



Origin and Spread of Haplogroup N

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ABSTRACT

Haplogroup N is a common genome in Africa. Here we use Archaeogenetics to discuss and explain the rise and spread of haplogroup N from the Great Lakes Region of East Africa to Nigeria and the Senegambia region. The paper uses craniometric and molecular evidence to explain how haplogroup N was probably taken to western Eurasia across the Straits of Gibraltar by the Khoisan people who established the Aurignacian culture in Europe.

KEYWORDS: Haplogroup N, Africa.

ORIGIN AND SPREAD OF HAPLOGROUP N

Controversy surrounds the existence of haplogroup N in Africa. Some researchers have suggested that haplogroups N probably originated in Africa [1,2] Quintana-Murci et al [1] has suggested that haplogroup N probably originated in Ethiopia before the out of Africa migration.

Other researchers believe that haplogroup N in Africa is the result of a back migration. The craniofacial and molecular evidence does not support this conclusion. The molecular evidence indicates that haplogroup N is found across Africa from East to West [3].

Archaeogenetics is the use of genetics, archaeology and linguistics to explain and discuss the origin and spread of homo sapiens. Using this methodology we can gain valuable insight into human history and population movements in prehistoric times.

In this paper we will examine the spread of haplogroup N from Africa to Eurasia. It will either support an African origin or, back migration for the presence of the N haplogroup in Africa .

MATERIALS AND METHODS

We analyzed the craniometric , genomic and archaeological literature relating to population movements in Africa and Eurasia. This literature review provides us with a critical examination of the distribution of the N haplogroup in Africa, and the probable dispersal of this haplogroup from Africa into western Asia.

RESULTS

In Africa haplogroup N is spread across the African continent (see Table 1). Common transitions for haplogroup N are transitions 73,7028,11719,12705,14766 and 16223. The defining mutations of haplogroup N include 8701, 9540,10398,10873 and 15301. Haplogroup N is a branch of L3(M,N).

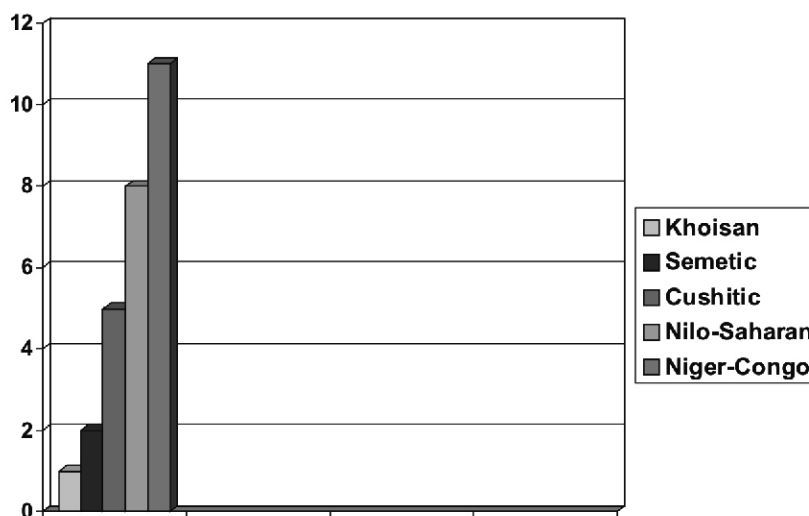
Haplogroup N represents the ancestral haplogroup of many Eurasian and African haplogroups including R, N1, A, I and X. The N and R haplogroups possess the mutations 10398G>A and 10873C>T on the line to CRS and the HVR1 mutation 16223T>C. In relation to haplogroup L3(M,N) is 94.3kya [4].

Table 1: African Populations and haplogroup N

Population	Norm	Study
Hadza	1	Tishkoff et al,2007
Datoga	8	Tishkoff et al, 2007
Mozambique	3	Pereira et al, 2001
Nigerians	3	Watson et al, 1999
Guineans	2	Rosa et al,2003
Burunge	3	Tishkoff et al, 2007
Ethiopia	3	Rosa et al, 2003
Kenya-Sudan	2	Watson et al, 1999
Tanzania	2	Gonder et al, 2006

In Europe only 0.2 of the population belong to haplogroup N. The carriers of haplogroup N are mainly situated in Central Europe. In Africa haplogroup is found throughout the African continent. In Africa the populations carrying haplogroup N belong to almost all the language families spoken in Africa including Cushitic, Nilo-Saharan, Khoisan, Niger-Congo, and Semitic (see: Figure 1).

Figure 1: Languages Spoken by Haplogroup N Populations



The majority of carriers of haplogroup N in Africa live in Sub-Saharan Africa. In East Africa we find 85.5 percent of the populations carrying haplogroup N. Around 14.5 percent of the carriers of haplogroup N live in West Africa.

The contemporary genomic data for haplogroup N in Africa indicates that this haplogroup probably appeared first in East Africa near the Great Lakes region. The geographical center for haplogroup N was probably Tanzania. Here we find in relative close proximity speakers of Khoisan, Niger-Congo, Cushitic and Nilo-Saharan language families that carry haplogroup N.

There was probably a serial expansion of haplogroup N from Tanzania first into Ethiopia, Yemen and thence Asia during the first out of Africa event 60kya. Sometime before 40kya there was probably a second migration event from Tanzania into West Africa.

The Khoisan speakers were probably the first carriers of haplogroup N to Europe. One of the oldest civilizations in Europe is the Aurignacian civilization. This civilization dates back to 34,000 years before the present (ybp).

The Aurignacian civilization appears to have expanded from West to East Eurasia [5]. The founders of this culture came from Africa [6,7]. Some researchers have argued that the Aurignacian culture was introduced to Europe [8]. They based this conclusion on the fact that its tool kit was foreign to the Mousterian type, and the culture appears in a mature form throughout Europe from France to Central Europe [9,7,8].

The craniofacial evidence makes it clear that the Levantines and **Aurignacian** people came from Africa [1,8,10]. As a result we find that the craniofacial features of the Grimaldi-Cro-Magnon population correspond to African populations like the Khoisan [3]. Later ancient western Eurasians especially the Natufian populations when plotted fall within the range of Sub-Saharan populations like the Niger-Congo speakers [4].

There have been numerous Sub-Saharan skeletons found in Europe [1,8,10]. Marcellin Boule and Henri Vallois [3], Anta Diop [7] provides an entire chapter on the skeletons of Sub-Saharan populations in Europe [1,7,10]. W.E. B. DuBois, in *The World and Africa*, noted that there was once an "uninterrupted belt' of Sub-Saharan culture from Central Europe to South Africa'.

Boule and Vallois [3], noted that the most ancient craniofacial features of skeletons from the Grotte des Enfants, the Chamblandes in Switzerland, and several Ligurian and Lombard tombs of the Metal Ages have also yielded evidences we have a human type which is readily comparable to modern types and especially to the Sub-Saharan population. Since the publication of Verneau's [10] memoir, discoveries of other Negroid skeletons in Neolithic levels in Illyria and the Balkans have been announced [3,10]. The prehistoric statues, dating from the Copper Age, from Sultan Selo in Bulgaria are also thought to be of Sub-Saharan origin [8]. In 1928 Rene Bailly found in one of the caverns of Moniat, near Dinant in Belgium, a human skeleton of whose age it is difficult to be certain, but seems definitely prehistoric [3]. It is remarkable for its Sub-Saharan characters, which give it a resemblance to the skeletons from both Grimaldi and Asselar [3]. Boule and Vallois [3], note that "We know now that the ethnography of South African tribes presents many striking similarities with the ethnography of our populations of the Reindeer Age. Not to speak of their stone implements which, as we shall see later, exhibit great similarities, Peringuey has told us that in certain burials on the South African coast 'associated with the Aurignacian or Solutrean type industry....". They add, that in relation to Bushman/Khoisan art this almost uninterrupted series leads us to regard the African continent as a centre of important migrations which at certain times may have played a great part in the stocking of Southern Europe [3]. Finally, we must not forget that the Grimaldi Sub-Saharan skeletons show many points of resemblance with the Bushman skeletons [3]. They bear no less a resemblance to that of the fossil Man discovered at Asslar in mid-Sahara, whose characters led Boule and Vallois [3] to class him with tropically adapted hominids like the Khoisan speaking Hottentot-Bushman group.

The Aurignacian population is called Cro-Magnon and/or Grimaldi. The research of Boule and Vallois [3] make it clear that this population was probably Khoisan speakers.

Researchers have found that the ancient Europeans fail to have a genetic link with contemporary European populations and the Neandertals [11]. An analysis of Cro-Magnon DNA indicates that they belonged to haplogroup N [5].

The Cro-Magnon mtDNA is associated with the Paglicci-12 [5]. Paglicci-12 show the motifs, 00073G, 10873C, 10238T and AACC between nucleotide positions 10397 and 10400 [5]. This classifies the sequence into the macrohaplogroup N. According to Caramelli et al [5] a mutation in 16223 within HRV1 suggests a classification of Paglicci-12 in the haplogroup N*.

Caramelli et al [5] discovery of Cro-Magnon mtDNA confirms the research of Boule and Vallois [3]. This is confirmation of Boule and Vallois [3], because the Khoisan carry haplogroup N [12], the L3(N) haplogroup that was also found among the Cro-Magnon people.

Early farmers of the Levant and Europe show Sub-Saharan craniofacial features [4,13]. There is other evidence of a predominately Sub-Saharan population formerly existing in the Levant. Trenton W. Holliday [13], tested the hypothesis that if modern Africans had dispersed into the Levant from Africa, "tropically adapted hominids" would be represented in the archaeological history of the Levant, especially in relation to the Qafzeh-Skhul hominids. This researcher found that the Qafzeh-Skhul hominids (20,000-10,000 BC), were assigned to the Sub-Saharan population, along with the Natufians samples [13]. Holliday [13] also found African fauna in the area. Holliday [13] confirmed his hypothesis that the replacement of the Neanderthal people in the Levant were Sub-Saharan Africans. This finding was similar to Brace *et al* [4] findings for the Levant and Europe.

The founders of civilization in Levant were the people, archaeologists call Natufians. Clark [6] claims that the Natufians originated in Africa.

By 13,000 BC, according to J.D. Clark [6] the Natufians were collecting grasses which later became domesticated crops in Levant and European. In Palestine the Natufians established intensive grass collection. The Natufians used the Ibero-Maurusian tool industry [14]. These Natufians, according to Christopher Ehret were small stature folk who spread agriculture throughout Nubia into the Red Sea (1979) and thence into North Africa and Europe. The

Natufians took the Ibero-Maurusian tools into Europe, North Africa and the Middle East any of the ancient European farmers were Sub-Saharan Africans [4]. These early European farmers fail to share haplogroups found among contemporary Europeans. Ancient DNA found in the ancient skeletons dating back to this period belong to the N haplogroup (Haak et al, 2005).

Haak et al (2005) has discussed the identification of haplogroup N1a in ancient Europe. These researchers report that between 8 and 42 percent of the early farmers belonged to the N1a lineage [11]. Today the current percentage of central Europeans who belong to the N1a lineage is only 0.2 percent.

Haak *et al.* [11] found that the first Neolithic farmers did not have a strong genetic influence on modern European female lineages. As noted above, these researchers found that the farmers carried HG N1a. This is interesting because Brace *et al.* [4] found that the craniofacial features of these early European farmers and the Natufians plotted with Sub-Saharan groups, just like the Aurignacians [3] The presence of haplogroup N among the Cro-Magnon population and Neolithic farmers shows continuity between these populations genetically.

Brace *et al.* [4] recognized Sub-Saharan Africans as associates of the Natufian farmers that introduced farming into Europe. This should not be surprising since the haplogroup N is found within Sub-Saharan groups including Tanzanians [15], Senegambians [16, 17] modern Ethiopians, Mozambiqans, Nigerians and other African populations [12].

DISCUSSION

The craniometric and molecular evidence fails to support the hypothesis that haplogroup N entered Africa as a result of back migration. The presence of the N haplogroup among Sub-Saharan populations from the Nile basin, into West Africa, NorthEast Africa and East African corresponds to Ehret's [18] hypothesis that the major contemporary African language families probably originated in one composite region extending from the Nile Basin to the Ethiopian highlands.

It appears that the Khoisan speakers took haplogroup N to western Eurasia. The molecular and craniofacial evidence makes it clear that the Aurignacians and many early farmers in the region were direct migrants to the Levant and Europe from Africa [3,8]. Moreover, the identification of Sub-Saharan craniometric features [3,4,11] and the N haplogroup among ancient skeletons [5,11] suggest that the ancient Sub-Saharans in the Levant and Europe already possessed haplogroup N (when they arrived in these areas from Africa. This is supported by the fact that anatomically modern humans did not replace Neanderthal people in the Levant until after Cro-Magnon people has established the Aurignacian culture in Spain and France [13].

The craniometric evidence that the Aurignacians [3], Natufians [4,13] and other groups who inhabited the Levant and Europe belonged to Sub-Saharan populations at this time suggest that these farmers carried haplogroup N into western Eurasia between 40,000-7500 ybp and confirms Quintana-Murci et al [19] hypothesis that haplogroup N originated in Africa.

The findings of Brace *et al.* [4] and Holiday [13] suggest that the Old Europeans may be related to African cattle raising farming groups. This supports the idea that ancient Eurasian farmers originally from Africa and the Middle East may have planted the seeds of agriculture in ancient Europe, since Boule and Vallois [3], and Brace *et al.* [4] have shown that the Aurignacians and the Natufians have a clear link to Sub-Sahara Africa.

Finally the Aurignacians did not come from the Levant. The archaeological evidence makes it clear that the Aurignacian culture appears fully developed in France and Spain [5]. The archaeological evidence also makes it clear that the Aurignacian culture moved from west to east [7,8,10]. As a result, the dates for the Near Eastern Aurignacian are later then the Aurignacian dates for Europe [20]. The spread of Aurignacian culture from France and Spain to Central Europe, suggest that there were two out of Africa exits one from the East, and another, later out of Africa event across the Straits of Gibraltar 40,000 ybp.

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