

DOES DARK MATTER
Colour Inheritance a Natural marker for speed
By Derek Green—April 10th 2007

Over the years of studying litters of pups and stud dogs, the one thing that has intrigued me, is why is it that Black and Brindle dogs are so dominant when it comes to speed. And why is it that they go on to outshine their White and Light coloured brothers and sisters.

In any domestic breeding programme where performance is the prime objective, then any single coat colour is unimportant, unless that colour adds to the performance. Now if breeders did not intentionally set out to remove white and light coated racing dogs from the breeding pool,. then unwittingly the black and dark coated dogs must have been seen as the best specimens, when it came to racing ability and producing fast offspring.. Could we be witnessing Darwin's theory of evolution in action twenty first century style, with the survival of the fastest not the fittest .So while breeders were checking out race stats, times, pedigrees and breeding theories, nature was giving breeders a very selective list of dogs to chose from. But where breeders failed to take account of the effects of coat colour, nature was taking on the immortal words of John Lennon (life is what happens when you are planning something else).No I have not forgotten about the dominant black genes or the numbers of imported Australian dogs, but this drift to black super sires pre-dates the Aussie dogs. So I hope this paper stimulates debate and speeds up research, that will ultimately help to unravel the nature of the biological mechanism and it's effects.

BRITISH OPEN RACE STATISTICS (Jan- 1st to Dec-31st 2006)
(The top twenty stud dogs and brood bitches including coat colour)

Stud Dogs

Top Honcho-- (Black)
Droopys Vieri—(Black/White)
Larkhill Joe—(Black)
Davies Mentor—(White/Black)
Droopys Woods—(Black)
Toms The Best—(Black)
Droopys kewell—(Black)
Honcho Classic—(Blue)
Roanokee—(Brindle)
Hondo Black—(Black)
Spiral Nikita—(Black)
Smooth Rumble—(Dark Brindle)
Pacific Mile—(Black)
Brett Lee—(Black)
Fortune Mike—(Black)
Hotshow Ben—(Black)
Split the Bill—(Black)
Top Saviings—(Black/White)
Judicial Pride—Fawn)
Droopys Rhys—(Blue)

Brood Bitches

Mega delight-- (Brindle)
First to Return—(Black)
Killeacle Phoebe—(Brindle)
Zigzag Bullet—(Black)
Dysert Diva—(Brindle)
Rhincrew Armada—(White/Fawn)
After Glory—(Black/White)
Hare Star—(Brindle)
Queen Survivor—(White/Brindle)
Mind the Way—(White/Black)
Top Delivery—(Blue)
Ard lightning—(Brindle)
Farloe Dingle—(Fawn)
Droopys Beauty—(Black)
Lucy May—(Fawn)
Simple Vintage—(White/Blue)
All Magic—(Black)
Heartbreak high—(Black)
Carnaross mini—(Black)
Ballymac Pepes—(Black)

Stud Dogs—12 Black,2 black/white,2 brindle,2 blue,1 white/black,1 fawn.-Total 20

Brood bitches—6 Black,6 Brindle,2 Fawn,1 Black/White,1 White/Black,1 White/Fawn
1 White/Blue,1 White/Brindle,1 blue.-Total 20

IRISH TRACK RECORD HOLDERS – (Numbers plus coat colour)

(January 1st to September 30th 2006)

Listed below are the number of track records recorded at the 18 top Irish tracks, Where any dog held more than one track record, I have listed the multiple record holders separately at the end.

Black Dogs— 64 Track Records.

Brindle Dogs— 21 / /

White/Black ----9 / /

Fawn-----9 / /

Blue----- 6 / /

Black/white---- 6 / /

Brindle/White—4 / /

White/Fawn---- 6 / /

White/Brindle---3 / /

Blue/Brindle----2 / /

Blue/White----- 1 / /

TOTAL -----(131)

Two dogs Hold Three track records— Making Merry—(Black)

Hulkster----- (Fawn)

Twelve Dogs Hold Two Track Records—Ardfert Billy—(Black)

O’Leary Peggy-(Black)

Recovery Mission-(Black)

Shelbourn Kay----- (Black)

Kilmalady Boy----- (Black)

Second Rate Champ(Black)

Lemon Rambo----- (Black)

Boherduff Light----(Brindle)

Romans Delight----(Brindle)

Charity Jack----- (White/Black)

Debidee Lane----- (White/Fawn)

Quarter To Five----- (White/Fawn)

As you can see black dogs dominate the track record lists in Ireland,

The total number of track records across all 18 tracks totals –(131)

If you combine all the black and brindles ,then the dark coated dogs would have held 85 of the 131 track records.

DARK MATTERS

This paper is based on original thought and known science. I believe that black and dark coated dogs have an **EDGE** (**E**umelanin,**D**ivides,**G**raded,from **E**lite) when it comes to speed. So why have I come to that conclusion? Well it all started with a chance reading on the subject of dark matter and it's genetic triggers. We often refer to using the old grey matter, but when it comes to dark matter very little is known about it's effects on dogs .So with the masses of available information via the internet..I started to look at dark matter and the animal kingdom to see if there was any correlation between humans and the rest of the animals .Neuromelanin (which will be dealt with in the next chapter) is found in carnivores, dogs ,cats ,and primates . But very little research has been undertaken to see what effect dark matter has on other species except for humans. Some work has been undertaken on rats and mice by (CR FREED and BK YAMAMOTO) and they have proved a link between brain dopamine, SPEED,and direction of movement.

DARK MATTERS (Dopamine, Aids, Race, Kinematics)

The pigment that is responsible for a greyhounds coat and skin colour is called melanin. There are two types of melanin, a pigment associated with black and brown (called eumelanin) and a pigment associated with light colours (called pheomelanin). As this paper is mainly dealing with black and brown. I will concentrate on following the EUMELANIN path.

Now Eumelanin leads us on to NEUROMELANIN via- the Substantia nigra (latin for black substance) or locus nigra, this is a heterogeneous portion of the mid-brain structure. It is considered part of the basal ganglia complex due to its close ties with the striatum. Classically it has been divided into two components, the pars compacta and adjacent DOPAMINERGIC (releasing dopamine) groups.The pars compacta is a Cell-Rich region with large pigmented neurons. These large nigral neurons exhibit a characteristic BLACK PIGMENTATION,hence the origin of the structures name (black substance)

The pars compacta contains neurons which are coloured black by the pigmented neuromelanin. Neurons of the pars compacta, they receive signals from the collateral axons from the neurons of the pars reticulata. All these neurons send their axons along the nigrostriatal pathway to the striatum where they release the neurotransmitter dopamine.

DOPAMINE is a neurotransmitter that affects a wide variety of brain processes, many of which are involved in the control of movement, the formation of emotional responses, and the perception of pain and pleasure..The naturally occurring immediate precursor of dopamine is norepinephrine.

Norepinephrine or Noradrenaline is a CATECHOLAMINE and a PHENETHYLAMINE. It is released from the medulla of the adrenal glands as a hormone into the blood, but it is also a neurotransmitter in the central nervous system and sympathetic nervous system where it releases EPINEPHRINE the flight or fright response, by increasing heart rate, triggering the release of glucose from energy stores, and increasing muscle readiness

CATECHOLAMINES are chemical compounds derived from the amino acid tyrosine. Some of them are biogenic amines. Catecholamines are water soluble and are 50% bound to plasma proteins, so they circulate in the blood stream. The most abundant are epinephrine (adrenaline) Norepinephrine (noradrenaline) and dopamine are produced from Chromaffin cells.

CHROMAFFIN cells secrete ADRENALIN, NORADRENALINE,and ENKEPHALIN into the bloodstream .As such they play an important role in fight or flight response. They are also referred to as granules and this is where the enzyme dopamine-hydroxylase catalyzes the conversion of dopamine to norepinephrine

Chromaffin cells are so named because they can be seen by staining with chromium salts. Chromaffin salts oxidize and polymerize catecholamines to form a Brown Colour, most strongly in the cells secreting noradrenaline.

DOPAMINE AND IT'S RELATIOSHIP TO BANNED SUBSTANCES

Neurotransmitters are chemical messengers. Dopamine is one of the major transmitters activated by the use of banned drugs. For the purpose of illustration and the significance of its name, I have chosen the amphetamine SPEED to see how these drugs interact with the brain.

What is speed, apart from being an amphetamine,, it's a stimulating drug that triggers the brain reward system giving the user pleasure. The drug works by increasing the natural release of dopamine Dopamine is released into the synaptic space in between the pre and postsynaptic neurons. Here is where speed comes in. Speeds goal is to trigger a build up of dopamine. Speed first enters the terminal button in one of several ways. Speed is very similar on a molecular level to dopamine so speed can enter the dopamine transporters or speed can diffuse into the neuron. The amphetamine then expels the dopamine out into the synaptic space. It does this through a process that forces the dopamine transporters to go in reverse. Under natural circumstances dopamine is brought back into the terminal button through the dopamine reuptake pumps. These pumps do not work as well when speed is present in the brain and the dopamine remains longer as a result. Speed also forces glutamate to come into the synaptic space. The result of this is dopamine will flow more easily. The effects people notice with amphetamines makes it clear why the drug has earned the name speed. Speed makes everything go faster. When on the drug your heart rate, blood pressure and movements all increase in speed With a few grams of speed I could have written all of this in 5 minutes.

But what I think this illustrates is what happens when a dogs natural ability to secrete dopamine is just increased a little. Also, although it is not on the banned list, omega-3 fatty acids that you find in fish oil and fish supplements also increase dopamine levels, so when you see it as one of the ingredients in dog foods and performance enhancers you know why.

DOPAMINE AND COLOUR, AND IT'S EFFECT ON SPECIES

One cannot fail to notice the increase in the numbers of athletes who are failing drugs tests , due to the high levels of natural occurring dopamine found in there positive test results. Now this could be put down to illegal drugs, that trigger the body's own natural response system or certain individuals producing higher levels of dopamine than others. What it does show is that these higher levels do exist and the governing sports bodies do recognize that they do enhance performance. We also know that humans do display different levels of dopamine when they have certain types of illness. Low levels of dopamine can lead to Parkinsons disease and high levels to schizophrenia. The levels of schizophrenia are much higher in Afro-Caribbean populations but not all cases can be put down to dopamine. But Afro-Caribbean populations do show a 2 to 5 fold increase of schizophrenia when compared with white populations from the same social economic groups. When we look at other species like the thoroughbred race horse we find that they are usually bay 'brown' in colour. They also come in chestnut, black, or grey, less common colours include roan and palomino. White is very rare but it is a recognized colour separate from grey. Thoroughbreds are classified among the " hot blooded " breeds , animals bred for agility and speed. Generally considered spirited and bold all the traits associated with brain dopamine. Even racing pigeons owe their speed to black feathers, I read this next part on (Speedpigeon.com) Racing pigeon 90 Belg 6129259, originally from Michel Delen "and the only dark check pigeon in my loft. I mention this pigeon not only because he produced generations of winning racing pigeons, but this pigeon was also responsible for slowly changing all the blue bars and blue checkers to the current dominant dark check racing pigeon family". Unlike most greyhound owners, pigeon owners breed most of their own stock themselves. So they have a much better understanding of what is required to produce a fast bird.

Pigeon racing is all about speed, birds are calculated on the time it takes them to fly from point (a) the release point, to point (b) their loft. I spent many weekends clocking in birds for my father when he was away on business. So like the trend in greyhounds for greater speed, racing pigeons have gradually

evolved into a species with dark feathers. Eumelanin is not only a colouring for hair and skin it also colours feathers. So the link between colour and speed starts all over again.

MAKING SENSE OF COAT COLOUR

Some facts are known about coat colour and patterns, hair colour is determined by specialized pigment cells called melanocytes, which are found in the basal or innermost layer of the epidermis. It is believed that whether or not melanocytes produce melanin depends on the presence or absence of chemical activators and inhibitors, although it is not yet known what those chemicals are, each observed coat pattern is thought to reflect an underlying chemical prepattern. The prepattern if it exists should reside somewhere in or just under the epidermis, the melanocytes are thought to have the role of “reading out” the pattern, in white coated dogs the colour can be evident in one or two ways. It may be the result of extreme dilution, or it may be the result of the absence of pigment cell. When inhibitors come into play distinct patches of fully pigmented coat are commonly found. These commonly occur around the eyes and ears but such distinct patches can also be found on the body. This is no more evident than in white dogs with brindle patches, these patches are usually very crisp in colour and markings.

There has been much scientific controversy over what causes this mechanism but it seems likely that pigment cells initially cover the whole of the body. There is then a period before birth when most pigment cells in the white areas do not survive. There can also be considerable right left asymmetry. For example, there may be a pigment patch around an eye or ear on one side of the head but not on the other. At least two genes are known to cause white by absence or dilution. One is the dominant Merle (M) gene, commonly carried in the heterozygous (single) dose. The second gene that reduces the number of pigment cells to cause a white coat is the recessive (s) gene.

The gene designated as “E” is responsible for eumelanin production. The absence of the dominant form of “B” (brown) will change the black colour of eumelanin into brown but it will not change coat colour. The “A” gene is a bit more complicated, this gene controls where and how two pigments are produced on the body or even on the individual hair. There are other groups of genes responsible for coat colouration. They are- “C” (albino),-“D” (blue Dilution) “G” (grayling), “M” (merle), “R” (roaming), “S” (white spotting), “T” (ticking) and “K” (dominant black)

THE BIRTH OF NOW

As I stated earlier I believe that the rise of these super sires started long before the introduction of so many Australian stud dogs into Ireland. Most modern dogs (excluding Sand Man lines) can trace the start of this phenomenon back to between the 8th and 12th lines on their Pedigree. So which dogs were responsible? I believe it all centres around 3 dogs- INLER-his son TANIST- and his son MAD TANIST. Tanist and Mad Tanist had so much speed it bordered on suicidal.

Most tracks were too tight on the bends for them. ATAXY another son of Inler was blessed with speed. Inler also produced one of the Greatest Brood bitches of all time -INLER MAY.

MAD TANIST went on to produce, THE GRAND CHAMPION, SANDOWN CHAMPION, and MAD PROSPECT, they were the foundation of most Irish, British, and Australian lines we see around today, Plus many of the worlds fastest dogs (Yellow printer, Super Rory, Brett Lee) and many other dogs. One or more of Inlers offspring will be represented many times on their pedigrees. In the example of BRETT LEE- Mad Tanist, The Grand Champion, and Sandown Champion appear no less than 73 times, and with a total 10% of his blood quota. If you look at any of the Irish and British dogs these figures are much higher. On the following page I have shown how some of to-days top racers and stud dogs can be traced back to INLER.

THE BIRTH OF NOW

ATAXY-----**INLER**-----**INLER MAY**
 (brindle) (Black) (black)
 | |
 | (one of the greatest brood bitches of all time)
TANIST
 (Brindle)
 |
MAD TANIST
 (Black)
 (winner 1940 irish derby)

SANDOWN CHAMPION-----**THE GRAND CHAMPION**-----**MAD PROSPECT**
 (Black) (bk/bd/w) (bk/w)
 | | |
YELLOW PRINTER **WAVERLY SUPREME** **CRAZY PARACHUTE**
 (red/fawn) (White/Black) (Black/ white)
 | | |
 | (worlds fastest greyhound) | |
SUPER RORY **SOBBING SAL** **MONALEE CHAMPION**
 (Fawn) (Black) (Black)
 | | |
 | (Worlds fastest greyhound) | |

HOTSHOW BEN---**BRETT LEE**---**TRENDY LEIGH**
 (Black) (Black) (Black)
 | | |
 | (Worlds fastest greyhound) | |

LINDA'S CHAMPION-----**ITSACHAMPION**-----**PHANTOM FLASH**
 (Black) (Black) (Black)
 (Winner 1977 Irish Derby) | |
DALEYS GOLD **SLANEYSIDE HARE** **SPIRAL NIKITA**
 (white/ black) (Black) (Black)
 | | |
KNOCKEEVAN STAR **LATE LATE SHOW**
 (Black) (Black)

CONCLUSION

It has been 148 years since Darwin's evolutionary theory "Origin of Species" first saw the light of day, but modern biology consistently confirms his amazing ideas even though the great man knew nothing of genetics or molecular biology. Yet there are still nagging questions that evolutionary biology has yet to answer. Such as, is evolution predictable or is it just down to chance? What about evolutionary intermediates. How do we spot the viable lines?

Evolutionary intermediates represented a central preoccupation for Charles Darwin in his case for the theory of evolution. He remarked for example - why, if a species has descended from other species by insensibly fine gradations, do we not everywhere see innumerable transitional forms? The idea of useless intermediate stages of a useful adaptation is even older than Darwin. When attempting to understand evolution, we traditionally rely on analysing evolutionary outcomes, despite the fact that unseen intermediates determine its course.

This drift to darker coated racing greyhound was inevitable when you take into account the underlying dynamics of my hypothesis that Eumelanin via Dopamine increases a dogs potential to break quicker and run faster. But it will come at a cost during this evolutionary intermediate stage. We have to address the fact that with faster dogs we will have more injuries. What we are witnessing is the result of mans intervention in evolutionary intermediates.

My theory that colour inheritance is a natural marker for speed fits Karle Popper's criteria of a scientific theory, it meets the 'falsifiability test' in that there will always be exceptions to a rule. The famous philosopher Karle Popper proposed falsifiability of a theory as a criterion to distinguish scientific from non-scientific theories. Falsifiability means that a theory must be able to be refuted by at least some real-life observations. A falsifiable theory is a scientific theory and an unfalsifiable theory is not a scientific theory at all.

It's hard to think of another breed of dog that has more colour and pattern variations than the greyhound. So before we dismiss light coated greys, we have to address the possibility that they may have a secondary function contained within their genes and junk DNA. While the bulk of genes are shared with other organisms, much more of junk DNA is peculiar to a species. New research shows that much of this junk DNA is not redundant but is chemically active, in ways that influence how genes are switched on and off. As there is more variation in the junk, one theory is that it provides a stock of genetic material from which potentially useful mutations can arise to drive evolution. The only problem is that with todays close breeding methods, we may well remove them by accident. Natural selection has preserved secondary functions for a reason. The fact that those reasons are not obvious to us at the present time in no way negates our responsibility to preserve them.

We are slowly unlocking some of the secrets contained within hair and skin colour. Only recently Italian scientists have developing a quick and inexpensive way of screening people with a susceptibility to melanoma (cancer) by measuring the amount of Melanin in a strand of hair. So the notion that coat colour and speed are linked is no less valid because it seems so simple to have been overlooked for so long. I am convinced of the significance that when it comes to speed and black or brindle dogs, they do have an advantage, and that it stems from the link between Melanin, Eumelanin, Neuromelanin, and Dopamine.

In any great dog you need speed coupled with controlled aggression or determination, and Dopamine controls all these elements. So if you can get your hands on a dog that is a 'bang railer' with lightning early pace, who also gets 480m going away, and that is of course **black from head to tail** then you may just have the next 'Brett Lee'.

REFERENCES

Greyhound Star 2006: Open Race Statistics

Greyhound Annual 2007: Irish track record holders

Floyd Amphlett: In The Blood

Greyhound Data: Breeding Database

Gert Korthof: 'Does irreducible complexity refute neo-darwinism?'

Howard Gardner: 'Five Minds For The Future'

CR Freed and BK Yamamoto: Regional brain dopamine a marker for speed

Healthgene: 'Making sense of Coat Colour'

The times newspaper: 'Times 2 science news'

Newscientist.com: 'Science and technology news'

Studentwebs: 'How does Exercise affect our Mood'

Molecular expressions: 'The Substantia Nigra'

Molecular expressions: 'Neurotransmitters And Dopamine'

Rupinder Mann: 'The role of Dopamine in Schizophrenia'

Sarah whillett: 'Runners high'

Urban Dictionary: 'What is Speed?'

Serendip: 'The pleasure principal and the Neurotransmitter Dopamine'

The Nature Journal: 'Neuro science'

Classes yale edu: 'How the leopard gets it's spots'

James D Murray: 'How the leopard gets it's spots'

Speedpigeon . com: 'Racing pigeons bred for speed and endurance'

Polar bears international: 'Polar bears in depth'