

## DNA and Breed I.D.

### **Advances in DNA testing illuminate the world of dogs.**

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Posted: Fri Oct 1 00:00:00 PDT 2004

The degree of similarity can be used to estimate how related breeds are to one another and to wolves. Eight wolves, one each from China, Oman, Iran, Sweden, Italy, Mexico, Canada, and the United States, were used for comparison. Using these wolves as the root of a phylogenetic tree, a cluster of breeds consisting of four smaller branches was clearly separate from the remaining breeds. These branches and their breeds were: 1) the Chinese Shar-Pei, Shiba Inu, Akita, and Chow Chow; 2) the Basenji; 3) the Alaskan Malamute and Siberian Husky; and 4) the Afghan Hound and Saluki. By changing the statistical criteria and using these breeds as the root of a phylogenetic tree, the Tibetan Terrier, Lhasa Apso, Pekingese, Shih Tzu, and Samoyed were also grouped in this cluster. That this progenitor cluster springs from such a wide geographic expanse suggests that the first dogs originated in Asia, and migrated with humans throughout Asia and as far north as the Arctic and as far south as Africa.

The remaining breeds (those not in this progenitor cluster) probably originated more recently from European founders. Applying more sensitive analyses allows these breeds to be subdivided into three groups. The first is made up of Mastiff-like breeds and includes the Boxer, Bulldog, Newfoundland, and other guarding breeds. The German Shepherd Dog also falls into this group, perhaps reflecting an influx of genes from military dogs with Mastiff forebears. A second subdivision is made up of herding-type breeds such as the Collie, Belgian Sheepdog, and Australian Shepherd. This group also surprisingly contained the Saint Bernard, Greyhound, Borzoi, and Irish Wolfhound. These non-herding breeds may have been either herding breed progenitors or descendants. The remaining subdivision represents a wide variety of dogs of mostly recent European descent, and includes terriers, scenthounds, spaniels, pointers, and retrievers.

These findings are important because they will allow researchers to pool samples from closely related breeds in order to better map disease and complex trait genes in dogs and possibly humans. The research also has significance for understanding the evolutionary history of dogs, in forensics, and for breed and mixed-breed identification.

Being able to assign a dog to a particular breed has many implications. At present, the AKC issues Indefinite Listing Privilege numbers based on a dog's physical similarity to a particular breed. Many such dogs are fortuitous imposters that are in reality mixed breeds. DNA identification may eventually prove to be more reliable than the current method.

Breeders who produce unexpected phenotypes in their supposedly purebred litters can at present turn to DNA parentage testing, but this only proves the sire and dam are who they claim to be. It's possible that unusual traits could instead result from the influx of genes from a dog of another breed several generations ago, and that through inbreeding these recessives have been expressed. DNA microsatellite comparisons may or may not differentiate between mutation and cross breeding.