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## The genetic hallmarks of dog breed development reveal shared patterns of historical human-dog interactions.

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### Abstract

Each Approximately 15,000 years ago, the wild grey wolf gave rise to the first domestic dogs. Multiple domestication events likely took place throughout modern day Eurasia, though the precise times and locations are a hotly debated topic among researchers. Distinct populations of dogs, varying in physical appearance and behavior, developed to reflect the needs or desires of the human cultures in which they were formed. Rich in history, Italy is home to at least 24 unique dog breeds. Genetic analysis of these breeds, in relation to global dog breeds, has highlighted key technological advancements and movements of the region's people. We have analyzed DNA from 1,609 dogs, representing 182 breeds, and 16 wild canids, on a panel of 142,840 markers genome-wide. Twenty-four of these breeds are native to Italy, with 3 represented by both Italian and American populations. Through analysis of phylogeny and identity-by-descent haplotype sharing, patterns of breed formation have emerged that parallel the developmental progression of humans. Selection for common physical and behavioral phenotypes in hunting sighthounds, without evidence of recent shared genetic history, reveals shared human needs and biologically ideal forms. Identification of breed relationships to the isolated Foini's Dog of Sardinia exposes geographic regions of development and tracks shared migration with human cultures. Finally, molecular evidence of historic agricultural practices is observed in the shared genetics of livestock guardian breeds.

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