

## Basenji Conservation

by Dr. Jo Thompson

As reported in the Basenji Club of America (BCOA) Bulletin Board Newsletter dated 15 May 2007, a committee was authorized by the 2006 ballot to petition the American Kennel Club (AKC) to open the Basenji registry of the AKC studbook. This initial move to explore the possibility of adding new imported dogs from Africa into the Basenji registry provides an opportunity to contemplate the concept of conservation as it applies to the preservation of Basenjjs.

First of all, we need to define the “population” we are considering. All domesticated dogs are in the same species. The dog (*Canis familiaris*<sup>1</sup>) has evolved to become one of the most variable animal species associated with humans; with many various types forming separate breeds. The Basenji has a lineage of distinguished ancestry and forms its own global ‘metapopulation’ with all individuals descending from the original native ancestral group in central Africa. The Basenji is the second oldest distinct breed to diverge from the proto-dog/wolf common ancestor<sup>2</sup>, making it one of the most ancient domesticated breeds in the world. In other words, as a group it has been isolated from other breed development longer than almost all other dogs, which ensured the distinct differentiation of the specific canid type we call Basenji. This isolation was crucial in avoiding the exchange of genetic material from the general canine population. Archaeological evidence suggests that dogs were incorporated into the social structure of humans and domesticated away from the proto-dog/wolf ancestor about 14,000 years ago<sup>3</sup>. That may provide some idea of the length of time that the breed, we have known for about a century, has actually been reproducing within its own typology, thus fixing the desired physical traits that distinguish it as unique. The word *primitive* is sometimes used to describe the Basenji because it is one of the breeds of dog that is believed to still remain close in morphology (appearance) and behavior (hunting style) to that earliest ancestral canine.

The Basenji is a natural breed found within the milieu of equatorial Africa, principally the Congo Basin forest block corresponding to the watershed of the Congo River. This geographic region is still the root source of the Basenji ancestral stock and

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<sup>1</sup> The BCOA website says that the club is, “dedicated to the preservation and improvement of *Canis basenji*.” In fact, there is no such species; *Canis basenji* is simply an imaginative term coined to emphasize the uniqueness of the Basenji breed for literary purposes and for fun.

<sup>2</sup> Phylogenetic analysis suggests that ancient dog breeds first bifurcated into a clade of Asian breeds (with the Chinese Shar-Pei to diverge into the first distinct breed) and a clade of all others; the second bifurcation was the split between Basenjjs, as a distinct breed, and all others.

<sup>3</sup> Canine genome research suggests that the dog branch (the origin of *Canis familiaris*) of the canine tree diverged from the wolf branch somewhere between 135,000-60,000 years ago followed by numerous episodes of admixture (repeated genetic exchange) between wolves and dogs. However, the dating of domestication and those behavioral traits (influenced by genetic change) that promoted the permanent association and companionship of dogs with humans will here be based on archaeological evidence which demonstrates the ritual burying of dogs as indicative of the social relationship between dogs and humans [“Burying key evidence: the social bond between dogs and people” in the *Journal of Archaeological Science* (2006)].

serves as the reservoir for the full complement of breed genotypic variation or genetic allele diversity. But, it is not the only home of Basenjis. Basenjis are officially recognized through breed registries throughout many parts of the world outside their traditional home. When viewed globally, the Basenji metapopulation has a fragmented populace; those inside their native home in central Africa, here called the *source population* and those outside, here called the *modern population*. The source population is genetically diverse resulting in a low chance that any two negative genes will combine and individuals have a very high chance of being healthy. Conversely, the modern population is not genetically diverse and the chance of two negative recessive genes combining rises in direct relationship to the degree of homogeneity. The evidence that the source population appears to be "clean" is indicative that it is still diverse enough that negative genes are not yet combining.

So, how do the concerns of population conservation apply to preservation of the Basenji? Population geneticists insist that populations under artificial selection, subjected to high levels of inbreeding, tight line breeding, non-random mating, genetic drift, popular sire syndrome, inbreeding depression, directional selection within a closed registry, or small gene pool dynamics simply cannot maintain genetic viability and breed vigor in the long term without the introduction of new genetic material.

Historic records tell us that the first Basenjis to be brought out of Africa were a pair whose origin was the rainforests of Congo in central Africa (modern day Democratic Republic of Congo; formerly known as Zaire, the Belgian Congo or Congo). They arrived in London in 1895. These first native imports were brought from the Congo by a British explorer during a time when Britain was first penetrating up the Congo River system and making first contact between Westerners and indigenous people. The breed was introduced to Europeans when the pair were exhibited at the Cruft's Dog show that same year; although shortly after both died of distemper<sup>4</sup>. During the heyday of large English kennels, the entrance of these unique barkless (but vocal) hunting dogs onto the international scene did not go unnoticed. Over the following years many more attempts were made to export foundation stock from the Congo Basin (the Congo and southern Sudan) for the dog show fanciers. Most private efforts were unsuccessful<sup>5</sup> until three Basenjis from southwestern Congo [Bokoto of Blean, Bongo of Blean, and Bereke of Blean] established the foundation of the breed when they were successfully imported to the United Kingdom in 1936 and bred.

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<sup>4</sup> The viral cause of distemper was first described in France in 1905. After distemper swept through several hunt kennels in the United Kingdom in 1923, 'The Field Distemper Fund' was set up by *The Field* magazine, the largest field sports publication in the U.K. The money raised was used to initiate a vaccine development project. After years of work, a vaccine was developed that produced attenuated virulence for foxes -- i.e. the strain was so weak that it would not kill the fox, but it would provide the fox with immunity. After additional experimentation, a modified live-virus strain was developed which was believed to cause only "a slight malaise" in dogs. In 1939 widely administered trials began to immunize healthy dogs against distemper as an extra precaution. Due to quality control problems, the vaccine was not always effective. Many dogs died because of the non-perfected vaccine. World War II stopped all research into distemper, but after the War ended, improved culturing methods enabled even more attenuated strains of the distemper virus to be created, and by the early 1950s distemper vaccine was available on the market.

<sup>5</sup> The Berlin Zoo exhibited and bred 'Native Dogs of the Congo' in the early 1900s, and the Paris Zoological Garden exhibited Basenjis under the colloquial nomenclature "Congo Terriers" in the 1890s.

Over the course of the following five years an additional four native imports contributed to the registered foundation stock of Basenjis and its descendants recognized by the Basenji Club of Great Britain (BCGB) and registered under The Kennel Club of the United Kingdom [Bashele of Blean, Bungwa of Blean, Amatangazig of the Congo, and Simolo of the Congo]<sup>6</sup>. The breed was then developed in Great Britain with these seven (7) as the foundation stock outside of their native homeland; this is known as the founder event<sup>7</sup>.

The Basenji Club of Great Britain was formed in 1939. Early breeders worked to “achieve the desired improvements of daintiness, soundness and short backs” (Basenjis: The Barkless Dogs. by Veronica Tudor-Williams, 1946, page 70) wanted by the fancy. The breed standard was written for the first time in February 1939 as an unofficial archetype defining the breed based on a phenotypic description and distinguishing all breed members separate from other breeds by this typology identification. Then, with some modifications to include more details, on June 24, 1942 the official Basenji breed Standard was approved. The breed Standard has been revised a number of times since its original form but always with the goal to promote breed improvement, advancing from the ancestral form. Over the years of breed development the Basenji “has been improved anatomically by careful breeding in order to fit [the] present- day Standard” (The Complete Basenji. By Elspet Ford, 1993, page 33). The word *modern* is used here to describe the Basenji that has been selectively bred and modified to achieve the breed Standard theoretical ideals. Conformation dog shows award dogs that most closely express the breed Standard. The goal of the conformation show is conformity and, where winning guides the breeding programs, the gene selection criterion are narrowed.

Basenjis first arrived in the United States in 1937; one native import from the Congo [Bakuma of Blean aka Phemister’s Bois] and two descendants of British breeding. The only one to contribute to the modern line was Phemister’s Bois. In February 1938 two British bred Basenjis [Bakuma of Blean and Basashi of Blean] were exhibited at The Westminster Kennel Club. Soon thereafter, in 1941 Phemister’s Congo was found on a ship trapped with cargo that had been loaded at the port of Monrovia, Liberia. Mr. Alexander Phemister, based on his knowledge of the breed, proclaimed the castaway to be a Basenji. The breed was again presented to the USA dog fancy community at the 1941 Morris and Essex Kennel Club dog show. The ‘Morris and Essex’ was considered to be the most prestigious of shows in its era; the name Morris & Essex is linked to Geraldine Rockefeller Dodge. Shortly thereafter, the Basenji Club of America was formed in 1942; the original board of directors included Mr. Alexander Phemister, President; Miss. Ethelwyn Harrison and Dr. Eloise Gerry, Vice Presidents; Mr. George L. Gilkey, Treasurer; and Mr. George E. Richards, Secretary. They agreed to accept the

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<sup>6</sup> Basanga of Blean was also imported at this time but she was deemed to be untypical and the two puppies from her only litter were placed in pet homes, “not to be bred from” ... she did not contribute to the foundation of the breed.

<sup>7</sup> When a finite number of individuals “found” (start) a new population group, the genome of the new group will necessarily reflect the genes brought to it by the founder animals; gene frequencies within that population will reflect the gene frequencies within the limited founder group rather than that of the source population. In this way, when a founder event occurs, a gene quite rare in the source population may have a much higher frequency in the new population; conversely, genes common in the source population may be infrequent or even absent from the new population.

breed Standard approved by the BCGB. After exchanged communications<sup>8</sup> with board members, the American Kennel Club officially accepted the breed in 1943. Once the breed was accepted, a Basenji registry in the AKC studbook<sup>9</sup> was opened. A total of 39 Basenjjs were enrolled during that initial registration in June of 1944 (14 dogs and 25 bitches) as the first American Basenjjs. Table 1 identifies those original AKC registered Basenjjs. Note that except for Phemister's Bois and Phemister's Congo, they are all the descendants of dogs from The Kennel Club of the UK. Thus, the AKC foundation stock for the breed was started from 9 dogs who contributed descendants: the original 7 native import foundation dogs registered in The Kennel Club of the UK and the two Phemister<sup>10</sup> native imports.

Other foundation stock registered in the AKC included Kindu and Kasenyi. Kindu and Kasenyi were imported in 1941 from the Republic of Congo, at the western limit of the traditionally accepted range of the pure Basenji. Their appearance was notably different from the standard type. They produced a litter in 1945 that were registered and subsequently Kindu and Kasenyi were also registered in 1946. Thus, these 2 were added to the native import foundation stock for a total of 11 founders (the original progenitors from the source population) to produce the major Basenji breeding lines. Also, diverse genes were added to the modern pool from dogs that were not imported into the USA. A number of dogs contributed limited genetic diversity through the export of their descendants from continental Africa. Tex of Alexandria (southern Sudan), Miliku and Kogi (Liberia), and Binza of Laughing Brook (southern Sudan) were bred from Africa and their descendants were then exported and added to the modern gene pool outside the USA. Others were imported from Africa to the U.K. and their descendants contributed significantly to the modern population gene pool {Wau of the Congo and Fula of the Congo). Kiki of Cryon was imported to the USA from Liberia but was not registered. Her genes contributed to American registry stock through breeding with U.K. lines. Therefore, the Basenji modern population was derived from 18 original progenitors, with varying degrees of gene representation.

As a result of this very small pool of founders, some more heavily represented than others, the modern population of the Basenji suffered indiscriminate loss of genetic diversity. In response to the high degree of inbreeding and the lethal expression of some health related recessive traits, in 1990 the Basenji registry was opened to allow additional new founders (those whose genes contributed to future generations, leaving aside those which did not reproduce) imported from the source population in the Congo (Zaire). An additional eight dogs [Avongara Diagba, Avongara Gangura, Avongara K'Posi,

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<sup>8</sup> Those critical exchanges between BCOA and AKC are not in the AKC archives – they were private communications.

<sup>9</sup> According to the AKC, there is only one studbook; each breed represents a different “chapter” (term used by AKC) in the studbook. Each professional registry (such as the KC, UKC, CKC, and others) holds its own studbook for its recognized breeds.

<sup>10</sup> In 1964 George Gilkey (one of the original BCOA board members) wrote, Phemister's “Congo was bred but once and had three pups, two of which were later bred to other stock. I have a record of the first 1,500 dogs registered by the American Kennel club and my studies indicate that the oldest living dog carrying this bitch's blood has today less than one percent of the same. As she is no longer a factor in our bloodlines I will drop her from consideration.” (“Our First Basenjjs” in *The Basenji* Vol. 1, No. 1, May 1964. Pgs. 4-5.)

Avongara M'Bliki, Avongara N'Gola, Avongara N'Gondi<sup>11</sup>, Avongara Zamee, and Esenjo] contributed to the gene pool rescue effort at that time. It was a good first start, but it was not enough. This brought the founder number for the AKC registered modern population up to 26 contributors (see Table 2); however, some of them have made a limited contribution or been maintained in tightly controlled breeding programs and not incorporated into the modern population pool. It is important to realize that these founders have not contributed equally to the gene pool. It has been suggested that the stud dogs Bongo of Blean, Wau of the Congo, and Kindu represent well over 95% of the Y chromosomes (the Y chromosome is passed exclusively from stud male to male progeny) in the modern population gene pool. Compounding this, several of the lines have died out in recent years, further limiting the genetic diversity of the modern Basenji. Since 1936 when the Basenji was successfully established outside of Africa, all the modern population descended from these few original imports and all are related at some point in their lineage once the pedigree is taken back far enough.

One of the most basic factors affecting the genetic makeup of a small population is the number of unrelated original progenitors (the founders). In the science of population genetics, the concept of “*effective population size*” (the minimum number of animals to constitute the foundation stock) is concerned with the number of breeding individuals in an “*ideal population*.” It is assumed that these ideal breeding founders (the original progenitors) show the same amount of dispersion of allele frequencies under the effects of small population and are equally unrelated to any other Basenji in the population except their descendants according to their pedigree representation. This is important to note because many of the modern population lines result from founders that originated from defined geographic areas in the Congo and individuals from each grouping are certainly more closely related to each other than to other Basenjies in the population.

The effective population size is always smaller than the absolute population size or the census, often by several orders of magnitude. The gene pool is the complete set of unique alleles found by including all the genetic material of every living member of the breed at its origin or source. Levels of genetic variation are intimately connected to the fitness of a population. The source population contains the most extensive genetic diversity found in the native reservoir and exhibits vigorous/ robust biological fitness. Meanwhile, the modern population is a subset of the genes available to the breed and exhibits reduced biological fitness. The large assemblage of alleles available in the source population contributes to a full compliment of genetic diversity and heterogeneity with multiple alleles at many gene loci. The reduced assemblage of alleles found in the modern population, a selected subset of the source, result in narrow genetic diversity and homogeneity.

M.E. Soulé (“Where do we go from here?” Pp. 175-183 in: *Viable Population for Conservation*, 1987) calculated a minimum requirement of 50 individuals with a generation interval<sup>12</sup> of greater than 10 years for the healthy persistence of a population

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<sup>11</sup> Avongara N'Gondi whelped a litter of 6 puppies. Three of those puppies [Avongara Elly, Avongara Nabodio, and Avongara Renzi] were registered in the AKC Basenji breed registry.

<sup>12</sup> In limited, genetically isolated populations such as our modern population, a certain amount of unique genetic diversity is diluted with each reproductive event through the action of genetic drift, inbreeding and artificial selection. Thus, the number of generations away from the founder becomes an issue of concern. Genetic material can be rapidly narrowed, each generation carrying a reduced level of heterozygosity as it

for up to 100 years, allowing for continual attrition of genetic variation over time. However, FW Allendorf and N Ryman (“The role of genetics in population viability analysis.” Pps 50-85 in: Population Viability Analysis, S.R. Beissinger and D.R. McCullough, eds. 2002) determined that populations with shorter generation intervals require larger effective population sizes. So, when adjusting for the Basenji generation interval of approximately 3 years, the effective population size required for the modern Basenji population then jumps to more than 300 individuals in order to have a population large enough to maintain ‘normal’ amounts of additive genes to retain 95 % heterozygosity for 100 years. But, remember that this recommendation is for an “ideal population” where all variables are controlled. This does not take into account deviations from the ideal conditions which occur in real populations, as illustrated with the scenario above. To use a relevant real life example, according to the US Fish and Wildlife Services guidelines, the Idaho wolf population needs to stay above 100 founder individuals for the isolated population to remain viable and self sustaining. With Basenjis, it is clear that new stock is required to augment the modern gene pool. Another factor which makes a great difference is the sex ratio of reproductively successful founders. The effective breeding population can never be greater than four times the number of males, no matter how numerous the females may be, since gametes<sup>13</sup> must come from both sexes. Thus anything that limits the number of males in use drastically restricts the effective breeding population. Overuse of popular sires is a tremendous deleterious factor in genetic impoverishment.

Following the thinking of Soulé from 1987, the question must be where do we go from here when we consider the small number of founders used to constitute the modern stock? In the modern population of today we have 26 founders, those whose genes contributed to future generations, with varying degrees of representation. We require a minimum of at least 50-300, probably more like 100. The answer must be to outcross to dogs entirely outside the modern gene pool, to unrelated dogs from the source population. The Basenji breed is fortunate in that it is a natural breed. At the moment they still have a limited source population of autochthonous (indigenous or native) dogs to draw from where the full compliment of breed specific genetic variation exists. Due to dramatic moves to develop the remote forests of the Congo Basin, this small window of opportunity is quickly closing. Rather than out crossing to a different breed for genetic diversity, individuals from the source population may be introduced into the derived modern population. As a breed club, our strategy must aim at preserving genetic variability by increasing the effective population size through recruitment of additional founders. When it comes to the health and future of the Basenji, conservation requires that typological thinking will have to be tempered with population thinking; the ultimate goal is to expand the modern population gene pool.

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is permanently linked by the horizontal pedigree. The average time between one generation and the next is a convenient yardstick to help us realize the relative rate of genetic attrition.

<sup>13</sup> Gametes are the specialized cells involved in sexual reproduction; when mature each has a single set of unpaired chromosomes, or half the genetic information that its parent cell possessed. Male gametes are sperm and female gametes are eggs.

Table 1. Original cohort of AKC registered Basenjis. (source: American Kennel Club Stud Book Registrations, Group No. 2 – Hounds, Basenjis, June 1944, pgs. 68-69)

<b>Name:</b>	<b>Sex:</b>	<b>Sire:</b>	<b>Dam:</b>
Alan of Glen-Ho	Dog	Kwillo of the Congo	June of Windrush
Alverna of Glen-Ho	Bitch	Kwillo of the Congo	June of Windrush
Andy of Glen-Ho	Dog	Kwillo of the Congo	June of Windrush
Annabelle of Glen-Ho	Bitch	Kwillo of the Congo	June of Windrush
Antonio of Glen-Ho	Dog	Kwillo of the Congo	June of Windrush
Armina of Glen-Ho	Bitch	Kwillo of the Congo	June of Windrush
Bongheli	Dog	Jinga	Rosemary of Windrush
Gayety of Sirrah Crest	Bitch	Phemister's Ho of Sirrah Crest	Phemister's Ha of Sirrah Crest
Ho Hum of Sirrah Crest	Dog	Phemister's Ho of Sirrah Crest	Phemister's Ha of Sirrah Crest
Jokund of Sirrah Crest	Dog	Phemister's Ho of Sirrah Crest	Phemister's Ha of Sirrah Crest
Joy of Sirrah Crest	Bitch	Phemister's Ho of Sirrah Crest	Phemister's Ha of Sirrah Crest
Jinga*	Dog	Kwillo of the Congo	Juliana of Windrush
Juliana of Windrush	Bitch	Koodoo of the Congo	Kiteve of the Congo
June of Windrush	Bitch	Koodoo of the Congo	Kiteve of the Congo
Kano of Rhosenji	Bitch	Pistol Pete	Tanya of Windrush
Keffi of Rhosenji	Bitch	Pistol Pete	Tanya of Windrush
Kita of Rhosenji	Bitch	Pistol Pete	Tanya of Windrush
Kong of Rhosenji	Dog	Pistol Pete	Tanya of Windrush
Koro of Rhosenji	Bitch	Pistol Pete	Tanya of Windrush
Koodoo of the Congo	Dog	Kobbi of the Congo	Senji of the Congo
Makwa of Windrush	Bitch	Koodoo of the Congo	Kikuyu of the Congo
Merry Ha Ha of Sirrah Crest	Bitch	Phemister's Ho of Sirrah Crest	Phemister's Ha of Sirrah Crest
Mofwe	Bitch	Jinga	Rosemary of Windrush
Mokima of Windrush	Bitch	Koodoo of the Congo	Kiteve of the Congo
Penelope of Windrush	Bitch	Koodoo of the Congo	Kikuyu of the Congo

Phemister's Berecke*	Dog	Kwillo of the Congo	Juliana of Windrush
Phemister's Ho of Sirrah Crest*	Dog	Kwillo of the Congo	Juliana of Windrush
Phemister's Kabero*	Dog	Kwillo of the Congo	Juliana of Windrush
Phemister's La Petite*	Bitch	Kwillo of the Congo	Juliana of Windrush
Phemisters Masabu *	Bitch	Kwillo of the Congo	Juliana of Windrush
Phemister's Bois** ++	Dog	unknown	unknown
Phemister's Congo**	Bitch	unknown	unknown
Phemister's Ha of Sirrah Crest	Bitch	Phemister's Bois	Phemister's Naida
Phemister's Naida*	Bitch	Koodoo of the Congo	Phemister's Congo
Pistol Pete	Dog	Koodoo of the Congo	Kiteve of the Congo
Rosemary of Windrush	Bitch	Koodoo of the Congo	Kikuyu of the Congo
Rwanda	Bitch	Jinga	Rosemary of Windrush
Zingili	Bitch	Jinga	Rosemary of Windrush
Tanya of Windrush	Bitch	Koodoo of the Congo	Kikuyu of the Congo

\* Bred in Canada, whelped in USA.

\*\* Foundation Stock

++ aka Bakuma of Blean ; originally imported to the United Kingdom in 1937 and registered under TKC as Bakuma of Blean while in quarantine but then exported to the USA and sometime later reregistered under AKC as Phemister's Bois.

Table 2. Modern population founder stock.

Registered Name	Country of Origin	Sex
Bokoto of Blean	Congo/Zaire	Female
Bongo of Blean	Congo/Zaire	Male
Bereke of Blean	Congo/Zaire	Female
Bashele of Blean	Congo/Zaire	Male
Bungwa of Blean	Congo/Zaire	Female



Amatangazig of the Congo	Southern Sudan	Female
Simolo of the Congo	Southern Sudan	Male
Bakuma of Blean aka Phemister's Bois	Congo/Zaire	Male
Phemister's Congo	Liberia	Female
Kindu	Republic of Congo	Male
Kasenyi	Republic of Congo	Female
Tex of Alexandria	Southern Sudan	Male
Miliku	Liberia	Female
Kogi	Liberia	Male
Binza of Laughing Brook	Southern Sudan	Male
Wau of the Congo	Southern Sudan	Male
Fula of the Congo	Southern Sudan	Female
Kiki of Cryon	Liberia	Female
Avongara Diagba	Northeast Congo/Zaire	Male
Avongara Gangura	Northeast Congo/Zaire	Male
Avongara K'Posi	Northeast Congo/Zaire	Female
Avongara M'Bliki	Northeast Congo/Zaire	Female
Avongara N'Gola	Northeast Congo/Zaire	Female
Avongara N'Gondi **	Northeast Congo/Zaire	Female
Avongara Zamee	Northeast Congo/Zaire	Female
Esenjo	Northeast Congo/Zaire	Female

\*\* Avongara N'Gondi whelped a litter of 6 puppies. Three of those puppies [Avongara Elly, Avongara Nabodio, and Avongara Renzi] were registered in the AKC Basenji breed registry.