



The Genetic Generation Gender Gap by Alan Wheeldon



Have you noticed that sometimes you buy in good pigeons with good pedigrees. They may even have an impressive race record of their own. You breed from them and they don't produce anything special. Occasionally you might breed from one or two of their average children and suddenly out of nowhere come pigeons that are head and shoulders better than anything else in the loft. They perform more like their grandparents. Why is this? Well it could be that those winning genes have jumped a generation.

This is almost certainly true for some recessive genes that can't be expressed in the first generation as they are suppressed by dominant genes. However recessive genes, can get passed down to the next, second generation, where they combine with other recessive genes, allowing them to get expressed in the grandchildren. This is why suddenly out of nowhere a pied for example, will suddenly appear in a family of blues.

Scientists have however discovered a new twist to this jumping the generation gap. They have discovered that certain genes can actually be switched off, in the offspring, by one of the parents. Then get switched on again as they are passed down to the next generation.

Let me give you an example of where this may have happened.

It has often been noted that over the years horse breeders not only record how good sires are at producing fast racers, but also how well they do as sires of broodmares that go on to produce fast racers. They noticed that some sires did not breed any decent racers and yet they were fantastic at producing mares that then bred fantastic racers.

One famous example of this must be the exceptional racer Secretariat, 16 wins out of 21 races, plus he set two new records, for 1.5 miles and a new record for the Kentucky Derby. To illustrate how good he was he won one race by 31 lengths. Secretariat may have been a fantastic racer but his offspring were very disappointing. However his daughters went on to breed some incredible racers. Producing such champions as A. P. Indy who won 8 out of 11 races, Summer Squall won 13 out of 20 races, Chief's Crown won 12 from 21 races, Dehere 6 wins from 9 races, plus Gone West, and Storm Cat two other excellent racers. Interestingly, if we go back a generation, Secretariats dam, Something Royal, had been sired by Princequillo, a leading sire of broodmares three decades before. So this jumping the generation gap had been going on a while before Secretariat came onto the scene.

The trouble was, with this jumping the generation gap, it did not make any sense to geneticists. It was too one sided, in Secretariats case for example, occurring predominantly down the sires side and appearing via his daughters. If it was simply due to recessive genes, the occurrence should

have been much more random, appearing in either sons or daughters. It obeyed no known laws of genetics. They called it the maternal-grandsire effect.

It wasn't until much later that scientists developed an idea of what exactly might have been going on. It seems that most genes are 'on' when they get passed down, however some get 'switched off' in the fertilised egg by the female, especially those donated by the males. For example none of Secretariat's sons or those sons offspring ever became exceptional racers. It is thought that this is because the mares that were carrying Secretariats foals were turning his winning genes off in the children that they were carrying. However, it appears that when the first generation daughters were mated and carried foals, they had somehow 'reset' the gene, turning it 'on' before passing it down. In Secretariats case this gene was probably related to performance. And sure enough, Secretariat's daughter's offspring were, like their grandfather, outstanding athletes.

Scientists have called these genes 'imprinted genes'. Others have been identified in pigs and humans. Interestingly, one of the imprinted genes found in pigs determine muscle growth and heart mass. This gene for muscle growth and heart mass may also be active in horses, because Secretariats heart for example, weighed an astonishing 22 pounds whereas a normal thoroughbred's hearts weigh only 8.5 pounds.

So these imprinted genes, are





genes whose expression is determined by one of the parents. Imprinted genes violate the usual rule of inheritance, which states that both genes, one from the father, one from the mother, in an offspring can be equally expressed. With imprinted genes either the maternal (inherited from the mother) or the paternal (inherited from the father) genes are expressed exclusively. One of the pair of genes is deliberately switched off. The most distinctive examples, where this switching off has occurred, have been identified in the female.

So what is the purpose of the female switching genes off? Well it is thought that there is a battle going on between the sexes. Take animals for example. The male wants his offspring to be big and strong, however the female doesn't want them too big, as she has to carry them in her womb and then provide milk for them as they grow. She wants to conserve some of her strength for future children that may even have a different father. The male doesn't care about this, as there is no guarantee that the female will stay with him, plus later on he might choose to mate with other females. So if his current partner gets worn out carrying, then giving birth to, and then feeding his giant strong kids, he doesn't particularly care.

The female does care, she doesn't want to get worn out and drained by carrying and feeding giant vigorous offspring. She wants to save herself to produce more offspring in the future. She deals with

this by switching off some of the male genes when they meet with her genes in the egg, usually genes that determine size, particularly muscle mass.

Similar imprinted genes may also be active in pigeons. You can imagine that the hen doesn't want giant demanding over voracious squabs, as she has to do most of the caring. Especially if the male decides to go off with another hen. So it would be in her interest to switch off some of the male genes that produce large vigorous hungry squabs. However when these switched off genes get passed down to the next generation they can get switched on again. It may explain why your stock won't breed winners but they may breed breeders of winners. Especially down one gender line such as on the female side only. In this way greatness skips a generation and gets passed down through daughters.

It is intriguing to speculate that by suppressing size in her squabs hens can inadvertently produce small vigorous cocks, that make great racers. This may explain why many champion cocks in the past have been small, for example Champion Breakaway (21 x 1st opens, 22 x 1st clubs, 15 x 1st Federations), Tom Thumb (10 x 1st Federations) and Supercrack (1st National St Vincent, 1st National Barcelona, 1st National Narbonne, 6th International Narbonne, 1st Chantilly, 1st Tours, 2 x 1st Poitiers, 3 x 1st Angouleme). I'm sure there are many other examples.

Alternatively if switching off genes

by the female does occur in pigeons then this may explain why fast racing genes skip a generation. The super genes need to travel down a generation before they get switched back on again.

The presence of this switching off genes, if it does occur in pigeons, is problematical for us as pigeon breeders. We need breeding to be more predictable. We haven't got the time to wait to breed an extra generation just to see if the gene gets switched back on again. What it does illustrate is why, when we try to breed champions from good stock, it is not as predictable as it should be, and why good pigeons and prolific breeding pairs are rare indeed.

One thing you can try, if you have the patience, is to breed from first generation offspring of champion stock, especially the first generation hens. So if a stock pair is not producing winning offspring, breed from the offspring, and you may be surprised. Also try back-crossing the second generation hens with the sire, but don't try to back-cross the second generation cocks with their dam. In case she keeps turning off those winning genes. If switching off genes is happening in your colony then this breeding strategy should increase the number of winners that you produce.

It is well known in the pigeon world that winners don't always breed winners, and that pigeons with a poor race record, can sometimes turn out to be fantastic breeders. Genes that jump the generation gap can, at last, explain this phenomenon.