

## **BOSTON TERRIER DEAFNESS**

Deafness has been known in the Boston Terrier since the origins of the breed. Several of the old books make reference to dogs that were deaf. Today, both Dr. George Strain, world authority on canine deafness, and Dr. Bruce Cattanach, canine geneticist at Oxford University in England, agree that most deafness in Boston Terriers is undoubtedly caused by the gene that cause white/blue eyed deafness in almost 60 other canine breeds. (In some cases there may be other causes of deafness such as infection.)

When the embryo is in the process of formation, pigment cells from the neural crest (embryonic spine) migrate outward and form the pattern of the Boston Terrier's markings that we are all familiar with. This pattern is called the Irish Spotting Pattern and is named by geneticists S(i). There is another gene that is found in some Boston Terriers called the piebald gene, and it is thought by some to be responsible for the white "overmarkings" found on some Boston Terriers. This gene is identified as S(p). It is thought that this gene is responsible for half white heads and white heads, or excessively wide collars, etc. There is actually much that isn't known about these color genes and exactly how they are expressed.

There may also be little understood modifier genes at work. In any event, the amount of white, especially on the head, appears to have a close relationship to deafness in Boston Terriers. Deafness in our breed has never been studied, so we have to make certain assumptions about what is known in other breeds.

When the pigment cells migrate outwards from the neural crest in the embryo, pigment will eventually cover the body of the dog almost to its stomach and part way down its legs. Other pigment spots on the head will migrate to places on the ears and eyes. This will leave the white blaze, muzzle, chest, and feet unpigmented. (It is also of interest that when a Boston is crossed with a long tailed breed, the resulting puppies will usually have a spot of white at the end of the tail that the pigment doesn't reach.)

If the pigment cells fail to reach the inner ear where there are hairs for hearing in the cochlea, the lack of pigment cells causes the death of these hairs about three weeks after a puppy is born. The lack of pigment which causes the death of the hairs results in deafness because the hairs are necessary to transmit sound. If the neural crest pigment cells do not reach the eye, the pigment of the eye remains bright blue. Normally vision in the eyes is not affected by the blue color.

Because inheritance of deafness in Boston Terriers has never been studied, we do not know for sure why some Bostons with regular markings may turn up with a deafness problem. Some of the explanations might be that it is a different kind of deafness that is inherited differently, or the modifiers are of the nature that the excessive white color is not expressed.

In any event, what seems apparent is that most deaf Bostons (perhaps about 80 per cent) come from that group of Boston Terriers (perhaps as many as 20 per cent of the breed) that carry excessive white or have blue eye(s). Helpful for the elimination of pigment related deafness is the fact that most show/hobby breeders have been breeding for better markings for almost a hundred years.

Dr. Cattanach feels that it should be relatively easy to reduce the amount of deafness in Boston Terriers by breeding for more conservative markings. He says "Therefore my key message is that if one wants to reduce the incidence of S locus associated deafness in a breed, then one should apply selection with as many indicators of pigment cell number and good migration as possible. Eye color appears to be the strongest indicator (in Dalmatians) so select against blue eyes. Size of pigment patches is another. In Bostons this should not be a problem. - at least compared to Dalmatians - and it might take a reappraisal of the Boston Terrier Standard to specify that less white rather than more white is desirable."

"And then there is the direct hearing testing by BAER. Selection for hearing, especially in both ears, would be expected to be effective."

"While I would not discount BAER, I would expect much faster progress with eye/patching selection. Why do I think the non-technical route better? Because every breeder can assess every dog he has, every litter, every pup born (alive or dead) by this method. He has a powerful range of measures to provide just about all the information he needs to select for hearing. And it costs not a penny. Were every breeder's individual data made generally available to all to aid in selective breeding, the breed could be transformed very quickly."

#### BAER TESTING

Only in recent years has BAER testing come into common practice in checking dogs for deafness. Dogs can be deaf in one or both ears. Dogs deaf in one ear are just as likely to pass deafness on to their progeny as those deaf in both ears. The only way that a unilaterally deaf dog can be identified is by BAER testing. This testing is done by attaching tiny electrodes to a dog's skin on his head and measuring the electric impulse produced. It only needs to be done one time in the life of most dogs. BAER testing can be done as early as six weeks, before a puppy leaves for his new home. (It shouldn't be necessary to anesthetize most Boston Terriers to do the BAER testing.)

We also need to learn more about the dogs that are not obviously deaf because of a pigment cell deficit. Whether this is the same inherited deafness, or whether deafness in these dogs is caused by a separate genetic inheritance we do not know.

The BTCA Health Committee would like to encourage all breeders to BAER test their dogs before breeding and to test all litters, but it recognizes that from a practical standpoint this is an impossibility for some people who live hundreds of miles from the nearest BAER testing center. You can find a list of BAER testers on the Internet at: <http://www.lsu.edu/deafness/baersite.htm>

Until we have a way to collect good data on deafness in Boston Terriers, it is recommended by your health Committee that you voluntarily refrain from breeding your overmarked and half white headed dogs, or dogs with excessive white on the body, or dogs with blue eyes. This could make a significant difference in the amount and extent of deafness in our breed both now and in future years.