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Full Length Research Paper

Y-Chromosome evidence of an African origin of Dravidian agriculture

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Y-linked markers provide loci to investigate genetic connections between human populations that can offer abundant anthropological information. Ancestry informative markers for Dravidian speaking populations in India that cultivate African cultigens were analyzed. The frequency of shared Y-chromosomes and HLAs between Dravidian and African populations is consistent with a possible African origin for millet, the principal food staple of Dravidian speakers in India. The evolutionary and epidemiological implications of these findings are reported herein.

Key words: Human leukocyte antigen (HLA), sickle cell anemia, haplotype, Y-chromosome, haplogroup, mtDNA.

INTRODUCTION

India is a nation of diverse populations speaking a myriad of languages from Indo-Aryan to the Dravidian group. The Dravidian Super Family of languages covers a large area of Southern India, in addition to numerous Dravidian speaking communities spread throughout northern India. The staple food for most Dravidian speaking communities is millet. Even though there are a number of millets native to India, the vast majority of Dravidian farmers cultivate African millets. This short communication will discuss the Y-chromosome evidence for an African origin of Dravidian agriculture.

DISCUSSION

Controversy surrounds the origin and expansion of agriculture among Dravidian speakers and the prehistoric appearance of African cultigens in India (Blench, 2003). The research literature favors an African origin for Indian cultivated millets as noted in Table 1. The controversy is fueled by the migration of African crops into India neither via the Nile Valley nor over the open sea (Blench, 2003; Weber, 1998). Controversy is compounded by the fact that the cultigens are confirmed archaeologically in areas away from the North and East African coast. The location of millet cultivation in Africa away from the coast bordering the Indian Ocean, fail to support a maritime transfer of millet cultivation from Africa to India.

The major crops cultivated by Dravidians are of African origin (Blench, 2003; Winters, 1980, 2008). These crops include tubers, okra, cow peas, Bambara ground nuts, castor bean, Niger seed, jute, tamarind, silk cotton, sorghum and African millets especially African finger millet (*Eleusine coracana*) and African pearl millet (*pennisetum glaucum*) (Weber,1998; Winters,1981a). These African crops appear in India during the Harappan period of the Indus Valley (Fuller, 2003; Weber, 1998; Winters, 1999b, 2000, 2005, 2008). Many researchers have assumed that the Dravidian terms for millet are of Dravidian origin. This is false. The lexical items used to identify the major African crops cultivated by the Dravidians, are related to African terms used for the same groups (Winters, 1981a, 1999a, 1999b). Winters (2000) has reconstructed the Proto-Dravido-African terms used for these crops. Possehl (1986) and Blench (2003) have suggested that African agriculture played an important role in the expansion of Indian agriculture. Sengupta et al (2006) assert that the research of Fuller (2004) support the indigenous origin of the Dravidian speakers based on archaeobotanical evidence. This archaeobotanical evidence fails to show an indigenous origin for the Dravidian speakers since most of the crops they exploit are of African, rather than Indian origin (Blench, 2003).

Many African cultigens cultivated in India arrived in India in ancient times (Blench, 2003). The biotic evidence

Table 1. Source of Dravidian Cultivated Millets.

Africa	India
Blench, 2003	Fuller, 2004
Fuller, 2003	Sengupta et al., 2006
Fuller, 2006	
Possehl, 1986	
Weber, 1998	
Wigboldus, 1996	
Winters, 1979	
Winters, 1981a	
Winters, 1981b	
Winters, 1985	
Winters, 2000	
Winters, 2005	
Winters, 2008	

from India indicates that Indian millets were domesticated by Dravidian farmers late in their history (Fuller, 2006). And even today millets native to India are utilized on a small scale in India (Fuller, 2006). Sengupta et al (2006) argues a peninsular origin for the Dravidian speakers in the Indus, with significant genetic input resulting from demic diffusion associated with agriculture. Although this is their opinion, linguistic (Aravanan, 1976, 1979, 1980; Upadhyaya and Upadhayaya, 1979; Winters, 1986, 1994) agricultural traditions, archaeology (Sergent, 1992; Winters, 2008) and genetic evidence indicate a recent African origin for the Dravidian speakers (Winters, 2007, 2008).

In India, millets have been found at Harappan sites dating to the 3rd millennium BC (Fuller et al, 2004). Weber (1998) claims that during Harappan times, African millets were integrated into the South Asian subsistence pattern. It is interesting to note that where millet was cultivated in ancient India, we also see the cultivation of rice. Fuller (2006) maintains that today African millets dominate cultivation in India at the expense of native crops. Fuller et al (2004) believe that the African millets may have come to India from East Africa. The only problem with this theory is that Wiegboldus (1996) found no evidence of millet and bicolour sorghum being cultivated in East African countries until late antiquity, millennia after African millets were being cultivated in the Sahara, West Africa and at Harappan sites (Fuller, 2006; Weber, 1998; Winters, 2000). Given the archaeological evidence for millets in the Sahara (Fuller, 2006; Winters, 1981a, 2000), leads to the corollary theory that if the Dravidians originated in Africa, they would share analogous terms for African plants cultivated in India, with African groups that formerly lived in the Sahara like the Niger-Congo speakers. This hypothesis is confirmed by the fact that Africans and Dravidian speakers share the same name for crops cultivated on both continents (Winters, 2000), and lexical items for many domesticated animals (Winters, 1999a, 1999b).

Table 2. Nadaro and Fulani HLAs. In this paper we use a meta-analysis of the y-chromosome and HLA literature to compare and contrast the genetics of Africans and Dravidian speakers. The studies discussed in this paper are concerned with the phylogeny and paleoanthropological evidence relating to an African origin of the Dravidians.

HLA Alleles	Nadars (N=61)	Allele frequencies (%)	Fulani (N=92)	Allele frequencies (%)
A*101	11	9.02	2	1.1
A*0211	13	10.66	1	0.6
A*03011	25	20.49	14	7.7
A*3303	8	6.56	5	2.8
B*3501	18	14.75	13	7.1
B*3701	11	9.02	1	0.5
B*51011	19	15.57	3	1.6

The most common mtDNA among Dravidian speakers belong to M macrohaplogroup. Although this is the case, the HLA of some Dravidian tribal groups is congruent with Africans. In addition the Y-chromosome polymorphic markers typed in Dravidian speaking tribal groups reveal African haplotypes. Aravanan (1976, 1980) pointed out that in addition to shared phenotypical features, African and Dravidian tribal groups such as the Kadaro, Irula and Pularya have the sickle cell trait and belong predominately to the Blood O group. Sickle cell anemia is named after the geographical region in which it is found: Arab-India, Benin and Senegal. The Senegal and India sickle cell share haplotypes. In relation to sickle cell Dravidian tribal groups and the Fulani of West Africa carry the Arab-Indian and Senegal haplotypes are both associated with a C!T mutation at position -158 (Bain, 2001; Rahimi et al., 2003).

The human leukocyte antigen (HLA) allele distribution has been studied in India and West Africa. The HLA system provides us with a means to define the relatedness of varying ethnic groups. Polymorphic DNA variants allow us to make inferences about prehistoric interactions among populations. Using HLA we can determine the relatedness of populations. Shankarkumar, Sridharan and Pitchappan (2003) have done an extensive analysis of Nadar HLA. Ellis et al (2000) has studied the Fulani HLA system. The congruent Fulani and Nadar HLA alleles include A*101, A*0211, A*3303 and B*370 at low frequency. As illustrated in Table 2, the HLA with the greatest frequency between both groups was A*03011, B*3501 and B*51011. The presence of shared HLA genome indicates that a genetic relationship may exist between the Nadar and Fulani peoples. This finding supported the linguistic (Aravanan, 1979; Upadhyaya and Upadhyaya, 1979; Sergent, 1992; Winters, 2007, 2008), anthropological (Aravanan, 1976, 1980; Winters, 2008)

Table 3. Distribution of African and Indian Haplotypes.

Population	T-M70 Allele frequency	H1 Allele frequency
Fulani**	18	-----
Utter Pradesh Gonds	10.81	59.46
Utter Pradesh Kols	--------	11.11
Madhya Pradesh Gonds	6.25	56.25
Dravidians*	11.1	22.2
Egypt**	8.2	---------
Tanzania**	3.8	

*Trivedi et al, 2008; **Luis et al, 2004.

and archaeological (Sergent, 1992; Winters, 2007, 2008).

There are a number of shared African and Indian Y-chromosome haplotypes. These haplotypes include Y-hg, T-M70 and H1. Table 3 indicates that Haplogroup T-M70 is found among several Dravidian speaking tribal groups in South India, including the Yerukul (or Kurru), Gonds and Kols. Y- haplogroup T-M70 is found in the eastern and southern regions of India (Trivedi et al., 2008). It has a relatively high frequency in Uttar Pradesh and Madhya Pradesh (Sharma et al., 2009). Sharma et al (2009) in a study of 674 Dalits found that 89.39% belonged to Y-hg K*, in relation to Dravidian speakers it was revealed that Y-hg T-M70 was 11.1%. Trevedi et al (2008) report that Y-hg T-M70 is predominately found among Upper Caste Dravidians at a frequency of 31.9. The highest frequency of T-M70 in the World is found among the Fulani (18%) of West Africa. Ramana et al. (2001) claims that the discovery of H1 and H2 haplotypes among the Siddis is a “signature” of their African ancestry. As a result, the Y-hg H1 subclade frequency among Dravidian speakers can also be considered as an indicator of an African-Dravidian connection.

The H1 haplotype is found among many Dravidians. Sengupta et al (2006) noted that the subclades H1 and H2 were found among 26% of the Dravidian speakers in their study, especially in Tamil Nadu. Trivedi et al (2008) found the Y-hg H1 frequency of 22.2 among Dravidian speakers in their study. Sharma et al (2009) reports a frequency rate of 25.2%. Researchers make it clear that although Africans and Dravidians share many phenotypical traits, they are not genetically related. But the research suggests that there are a number of HLAs and haplotypes shared by speakers of African and Dravidian languages.

The comparison of Dravidian and African HLAs, haplotypes and the exploitation of African cultigens by Dravidian speakers, who gave the cultigens names already used by African farmers, is highly suggestive of a possible historical relationship between these populations. Many researchers have assumed that Y-hgs T-M70 and H1 may be the result of a back migration to Africa from Asia. The presence of African millets in India along with archaeological and linguistic evidence suggests that the Dravidians originated in Africa and carried these genes with them to India as a result of an overland migration. This view is supported by the fact that the Dravidian tribal groups are believed to be the most pristine Dravidians. Given the fact that it is among the Dravidian tribal groups who share the most genomic material with Africans is further confirmation of a recent African origin for Dravidian speakers in India. This is highly suggestive of an African and Dravidian relationship since the Tribal groups are believed to be among the original settlers of India.

This genetic, biotic, linguistic, anthropological and archaeological evidence is congruent with a probable connection between these populations. Although this is true, this study includes a small sample of Dravidian tribal populations. The findings indicate that we need more research to gain a full understanding of the populations shaping Dravidian ancestry.

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