, predominately goats, are never slaughtered but are kept as a social rather than a subsistence strategy, to build alliances and to use in economic exchanges (Russell, 2017). The low levels of livestock at LSA sites might reflect such a livestock-keeping and circulating system. Milking would fit easily within such a system, although little milking was recorded amongst these ethnographically observed hunter-gatherer groups (Ikeya (1993) records 200 ml of milk being collected on a particular day), there is evidence of them following milking practices. For example, young animals are separated from their mothers during the day and dung is applied to their udders to deter feeding. Goat-keeping within a similar system is also mentioned by Guenther (1986), who notes the drinking of fresh goats' milk among the Nharo of Ghanzi, Botswana.

TABLE 6.3 Sites with pottery which fit Huffman's (2007) western stream of demic diffusion among Bantu-language speaking farmers

Site, Country, site type	Radiocarbon date	Calibrated Date	Western stream, kalundu tradition, pottery type	Reference
Benfica, Angola Coastal shell midden	1810±50 Pta-212	AD 212–322	Kalundu	Dos Santos and Ervedosa 1970; Vogel and Marais 1971; Huffman 2005, 2007
Gundu, Zambia Inland open-air	1510±85 GX-1114	AD 480–658	Kamangoza type pottery showing affiliation to Kalundu, Dambwa and Kumadzulo ware and has origins with Naviundu pottery in the Congo.	Huffman 1989, 2007
Wosi, South Africa Inland open-air riverside	1460±50 Pta-4100	AD 592–662	Msuluzi	Van Schalkwyk 1994
Lydenburg Head site, South Africa Inland open-air	1460±50 Pta-328	AD 592–662	Kalundu or Matola	Maggs 1980, Evers <i>et al.</i> 1982, Whitelaw 1996
Zambezi Farm, Zambia Inland open-air	1410±130 N-1140	AD 544–856	Pottery similar to Kalundu, Dambwa and Kumadzulo ware.	Vogel 1973
Mhlopeni, South Africa Inland open-air riverside	1400±50 Pta-2878	AD 636–765	Msuluzi	Maggs and Ward 1984

TABLE 6.3 Sites with pottery which fit Huffman's (2007) western stream of demic diffusion among Bantu-language speaking farmers (*cont.*)

Site, Country, site type	Radiocarbon date	Calibrated Date	Western stream, kalundu tradition, pottery type	Reference
Divuyu, Botswana Inland open-air	1400±70 Beta-13260	AD 635–766	Divuyu	Turner 1987; Denbow 2011
KwaGandaganda, South Africa Inland open-air riverside	1395±60 Wits-1918	AD 639–765	Msuluzi	Whitelaw 1994 a,b.
Mamba, South Africa Inland open-air riverside	1390±50 Pta-4093	AD 643–765	Msuluzi	Van Schalkwyk 1994
Msuluzi Confluence, South Africa Inland open-air riverside	1370±30 Pta-2193	AD 654–763	Msuluzi	Maggs 1980
Magogo, South Africa Inland open-air riverside	1360±50 Pta-2874	AD 659–765	Msuluzi	Maggs 1984
Magarape, Botswana Inland open-air riverside	1350±80 KN-2641	AD 648–841	Mzonjani type pottery or Kalundu type pottery.	Campbell <i>et al.</i> 1996; Huffman 2009
Mpame, South Africa Coastal open-air	1340±60 Pta-2019	AD 657–830	Msuluzi	Vogel and Fuls 1999
Bisoli, Botswana Inland open-air	1340±60 Wits-1099	AD 657–830	Bisoli	Denbow and Wilmsen 1986; Campbell <i>et al.</i> 1996; Huffman 2007

TABLE 6.3 Sites with pottery which fit Huffman's (2007) western stream of demic diffusion among Bantu-language speaking farmers (*cont.*)

Site, Country, site type	Radiocarbon date	Calibrated Date	Western stream, kalundu tradition, pottery type	Reference
Nqoma, Botswana Inland open-air	1290±60 Beta-13257	AD 685–860	Divuyu and Xaro	Wilmsen 1989, 2011; Denbow 2011
Ntsitsana, South Africa Inland open-air riverside	1290±50 Pta-4684	AD 685–858	Mzuluzi and Ndongondwane	Prins and Granger 1993
Nanda, South Africa Inland open-air riverside	1275±60 Wits-1917	AD 690–880	Msuluzi	Whitelaw 1993
Kulubele, South Africa Inland open-air riverside	1250±40 Pta-5865	AD 773–881	Mzuluzi pottery and/or Ndongondwane	Binneman <i>et al.</i> 1992
Kanono Mulapo, Namibia shell midden site	1230±50 Pta-8656	AD 770–960	Kalomo pottery showing similarities to Kalundu and Gundu	Kinahan 2013; Huffman 1989
Ndongondwane, South Africa Inland open-air riverside	1220±50 Pta-238	AD 774–819	Ndongondwane	Maggs 1984, Van Schalkwyk <i>et al.</i> 1997
SK17, South Africa Inland open-air	1210±50 Pta-3507	AD 777–967	Garonga pottery or Kalundu (Ndongondwane/Lydenburg) pottery	Meyer 1984; Plug 1989; Huffman 2007
Kalundu Mound, Zambia Inland open-air	1160±90 SR-41	AD 780–1020	Kalundu	Fagan 1967

TABLE 6.3 Sites with pottery which fit Huffman’s (2007) western stream of demic diffusion among Bantu-language speaking farmers (*cont.*)

Site, Country, site type	Radiocarbon date	Calibrated Date	Western stream, kalundu tradition, pottery type	Reference
Dombashaba, Botswana Inland hilltop	1150±80 I-13746	AD 859–1024	Bisoli	Huffman 2005, 2007
Ntshekane, South Africa Inland open-air riverside	1150±45 Pta-1058	AD 893–989	Ntshekane	Maggs and Michael 1976
Kamangoza, Zambia Inland open-air	1015±105 N-419	AD 987–1185	Kamangoza pottery showing affiliation to Kalundu, Dambwa and Kumadzulo ware.	Vogel 1971
Isamu Pati, Zambia Inland open-air	910±90 SR-31	AD 1046–1265	Kalomo pottery showing similarities to Kalundu and Gundu (Naviundu from Congo (western origin) is an ancestor to Gundu pottery)	Huffman 1989, 2005

4 Conclusions

The archaeological distribution for livestock remains over the last 2100 years shows the predominance of cattle-keeping among farmers in the eastern half of the sub-continent and sparser, yet continuous, caprine-keeping among Later Stone Age livestock-keepers in the low rainfall areas to the west. We might at a first glance expect that lactase persistence might dominate on the

eastern side of southern Africa. Genetic research shows that the reverse is true. The east African lactase persistence allele, -14010*C, is overwhelmingly found among pastoralist people in the western parts, irrespective of their language group. To explain this pattern, we turn to the ethnographic and historic record, which show the cultural practice among Bantu-speakers of drinking milk only in its fermented, lactose-reduced form. This is sometimes through its spontaneous fermentation in a gourd, at room temperature over a number of days, or through the addition of certain plants. Ethnography helps to explain why some hunter-gatherers have a high incidence of lactase persistence: they are those who have seen the social value of livestock in exchange networks, with small quantities of milk drinking. They remain overwhelmingly foragers for subsistence.

Archaeological evidence for the large herds of Khoe-owned cattle, observed historically, from the late 16th century onwards in the western and eastern Cape, which drew sailors and then settlers to southern Africa, has not been found. The archaeological picture is incomplete. For example, from 1652 to 1699, careful mercantile records show that 20 000 cattle and 40 000 sheep were traded with the Cape Khoe by the passing ships of the Dutch East India Company (VOC) (Ross, 2012). The contrast with the total 21 cattle and 365 caprine bones found across the entire 2100 year period of the archaeology of the Later Stone Age livestock-keepers, is useful as an example of just how fragmentary the archaeological record can be (Russell and Lander 2015).

There are unresolved differences between and within the genetic and the archaeological findings. For example, the timing of the arrival of the LP allele, -14010*C, is estimated to be at 1300 years BP by geneticists (Breton et al., 2014). This is 800 years later than the earliest archaeological discovery of remains of livestock in this region. On the basis of Y chromosomal evidence, Henn *et al.* (2009) estimate that pastoralism arrived in southern Africa from eastern Africa at around 2000 years ago. How accurate are the genetic clock estimations? Why do they differ? The ethnic identities of modern day southern African populations are complicated and complex: it would be useful to attempt to re-trace the histories of those groups sampled by geneticists.

Yet it is only by boldly confronting and challenging discrepancies between and within different disciplines that a fuller understanding of the complex history of Africa's past will be achieved. And what satisfaction when, as in the recognition of the importance of milch pastoralism in the drier western half of southern Africa for over a millennium by scholars from genetics, ethnography and archaeology, they concur.

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