

A Small Problem: Dwarfism in Dogs

Part Three: Confusion Continues

(Warning: Pictures are slow to download. Please be patient.)

By Fred Lanting

This is a follow-up article to the one I wrote entitled "Osteochondrodysplasias" in February of 2004. While that was a rather long piece, it still did not address all that people want to know about the subject. Nor will this, but at least we can look at some other aspects, including a little deeper delving into the questions about the genetics of dwarfism.

There are miniature and toy versions of "standard"-size breeds, but this is not the same as dwarfism, the latter being the result of an *abnormality* rather than a *variation within normal limits* in genes. People are always developing miniaturized strains by selectively breeding small examples to each other, and continuing to select until "regular" size individuals no longer appear. Some years ago, the heiress to a margarine fortune started to develop miniature Borzois. While some detractors accused her of using Whippets to jump-start the reduction in size, it really doesn't matter much. Livestock breeders know that you can introduce a gene for some dominant characteristic such as color, but then keep breeding the other structural phenotypes back into in the original breed in such a way that the "new breed" (really a minor variation on the one they started with) will look and perform no differently, except for that color. Or whatever trait they want to introduce.

There is also no reason to believe she did not simply choose the smallest Borzoi from her extensive kennel and, in successive generations, bring down the size until the partners would "breed true", in regard to that characteristic while not losing proportions or other qualities. Several years earlier, another woman developed a strain of Boxers that matured at 12 pounds body weight by selective, not cross-, breeding. While these examples never caught on, numerous such projects have, to some extent: the Shar-Pei, Australian Shepherd, Teacup Poodle, Bull Terrier, and numerous others. Miniatures do not have enough genetic change to classify their genes or body phenotypes as "abnormal" and, with the minor exception of a little difference in the head, miniatures have the same proportions.

There is a type of dwarfism that also produces proportional but suddenly smaller dogs. I say "suddenly" because unlike the "breeding down" through many generations, proportional dwarfs appear without successively smaller individuals in the line of descent. So far, I have found the particular type that I am thinking of, in only the German Shepherd Dog and in a breed with the GSD in its ancestry, the Karelian Bear Dog. Affected dogs are called Pituitary Dwarfs because the immediate cause, or at least the noticeable defect, appears in the hypophysis on the bottom of the brain. The anterior lobe of this endocrine organ is rightly called the "master gland" because of its governing or influential effect on other organs, specifically the glands. Minor abnormalities in this gland are what create the body types of Bulldogs, the acromegalic Saint

Bernard, Dachshunds, and endless other examples of a departure from the more "normal" or "ancestral" types such as the GSD, sighthound, Pointer, etc. Anatomic and functional abnormalities in different parts of the hypophysis make for the difference between the Boston Terrier and other breeds intentionally selected for their abnormalities, for example.

Proportional dwarfism in the GSD is called "pituitary dwarfism" because an old name for the hypophysis, or part of it, is "pituitary gland". Since this master gland controls much of the activity of other glands, it is not surprising to see abnormalities in thyroid function, and thus the inability to grow a normal coat. Most pituitary dwarfs look like Chinese Crested or other "hairless" breeds although by carefully dosing with thyroid hormones (and possibly the more expensive growth hormones), a normal coat can be maintained. See my article in the December 1984 issue of Dog World, which I may re-issue if there is enough interest. We can deduce that it is caused by a defect in a different part of the pars distalis of the hypophysis than different types of defects or in different gland parts in other breeds. We can make such deductions because such breed differences have been traced to such anatomic irregularities by Stockard and others at least as far back as the 1940s.

The non-proportional canine dwarfs, like their human counterparts, result from genetic defects that take root in other parts of this master gland, and therefore other endocrine glands and organs. But there is much confusion, disagreement, and lack of knowledge leading to frequently inadequate definitions. In my other article, which you might call Part One of a trilogy, I mentioned that various terms are used; I would like to here suggest that we settle on one umbrella word to cover all or most others: either chondrodysplasia or chondrodystrophy. The first simply means an abnormal development or shape (-plasia) of cartilage (chondr-). The latter is "translated" as poor (dys-) growth (troph-) of cartilage. Either would be a less cumbersome term than I used as the title of Part Two, osteochondrodysplasias, which includes the "osteo-" simply to emphasize that the bones are also abnormal. I think we do not need such a mouthful, and that readers will assume the inclusion of shortened bones in the term "chondrodystrophy". A possible drawback to using chondrodysplasia is that it might someday be confused with enchondromatosis, a rare disease often involving tumors; these words are used interchangeably in human medicine. On the other hand, chondrodystrophy is sometimes used as part of a longer term for different disorders, also. Most of the time, though, it refers to a congenital defect in the formation of bone from cartilage.

Achondroplasia is one of those words that uses the prefix "a-" to denote or connote an absence or deficiency of something. In this case, it means a lack of (good) shape, growth, or form of the cartilage. Aplasia, for example, means "lack of development", as illustrated in my 2004 book by the radiographic picture of an Airedale whose acetabulum and top portion of the femur did not develop at all from cartilage. The achondroplastic limbs of the Dachshund means that these extremities failed to elongate like the development in normal dogs. Achondroplasia of the skull is obvious in the Bulldog. In either example, the word refers to a disordered chondrification (and of course, later ossification) of the ends of bones. In most breeds, this is most obvious in the long bones (limbs). It is simply arbitrary preference that I use the words chondrodystrophy and

chondrodysplasia more often.

But what about the genetics? To even attempt to delve into the mysteries of inheritance of various forms of dwarfism, one must be prepared to consider different genetic causes and expressions in what, on first glance, is easy to assume are the same conditions. Only by crossbreeding can we make better guesses. A couple of the most active researchers into inheritance of traits and practitioners of crossing breeds to get answers were Stockard in the 1920s to '40s, and Whitney in the '30s to '50s.

Basset breeders know that achondroplasia is dominant in their breed, and some think that this means the F1 progeny will always have the same leg length as the Basset. But in crosses between Bassets and GSDs, typically about half the legs (dogs) are intermediate in length, the other half being normal (long, GSD-type) in length. The same when a Bassett-Bloodhound with intermediate-length legs is crossed to a long-legged dog such as the GSD or any other breed.

Cocker Spaniels often have shorter-legged individuals, but the mutation to achondroplasia is not frequent, and is definitely recessive. Other races breed true every time, such as Corgis. It appears that "reverse mutation", that is, a normal-leg-length offspring being produced by two typical Corgis, just does not happen. Yet we know that we can suddenly find Corgi-style legs in purebred pups of Cocker, German Shepherd, and other breeds. Corgis (and dogs with this mutation suddenly appearing) may have a slightly different genetic code and type of dwarfism than do Bassets and Dachshunds. English Bulldogs seem to have a type of dwarfism more like the Basset than the Corgi. The short legs of the Clumber Spaniel or the Beagle are almost certainly not examples of dwarfism, as the shapes of the joints and bones are more like those of the normal-length breeds. There is still a great deal to be sorted out, when it comes to defining the genetic differences in the dwarf dogs. Only when breeders are open and honest, and share their experience and dogs with researchers, will we make progress in unraveling the rest of this riddle.



Miniature Boxers. Proportional, but not dwarfs. It is possible to miniaturize any breed by selection over many



Karelian Bear Dog. Some cases of GSD pituitary dwarfism have been found in this breed, but that is because there is some

generations.



Achondroplastic dwarfism is a different type. It is quite rare in the *GSD*. These are littermates.

German Shepherd ancestry in the lines. This is a normal dog.



Many Cocker Spaniels have short legs, but this one has true dwarf characteristics. Exact type of dwarfism is unknown.

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NOTE: A well-respected AKC and Schaferhund Verein judge, Mr. Lanting has judged in more than a dozen countries, including the prestigious FCI Asian Show hosted by Japan Kennel Club, the Scottish Kennel Club, a Greyhound specialty in England, and more. National Specialties: 1994 GSD Club of America National; 1991 Tibetan Mastiff National; 1990 Shiba National; Fila Brasileiro Nationals (several times), Dogo Argentino National, Pyrenean Shepherd National. Numerous Chinese Shar Pei and Australian Shepherd specialties; regional Anatolian Shepherd specialty. Numerous GSD, Rottweiler, & Boxer specialties worldwide. He is also the author of several 'must read' books, including THE TOTAL GERMAN SHEPHERD DOG, CANINE HIP DYSPLASIA, CANINE ORTHOPEDIC PROBLEMS. A former professional all-breed handler in the US and Canada, he has lectured in over fifteen countries on Gait-and-Structure (Analytical Approach), Canine Orthopedic Disorders, and other topics, as well as being a Sr. Conf. Judges Ass'n (SCJA) Institute instructor. WV Canine College instructor & member, advisory board. His full [Curriculum Vitae](#) is very impressive and we are grateful to him for sharing that knowledge on this site. Join him in his tours to the