LETTER

# Questioning the evidence for a Central Asian domestication origin of dogs

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A recent study by Shannon et al. (1) proposes a Central Asian domestication origin of dogs, based upon the finding that Central Asia had the lowest short-range linkage disequilibrium (LD) among village dogs across the globe. A reanalysis of their data, however, suggests that these conclusions may require revision.

First, Shannon et al.'s (1) definition of "Central Asia" is questionable. Mongolia and Nepal [the two regions assigned to Central Asia by Shannon et al. (1)] are not associated with the common definition of Central Asia that includes the region bounded by the Caspian Sea, Russia, China, and Afghanistan, but are located in East Asia and South Asia, respectively. Although Mongolia is occasionally considered a part of Central Asia (e.g., by the United Nations Educational, Scientific, and Cultural Organization), Nepal is not, but is considered a part of South Asia according to all modern definitions (Fig. 1*A*). There is no expectation that the dogs in these countries represent a single, interbreeding population. Using the data from Shannon et al. (1), we recalculated the LD of Mongolia and Nepal separately, finding different LD patterns in the two countries (Fig. 1*B*). The LD is lower for Nepal than for the combined population, at both short inter-SNP distances (<0.0005 cM) and intermediate distances (0.01–0.05 cM), and higher for Mongolia, suggesting that the assumption of a single population is not correct.

Most important, although several studies have argued that domestic dogs originated in southern China (2), no dogs from this region were included in Shannon et al.'s analysis (1), neglecting available published data (3, 4). We therefore included published data from Ying Jiang, southwestern China (3, 4) (Fig. 1*A*), in the LD analysis. The results show that this South Chinese population, and not Central Asia or Nepal, had the lowest LD of all populations at both short and intermediate inter-SNP distances (Fig. 1*B*). Thus, although we question this statistic as a sole indicator of dog geographical origin, we here show that if low LD at short inter-SNP distances is used to identify the geographical origin of the dog, the available data suggest southern China rather than Central Asia or Nepal.

Last, Shannon et al. (1) correctly note that East Asia contains the largest number of mitochondrial DNA haplogroups worldwide, but claim that East Asia contains fewer Y haplogroups than most other regions, by lacking haplogroup 8 (H8). However, this assertion does not take published data into account. H8 was previously found in an East Asian dog, actually the "type specimen" in which H8 was first identified (5), implying that East Asia contains at least the same number of Y haplogroups as all other geographical regions.

These issues, related to geographical partitions and regional sampling bias, suggest that the conclusions reported by Shannon et al. (1) may require revision. It is important that future studies of dog origins incorporate samples from across the Old World, including southern China and Southeast Asia, in broad collaborations, and that data quality can be normalized across different data types.

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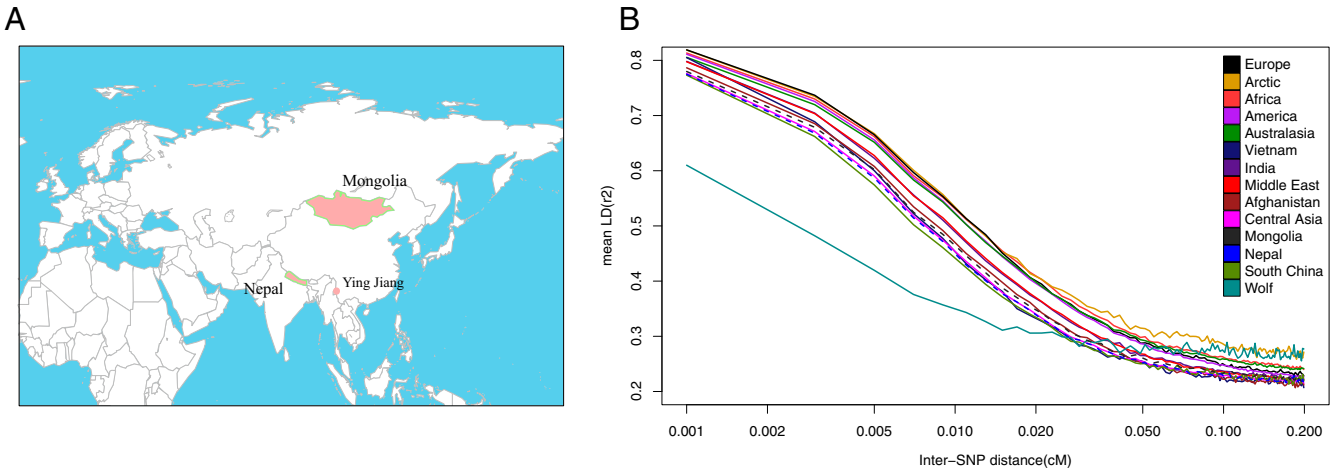


**Fig. 1.** (*A*) Map showing the location of Mongolia and Nepal, and Ying Jiang in southern China. (*B*) LD decay curves for village dogs worldwide based on the data from Shannon et al. (1), and the Ying Jiang village dogs. The dashed lines represent the populations from Mongolia (gray) and Nepal (blue), respectively. The grass green line represents the population from Ying Jiang, southern China.


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