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PART FIVE IN A SERIES

Let's take a quick look at how genetics affect your dog...

We've been talking about the dangers that threaten a purebred dog population when the gene pool gets too narrow. But how does that work?

Basically (and this is a really simplistic explanation — it's a lot more complicated than this), every gene in your dog has two copies, each a half of the strand. Each is an allele, an alternative form of that gene.

Each allele controls a particular trait in your dog — everything

from eye color to tail length. Some are dominant, some are recessive, meaning when two parents come together to make a puppy, the dominant allele is what the puppy usually gets. (Unless he inherited two recessive genes in that location of his DNA from each parent, in which case he gets a damaged expression of what that gene was meant to do, like, the liver shunt doesn't close as it was supposed to and toxins build up in the dog's body)

Genetic disease enters the picture when a gene mutates, a glitch in the reproductive copying process. Mutations are not necessarily bad. We all have them. Most are recessive and we never suffer any ill effects. But some cause genetic disorders like color-blindness or sickle cell anemia or cystic fibrosis. When the gene pool is large, the odds of them getting switched on are less. But when two parents carry the same gene mutation, like the “fruit” in a slot machine window, it all lines up—but instead of a flood of coins, we get disease.

Most of us has between 5 and 10 potentially deadly mutations in our DNA. The good news is, because we don't usually marry a close blood relative, the “slot machine fruit” doesn't line up. Good alleles block the recessive mutations in our children.

But in dog breeding, relatives *are* sometimes bred. Even when a careful breeder has done the research. Because of the Popular Sire effect, the genes of a single dog can come to dominate the breed.

Take a look at the [Irish Wolfhound Database](#). Trace your dog's lineage six or seven generations back and you'll see certain families of dogs turning up regularly in your line.

These dogs became popular sires because they appeared healthy and did very well in the show ring. But recessive problems can skip several generations. When the gene pool narrows and a few dogs dominate the breed, no matter how healthy they appear, they can carry recessive genes that no health screening will detect. And as the pool narrows, the odds go up that a mother and father will carry those recessive genes. And disease breaks out in a line of dogs, one or two here or there at first, but with each generation, more and more as that fruit in the slot machine window lines up regularly.

Genetic diversity in a breed is the key to keeping this from happening.