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Some preliminary results

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Introduction

Recent studies have brought new insights into the movement patterns of the domestic pig (*Sus scrofa* f. *domestica*) between the Near East and Europe. The main finding supports an introduction of domestic pigs of Near Eastern ancestry into Europe (6th millennium BC), which was followed by an eastward diffusion of the domestic pig of European ancestry replacing the earlier domestic pigs of Near Eastern origin [1]. Nevertheless, available molecular data from Near Eastern pigs are significantly under-represented and additional analysis is necessary for a more detailed picture.

In this context, at a crossroad between Middle East, Asia and Europe, the Anatolian Peninsula has played a key role in the interaction network which took place among these areas since the Neolithic. Consequently, the information resulting from the analysis of ancient domestic/wild pig samples from Anatolia appears to be a promising way to investigate a number of questions concerning the complex processes of domestication and subsequent population changes, as well as human migrations and trade networks that impacted these regions over the last millennia.

Material and Methods

We have collected more than 170 ancient domestic and wild pig samples from 9 Anatolian archaeological sites dated from the 10th millennium BC to medieval times, as well as some modern Anatolian wild/feral boar specimens (Figure 1).

We performed our preliminary genetic analysis on mitochondrial DNA from 30 recently excavated and untreated bone and tooth samples from domestic pigs from the archaeological sites of Sagalassos and nearby Tepe Düzen (Taurus Mountains, Southwest Anatolia), dated from 6th century BC to 12th century AD (AMS dating and stratigraphical sequencing of the site).

All the samples have been analysed in the Laboratory of Molecular Archaeology (Leuven, Belgium) according to published protocol [2] and in accordance with ancient DNA procedures [3,4]. Eight of the 30 samples have been simultaneously analysed in Uppsala University by Greger Larson according to method previously published [1]. The ancient DNA was analysed by sequencing the 80bp ANC1 and ANC2 diagnostic fragments and the sequences obtained affiliated to the major mtDNA clades [1].

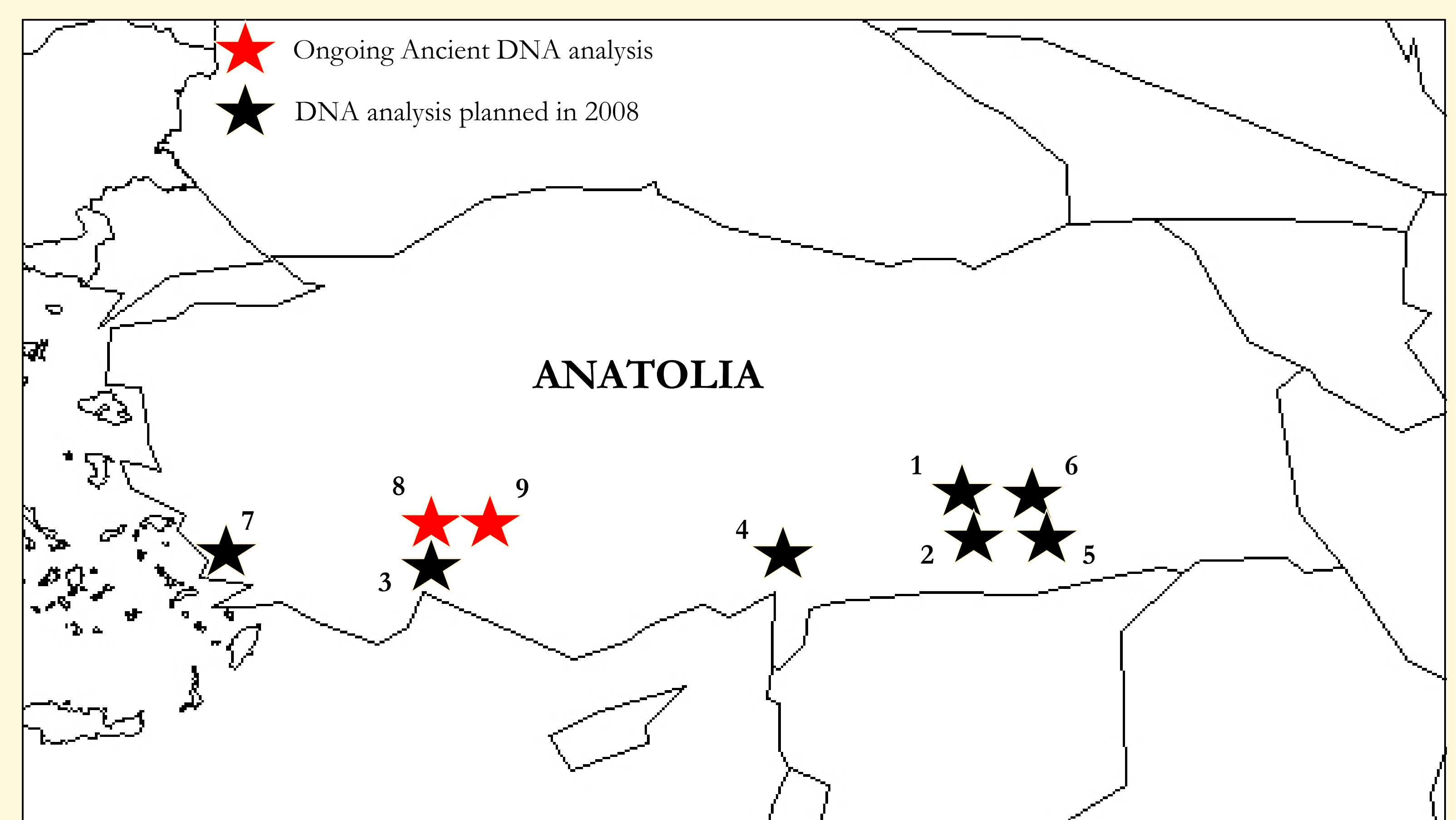


Figure 1. Location of the 9 archaeological sites from which 170 pig samples were collected. 1-Göbekli Tepe (10th millennium BC; Aceramic Neolithic). 2-Gürcütepe II (8th millennium BC, Aceramic Neolithic) and Gürcütepe V (Roman period). 3-Badmagacı (Early Neolithic to Early Bronze Age). 4-Sirkeli Höyük (Chalcolithic). 5-Hassek Höyük (Chalcolithic to Early Bronze Age). 6-Lidar Höyük (Early Bronze Age to medieval period). 7-Milet (Mycean period to 5th century BC). 8-Tepe Düzen (6th to 3rd century BC). 9-Sagalassos (1st to 12th century AD).

Results

N	Date	Polymorphic positions ¹						ANC-Haplotype ²
		ANC1			ANC2			
		15558	15587	15714	15733	15741	15758	
		A	C	T	C	C	T	
8	450-650 AD	T	.	C	.	.	C	A
1	450-650 AD	T	.	-	-	-	-	A
5	300-450 AD	T	.	C	.	.	C	A
1	300-450 AD	T	.	C	.	T	C	A
1	300-450 AD	T	T	C	.	.	C	LDomBritSaddle01
1	300-450 AD	.	.	C	.	.	.	C
1	0-300 AD	T	.	-	-	-	-	A
2	0-300 AD	T	.	C	.	.	C	A
2	0-1200 AD	T	.	C	.	.	C	A
1	600-300 BC	T	.	C	T	.	C	A
2	600-300 BC	T	.	C	.	.	C	A
1	600-300 BC	.	.	C	.	.	.	C

Figure 2. Polymorphic positions in the ANC1 and ANC2 diagnostic fragment from Southwestern Anatolian domestic pigs (Sagalassos and Tepe Düzen) and their haplotype attributions. ¹ Numbered according to the Reference Sequence GenBank AJ002189 [5]. ² Haplotype affiliation following [1].

Discussion

(i) Recent study shows that domestic pigs of European origin replaced indigenous Near Eastern domestic pigs in Armenia by at least the 7th century BC [1]. Our results confirm that during the same period a similar process probably took place in Southwestern Anatolia, more than 2000km south-westward (as the ancient Anatolian pigs only exhibit European haplotype A, C and LDomBritSaddle01). This suggests that the turn over from domestic pigs of Near Eastern origin to those of European origin was not restricted to the Caucasus area but was probably wide spread through the Near East by the end of the Iron Age.

(ii) Comparison of Armenian and Southwestern Anatolian pigs harbouring European haplotypes revealed a much lower diversity in Armenia: six Armenian pigs from five sites share all the most common European ANC1 haplotypes (A) [1], while 26 Anatolian pigs from Sagalassos and Tepe Düzen possess three different European haplotypes (A, C and LDomBritSaddle01). This raises some questions concerning the modality of diffusion eastward of European domestic pigs such as the dispersal route(s) used (north to the Black sea and/or across the Bosphorus strait?), the exact spatial and temporal origin of the dispersal(s) and the haplotypes involved.

Conclusion

Our preliminary DNA analysis of ancient Anatolian pigs supports the hypothesis that by the end of the Iron Age the whole Near East was impacted by the eastward diffusion of domestic pig of European ancestry. Nevertheless, further genetic analyses of our Anatolian sample set should reveal more detailed insights into the process of domestication, diffusion, admixture and replacement and ultimately to pin down the dispersal route(s), the timing and haplotypes involved.

References

[1] Larson et al. 2007. Ancient DNA, pig domestication, and the spread of the Neolithic into Europe. *PNAS* 104:15276–15281. [2] Jehaes E, Pfeiffer H, Toprak K, Decorte R, Brinkmann B and Cassiman JJ. 2001. Mitochondrial DNA analysis of the putative heart of Louis XVII, son of Louis XVI and Marie-Antoinette. *Eur J Hum Genet* 9:185-190. [3] Gilbert MTP, Bandelt HJ, Hofreiter M, Barnes I. 2005. Assessing ancient DNA studies. *Trends in Ecology and Evolution*, 20(10):541-544. [4] Cooper A, Poinar HN. 2000. Ancient DNA: do it right or not at all. *Science* 289:1139. [5] Ursing BM and Arnason U. 1998. The Complete Mitochondrial DNA Sequence of the Pig (*Sus scrofa*). *J Mol Evol* 47:302–306.