

Origin and domestication of chicken: a mitochondrial DNA perspective

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The origin of the domestic chicken remains highly debated within the archeologists and the geneticists communities. Most scholars agree that the red junglefowl *Gallus gallus* is at the main ancestor of the domestic species (Crawford 1990), although there is evidence of inter-species hybridization within the genus (Nishibori *et al.* 2005). Within *Gallus gallus* several subspecies namely, from west to east *G. g. murghi*, *G. g. spadiceus*, *G. g. jabouillei*, *G. g. gallus*, *G. g. bankiva*, could have contributed to the domestic stock. However, mitochondrial DNA information obtained in the 1990's suggest that one continental population of red junglefowl *Gallus gallus gallus*, probably from Thailand, is likely at the maternal origin of all domestic chicken (Akishinomiya *et al.* 1994, 1996). Later Niu *et al.* (2002), examining the mitochondrial DNA of Chinese native chicken, confirm that their most likely origin is Thailand and its adjacent geographic areas. No molecular genetic evidences have supported so far a possible origin of the domestic chicken in other parts of the Asian continent

With the help of many colleagues and institutions throughout Africa, Asia and Europe, the International Livestock Research Institute (ILRI) is engaged in large geographic scale project aiming to understand the origin and distribution of the genetic diversity of domestic chicken at the mitochondrial DNA level.

We analyse the genetic variation in the first 397 base pairs of the mitochondrial DNA (mtDNA) HV1. We have examined so far a set of 1076 native domestic chicken sequences including 919 new sequences (G. Bjørnstad, and V. Mobegi unpublished data) and 157 sequences from Genbank. More than 150 different haplotypes were identified amongst the native chicken. Neighbour-joining tree and medium joining network analysis group the sequences into six to seven different sets or clades of haplotypes and a small number of 'outliers' sequences. Geographic frequency distributions of the clades confirm Asia as the center of origin of domestic chicken with all clades observed in the geographic regions including the today distribution of wild *G. gallus*. Outside Asia a single clade is found nearly exclusively in the Near East and in Europe and the same clade is most commonly observed in Africa. These results are compatible with chicken domestication occurring in Southeast Asia with subsequent geographic dispersion and changes in frequency of each clade following genetic drift, founder effect and/or selection.

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However, diversity analyses within clades in different geographic regions suggest a different scenario. These analyses support an origin of some clade(s) in South Asia and others in Southeast Asia and/or adjacent geographic areas and suggest multiple maternal origins for the domestic native chicken and therefore more than one domestication event.

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