

Mitochondrial DNA and some more on the ancient Japanese-South American linkage: Recent concepts

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Abstract

The peopling of the Americas has been largely investigated by different methods. A recent one based on the mitochondrial DNA analysis have reinforced the widely discussed Asian-American linkage. Interestingly, the specific analysis of the so-called 9-bp deletion has shown an uneven distribution in current and ancient Asian and American populations. This deletion is absent in some present Japanese and South American people, and it is also lacked in ancient remains from both Japonesia and South American places. A route different to the Bering strait followed during the time of ancient migrations from Asia to America has been suggested and, if any, it would explain these unexpected features. Remarkably, a large amount of genetic, virologic, anthropologic, and archeologic data seem to point out that ancient contacts took place between Japanese ancestors -mostly those living around the south- and South American natives in a more direct manner than usually thought. We suggest that the transpacific currents that directly join Japan with some Pacific coastal places in South America could be the Oceanic vessel that allowed such ancient contacts since 6000 years ago or earlier.

Key words: Mitochondrial DNA, 9-bp deletion, Jomon, South American natives

Introduction

The peopling of the Americas has always called the attention and different investigations have been employed to explain it. A recent molecular tool based on the analysis of the mitochondrial DNA has been found useful for better understanding the human evolution (STONEKING and WILSON, 1989). Specifically the presence of the so-called 9-bp deletion seems to be helpful to clarify the widely discussed Asian-American linkages (BALLINGER *et al.*, 1992). However, the absence of such 9-bp deletion in some Asian and American clusters was recently observed (TORRONI *et al.*, 1993a; TORRONI *et al.*, 1993b) and these groups were called the lineage B cluster. This fact raised the possibility that "... group B mtDNAs came to the Americas by a different route than that followed by haplogroup A, C and D mtDNAs..." (TORRONI *et al.*, 1993a; TORRONI *et al.*,

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1993b). The loss of group B by a genetic drift was considered, but that hypothesis, according with those authors was "... not entirely satisfactory..." (TORRONI *et al.*, 1993b).

So we would like to make some comments on that probable 'different route' followed by those ancient travelers toward America and more Specifically to South America, which could have occurred at a different time, as it was recently suggested (TORRONI *et al.*, 1993a; TORRONI *et al.*, 1993b). These facts could be summarized as follows:

Main facts on the 9-bp deletion

A. The American scenario:

This deletion has been found in modern American natives from North, Central and South America (SHURR *et al.*, 1990; TORRONI *et al.*, 1992; HORAI *et al.*, 1993; TORRONI *et al.*, 1993a; TORRONI *et al.*, 1993b). A map drew accurately by TORRONI *et al.* (1993b, fig. 5) showed that this deletion was noticeably lowest or absent in some current populations living in the northernmost part of South America, and especially in Ticuna aboriginals. They are considered as one of the most isolated native groups in South America with very little foreign admixture (SHURR *et al.*, 1990; TORRONI *et al.*, 1992). These features suggested that a genetic restriction occurred between North and South America many years ago (SHURR *et al.*, 1990). On the other hand, a recent study performed on ancient mummy samples from Southwest United States and South America (Peru and Chile) showed an interesting finding: The pre-historic North American samples were deletion positive while those from South America - some of them dated between 4000 to 1000 years B.P.- were entirely deletion negative (HORAI *et al.*, 1991; FISHMAN, 1993).

B. The Asian scenario:

The 9-bp deletion has been considered as a useful marker in Asians and mostly, Southeast Asian populations (HERTZBERG *et al.*, 1989; STONECKING and WILSON, 1989). In Southeast Asia some contemporary populations present such deletion as for example 'modern' coastal people from New Guinea, Melanesians and Polynesians (HERTZBERG *et al.*, 1989; HORAI *et al.*, 1991). The latter group has reached up to 100% in such marker distribution (HERTZBERG *et al.*, 1989). By the way, this deletion was absent in natives from New Guinea highland, who lived in extreme geographical isolation until this century (STONECKING and WILSON, 1989), and in Siberian people (TORRONI *et al.*, 1993b).

Remarkably, in Japan a dual distribution was suggested (HANIHARA, 1991). This distribution has been confirmed by the analysis on the 9-bp deletion in current Japanese people (HARIHARA *et al.*, 1992). The people living in the central region of Japan (Honshu island) are considered as the 'modern' Japanese, and show a higher presence of 9-

bp deletion than those living in the Northern and Southern parts of Japan (HARIHARA *et al.*, 1992). These latter groups from Japan are related to Ainu and Ryukyu ancestors who are considered as the descendants of the Jomon people that established the so-called Jomon period in Japan (HANIHARA, 1991). More interesting was to know that some skeletal remains from that Jomon period dated between 6000 to 3000 years B.P., had no 9-bp deletion (HORAI *et al.*, 1991).

From another view, in the Jomon period a kind of pottery developed is known as 'CORD PATTERN', since much of their work is marked with an overall ropelike design (HALL, 1990). This type of pottery found in Japonesia (KATAYAMA, 1990), has been related with a similar one discovered in the so-called Lapita culture which is present in the Pacific basin (KATAYAMA, 1990). From this Lapita culture some skeletal samples were recently analyzed for the presence of that 9-bp deletion (HADELBERG and CLEGG, 1993). The more ancient samples from Melanesian places dated between 2700 to 1700 years B.P. didn't show such marker while the more recent ones from Polynesia dated since 700 years B.P. did (HAGELBERG and CLEGG, 1993).

More on the Japanese-South-American similarities

According to other genetic, linguistic and anthropological studies done on American aboriginals clinal differences between North and South America have been previously suggested (ROTHHAMMER and SILVA, 1989; O'ROURKE *et al.*, 1992; CALLEGARI-JAEQUES *et al.*, 1993). In the case of the settlement of Americas from North to South, as suggested elsewhere, it was noticeable that Central America was less densely populated than initially expected (O'ROURKE *et al.*, 1992). In genetical grounds, a close relationship between the Noanama natives located at the Northwestern part of South America, in Colombia, and the Japanese in Asia had been noted (KIRK, 1969). Recent HLA studies revealed the presence of a common haplotype in some South American natives and Japanese populations (SONODA *et al.*, 1992); and moreover, some of those people living around of the Northwesternmost part of South America displayed exactly the same haplotypes like those described in Japanese (SONODA *et al.*, 1994). In the same vein, the molecular analysis of a retrovirus named HTLV-I has been useful to understand ancient human movements (SAKSENA *et al.*, 1992). This retrovirus, in South America, has mostly been found in people with African ancestors and in populations living around Pacific Ocean (GONGORA-BIACHI *et al.*, 1993). The sequence analysis of these South American retroviruses was found to be similar to that described in Japanese carriers (MIURA *et al.*, 1994). Finally, from an archeological stand point, the Jomon pottery from southern Japan, already described, is similar to that discovered in Ecuador and so-called 'the Valdivia Phase'. These latter samples were found at the Northwesternmost part of South America along of the Pacific coastal of Ecuador. Both of those type of potteries were dated since 5500 years B.P. (ESTRADA *et al.*, 1962; SCHOBONGER, 1969).

The Asian-Pacific-South American connection

Not only us, everybody agree (SALZANO, 1984) that some ancient movements between Asia and America through the Bering Strait occurred (MIURA *et al.* 1994). However, it doesn't exclude the possibility that other contacts with the proto-polyne-sians as previously suggested (SALZANO, 1984; BELLWOOD, 1989; KATAYAMA, 1990; ZANINOVIC, 1992) could have taken place, too. This fact could contribute to the the presence of such 9-bp deletion in some South American natives, among others markers already commented. But, transpacific contacts with proto-melanesians; and moreover ancient trips from Japonesia toward some Pacific places of South America could have taken place following the sea-currents (ESTRADA *et al.*, 1962). In this sense, the Black currents flowing from Japan, along with those beginning from Panama, the Equatorial counter current; and the Humboldt current form an interoceanic vessel between the south of Japan and the Pacific Coastal of South America (ESTRADA *et al.*, 1962; BELLWOOD, 1989). This route could allow a closer contact between southern Japonesia and the Pacific Northwest Coast in South America. These transpacific route may explain some of those North-South differences found during the analysis of the 9-bp deletion in those ancient samples from American places (e.g., present in North American and absent in Peru and Chilean samples), and would also be useful for understanding the less densely populated Central America (O'ROURKE *et al.*, 1992). It may be helpful to clarify the North-South differences on the HTLV-I distribution in America. Likewise, these Japonesian-South American contacts might be useful to understand other correlations described in Japanese aboriginals and South American natives and commented elsewhere. Furthermore, these type of transoceanic and 'more direct' contacts between Jomon people (with no 9-bp deletion) and some Pacific places of South America might explain, in some manner, the suggestion done by TORRONI *et al.* regarding the arrival of some ancient 'group B-migrants' to South America, '... by different route than that followed by the haplogroup A, C, or D...' (TORRONI *et al.*, 1993a; TORRONI *et al.*, 1993b). Perhaps, those group B-migrants' genes have been maintained unchanged in some of those non-mixture native groups clustered around of the Northernmost part from South America.

Conclusion

We don't attempt to clarify a lot of scientific and well done studies on human migrations just with this explanation. We are aware that the mitochondrial DNA study is not only devoted to the 9-bp deletion (STONECKING and WILSON, 1989), and of course, more detailed studies on other genetic, linguistic, anthropological data, and so forth must be done for reaching a total understanding of the human evolution. Nevertheless, due to the fact that a large amount of information on 9-bp deletion has recently been published, and the importance given to this genetical marker is noticeable, we

have tried to assemble the majority of the outstandings data published on this matter in this paper. Thus, we have wanted to offer a probable explanation for some of those ancient and modern 'uneven' distributions on the 9-bp deletion's absence in the human mitochondria between some North and South American populations, and which will, or may; provide a useful correlation for further research on the human evolution around the World. The transpacific route from Japonesia and perhaps, from ancient Melanesia, is an important way that was likely followed by those sailors during the peopling of the Americas, and specifically to South America. In this sense, it is also probable that Jomon people and their relatives didn't carry such genoma deletion emphasized here (group B by TORRONI *et al.* (1993a)), and which could be transferred and maintained in some of the current South America natives since those times of ancient human migrations.

NOTE: A recent editorial of the American Journal of Human Genetics (CANN, 1994) commented that the presence of the lineage B cluster in America could also be due to direct contact across the Pacific Ocean.

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