

Preserving the Miniature Bull Terrier – the Argument Against Interbreeding

The objective of this article is to demonstrate that the Miniature Bull Terrier is a unique breed of dog, distinct from the (Standard) Bull Terrier, not only in behaviour and physical characteristics, but most importantly, in its genetic expression of the IGF1 gene, the so-called “factor for smallness”. This gene expression is present in all other Toy and Miniature dog breeds (e.g. Chihuahua, Yorkshire Terrier and Boston Terrier) but absent in (Standard) Bull Terriers. The expression of this gene in the Miniature Bull Terriers is threatened by the on-going use and over-use of interbreeding.

The practice of interbreeding - crossbreeding a Bull Terrier with a Miniature Bull Terrier - has been sanctioned for decades by the Kennel Club in the UK. Occasional use of small dogs like Romany River Pirate's son, Banktop Julius, was used to improve conformation in Miniatures as far back as the 1960s. In later years, with the genetic condition Primary Lens Luxation seemingly rife in the Miniature Bull Terrier population, more extensive interbreeding was allowed. This was subject to a strict interbreeding protocol requiring health-testing of the parents in order to obtain a limited time period Interbreeding Pass and rules regarding the subsequent registration of the offspring. These rules were more stringent in the past with separate registration of the offspring required for a number of generations.

In Australia, interbreeding was approved by the Australian National Kennel Council in 1986, even before the arrival of the first Miniature Bull Terrier (and nearly 20 years after the breed died out in that country due to a number of factors). The imported dogs were themselves, heavily interbred. Erenden Roxana was the result of two interbred parents and she was immediately bred with a full size Bull Terrier after her arrival in Australia. She was a founder dam of the breed in the country with “almost all Minis on the East Coast and indeed most of the West as well ... traced back to her and her imported son Unctious Ullock”¹ according to Joy Schafer, her Australian owner.

In the last three years, New Zealand registered their first litter of interbred Miniature Bull Terriers and in Europe, interbreeding was approved in Sweden, Finland and France, subject to varying rules. Interbred Miniatures have even been produced in South Korea. Interbreeding has not been allowed in the United States, Canada and the rest of Western Europe and Eastern Europe.

The initial motivation for interbreeding was to dilute the gene mutation causing Primary Lens Luxation (PLL) and resultant blindness in Miniature Bull Terriers. It was expected that if a Miniature Bull Terrier was affected with PLL but not showing symptoms yet, that the first generation at least could be PLL-carriers but not suffer a loss of sight. It seems that so widespread was the genetic malady that the sentiment behind the approval of interbreeding was that a desperate measure was required, that in fact; the future of the breed was at stake. Another concern was the small gene pool. Miniature Bull Terriers have never enjoyed the popularity of their large cousins and the worldwide population is less than a tenth of that of the Bull Terrier. But these issues, while they may once have seemed valid, are no longer so.

In September 2009, after extensive research, scientists at the Animal Health Trust were able to identify the gene mutation causing PLL and devise a specific DNA test to establish whether dogs were clear of the mutation, carriers of the gene or affected dogs that, with two copies of the mutation, would suffer the painful effects of the problem. Immediately it was possible to manage this genetic concern through selective breeding, despite the alarming fact that more than 60% of the tested Miniature Bull Terrier

population carry the mutation.² Avoiding the use of PLL-affected dogs in breeding programmes and allowing PLL-carrier dogs only to reproduce with PLL-clear dogs has removed the threat of this health concern.

After the development of the PLL-DNA test, the focus on the small gene pool in the Miniatures has increased. This was because the removal of PLL-affected dogs from the gene pool was expected to reduce genetic variation. Some felt that interbreeding could compensate for this. Irion et al. (2003)³ in a study of genetic diversity in different dog breeds presents a very interesting perspective. Among the 28 dog breeds, the Terriers were represented by both the Bull Terrier and the Miniature Bull Terrier, providing an opportunity to compare their genetic make-up. Two important points concerning these two breeds were made.

The scientists found *“Phylogenetic analysis using the more stable (less mutable) 66-marker panel revealed ... bull terriers and miniature bull terriers grouped in 100% of the trees generated for the final consensus tree.”*

They also found *“as one would expect, heterozygosity (H_B) and Hardy–Weinberg equilibrium tended to decrease as population size decreased and as length of time in a registry increased. **Counterintuitive to this was the finding that the miniature bull terrier had a 22.5% higher H_B value than the bull terrier.**”*

These results indicate that the Bull Terrier and the Miniature Bull Terrier share almost all gene expressions but surprisingly, it is the Miniature Bull Terrier that has a higher degree of heterozygosity, or genetic variation, rather than the Bull Terrier. This study found an H_B value of 0.474 for the Miniature Bull Terrier and 0.387 for the Bull Terrier. This is a significant difference when the highest value in the study was 0.758 (for the Jack Russell Terrier). Of the 28 breeds studied, the Bull Terrier had the least genetic variation. These values are reinforced by Leroy et al. 2009^{4&5}, where they quote a heterozygosity value for the Bull Terrier of 0.37 (this being the lowest value with a maximum of 0.77 and a mean of 0.62 for all 61 breeds) and an allelic richness value of 2.3 (this being the lowest value with a maximum of 6.9 and a mean of 4.56 for all 61 different breeds).

It is clear that the Bull Terrier with an existing high genetic correlation with Miniature Bull Terrier yet less heterozygosity, has little genetic advantage to offer the Miniature Bull Terrier. In fact, there is a stronger case for the reverse practice – to use Miniature Bull Terriers to diversify the Bull Terrier gene pool (although I am not in any way proposing this, for other reasons).

As a result of the PLL-DNA test and these studies, there is no longer an urgent health or genetic reason to continue to mix these two breeds. In fact, there can be no doubt that the uniqueness of the Miniature Bull Terrier is threatened by (the over-use of) interbreeding. The Miniature Bull Terrier is a distinct breed with a distinct show record, functional heritage and working dog history. It has existed as a recognised separate breed since 1939 in the UK, 1991 in the US and until 2008 in the FCI. (For three years between 2008 and 2011, it was erroneously reduced to the status of a variety of Bull Terrier but this mistake has been corrected at the recent FCI meetings in Paris, France.)

According to Col. Richard Glyn, founder of the Miniature Bull Terrier Club in 1938, “the Miniature Bull Terrier ... is a blend between the descendants of the old Toy Bull Terrier, a “small” Bull Terrier bred mainly for sporting purposes, and various “dwarf” specimens bred from full-size parents which have been used to improve type and head qualities... the Toy blood helps to keep down the size through what I call the “factor for smallness”...”⁶ In advice for breeders, Col. Glyn says “when two “small” Bull Terriers were

mated, the result was an even litter of “small” Bull Terriers... but “the dwarf specimens, though small in size, are genetically full-sized Bull Terriers; hence, if both parents contain much “dwarf” blood there is a possibility that one or more of the puppies will lack the essential “factor for smallness” and will develop into a full-sized puppy, irrespective of the size of the bitch in which it has been conceived”.⁶ This “factor for smallness” has been identified as the single gene (IGF1) which encodes insulin-like growth factor 1.⁷ Studies of mice lacking IGF1 show them reaching an adult body mass approximately 30% of normal.⁸ This IGF1 mediates most of the growth-promoting effect of Growth Hormone (GH). Conversely, overexpression of GH and IGF1 in mice leads to an increase in body size.^{9&10} In Sutter et al. study of the genetic basis of size in dogs, dogs homozygous for haplotype B, show reduced levels of serum levels of IGF1 protein (a median of about 120ng/ml) and this BB haplotype was found in all small dogs analysed.⁷ The B haplotype was absent and corresponding serum levels of IGF1 protein were high in all large dogs analysed. Even dogs with one B allele in the haplotype BI showed similar serum levels (same median of about 250ng/ml) as the largest dogs.⁷ This genetic expression has been traced back to Middle Eastern Grey Wolves and seems to pre-date domestication of dogs.¹¹ It seems possible that in the future, the presence or absence of this haplotype in the genotype may be a way to distinguish between Bull Terriers and Miniature Bull Terriers genetically.

Unfortunately, this gene expression in the Miniature Bull Terrier is becoming increasingly rarer. According to Dr. Brian Hill “the vast majority are above, and some considerably above, the height which the breed standard desires”.¹ Richard Glyn describes the ideal Miniature Bull Terrier as “about 12½ inches high when fully grown and 18lbs. weight”.⁶ Modern breeders are unsuccessful at breeding Miniature Bull Terriers *at* the measure, let alone *below* it. The reason for this is clear – the “factor for smallness” has become so diluted in the population (due to interbreeding) that consistent production of the required small size in the breed is now extremely difficult.

In summary, interbreeding has done little to reduce the occurrence of Primary Lens Luxation; it has enabled Miniatures to more closely resemble the larger Bull Terriers (in, for example, head shape) but in the process it has threatened the very nature of the Miniature Bull Terrier. Miniatures and Standards are currently indistinguishable in many countries which have used widespread interbreeding, most notably, in Australia. Despite this, there are breeders in many parts of the world that can still trace their lines back to the original working Miniature Bull Terriers and it is these supporters of the breed who have always known, and who witness daily, the uniqueness and distinction of the Miniature Bull Terrier. I suggest that it is time to cease cross-breeding our beloved Miniatures and afford them the breed autonomy that they are entitled to.

Tracey Butchart

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Miniature Bull Terrier Network of South Africa

P. O. Box 12573, Nelspruit 1200, South Africa

tracey@minibullies-sa.net

+27 82 856 4314 (phone) +27 86 689 9676 (fax)

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