The Melanistic Doberman

Melanistic Doberman are not “rare”, rather they are just different genes at play. Melanism in Doberman is due to a genetic mutation.[1] There are three potential causes of a "solid" Doberman;

- E lotus - em/em Masking Gene (Extreme Masking)
- A Lotus - a/a Recessive Black
- K Lotus - a single KB/ky and KB/KB on the K locus produce a solid, Dominant Black[2]

The E Lotus is the Masked Magician

The Em mutation is fairly rare, occurring in a limited gene pool of dogs. The Em on the E lotus causes a melanistic mask (muzzle or face). Normally, a Doberman has two normal genes, represented as N/N (N for normal). When there is a mutation it is represented as em/N or em/em. A dog with em/N will be a standard color but be able to pass on the em gene to 50% of its offspring. In Doberman this displays as a dark muzzle and darker black markings on legs and feet. Not every dark muzzle/pencilling has a Em mutation though! A dog with em/em will be "affected" for the melanistic mask and will pass at least one em gene on to all of its offspring. “Extreme masking can also "hide" tan points.[3]

The K & A Lotuses

Genetically, all dogs simplified have either a solid black coat pigment or red/brown coat pigment (phaeomelanin). A solid black is called eumelanin. "Whether a dog has a solid eumelanin (black) coat or a coat with red/tan markings (caused by phaeomelanin) depends almost entirely on the K locus. K consists of three alleles:

- KB - dominant black (solid black, no red). Sometimes referred to as simply K.
- kbr - brindle (this is dealt with on the brindle page, but for now all we need to know is that it acts as a k allele, but just adds brindle on top of any red markings).
- ky - recessive non-black (will still have black nose pigment and may have black markings, but may also have red markings too). Sometimes referred to as simply k.

Because black is dominant, a dog with even just one KB gene will be solid black. A dog with two ky genes (i.e. homozygous for ky) will be able to show tan markings. These tan markings are determined by another locus, A (ASIP). So basically, a genotype of ky/ky allows a dog to show whatever it has on the A locus. A Kb/ky or KB/KB dog may be genetically tan-pointed or sable on the A locus, but won't be able to show those markings because of its dominant black allele/s. Dominant black dominates the whole of the A locus, but it can be modified by other genes, such as liver, dilution, greying, and merle. All of these will alter the way a dominant

[1] https://www.pawprintgenetics.com/products/tests/details/163/?breed=114
[2] http://www.doggenetics.co.uk/black.htm
[3] http://www.doggenetics.co.uk/masks.html

black dog looks, but the one thing they cannot do is add phaeomelanin (red) to the coat. The only way phaeomelanin can be added to the coat of a dog with the dominant black gene is through the e gene (E locus) - recessive red. This turns a dominant black dog (or indeed, any dog) into a solid red dog with black nose pigment. ... Most black dogs have the dominant black gene, but there's also another, less common gene that can cause solid black too - recessive black (a on the A locus)."[4] The A lotus consists of four alleles:

- Ay - sable
- aw - agouti
- at - tan points
- a - recessive black

To be recessive black a dog must inherit a/a on the A lotus. Appearance is identical to that of Dominant Black. The only difference being Dominant Black only needs one K allele to be solid black.

Melanism is a Genetic Mutation

Melanism is a genetic mutation and not a variation of coat color. Research in mice[5] and cats have been proven to be genetic. Studies on some wild melanistic animals has shown that they're healthier and longer lived.[6] The reasoning behind this speculation is they are more difficult to spot thus having a greater chance at survival[7]; a melanistic prey animal is more difficult for a predator to find, a melanistic predator is more difficult to spot making it more successful at hunting. The exact reason for their better health is not well understood but may be linked to lower stress levels and better immune health. Melanism is correlated with better vitamin D synthesis[8] which boosts the immune system. One example of melanism and improved health is melanistic wolves have better immunity to distemper[9]. There was a significant difference between wolves carrying one gene for melanism and those who had two; "differences among color genotypes in the Yellowstone population includes highest annual survival, lifespan, and lifetime reproductive success for black heterozygotes and lowest survival, reproductive success, and frequency for black homozygotes "[10].

Fun Fact: Doberman are one of a few breeds that carry only the tan point allele (at) on the A lotus. That means all Doberman are born genetically tan pointed - though this can be overridden by the K Dominant Black or E lotus Extreme Masking.[11]

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[4] http://www.doggenetics.co.uk/black.htm
[5] https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0006435
[6] https://mashable.com/2015/03/05/black-animals-melanism/
[7] https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0226136
[8] https://www.ncbi.nlm.nih.gov/pubmed/19182816
[9] https://academic.oup.com/mbe/article/35/5/1190/4913657
[10] https://science.sciencemag.org/content/334/6060/1275.abstract
[11] http://www.doggenetics.co.uk/tan.html

There are many different alleles responsible for the same color or pattern. Allele frequency varies within different populations in a breed. Many off standard coat variations are naturally occurring, though not often expressed[12]. Recessive red (sometimes called clear reds) and, mealistics, dominant blacks, and extreme masking are all variations possible within the Doberman genetics but aren't often expressed.

The aim of a breeder should be to preserve and to improve the breed. The standard is a guideline, a blueprint for the integrity of the breed. Breeding for this mutation is to breed within a small number of lines or to inbreed relatives which is not benefiting the breed. Breeding like that produces dogs with higher COI (inbreeding ratios) and is not aiming to improve the breed, rather it is breeding strictly for color. Until the DPCA accepts melanistic dogs as part of the breed standard they should not be bred. Ethical breeders who sincerely care for the breed and its future will breed to the standard and for the betterment of the breed.

I firmly believe a breeder should breed to maintain the standard and to improve the health of the breed. To say definitively that melanistic Doberman are healthier than their standard counterparts is misleading. There is insufficient research into melanistic animals; none of which proves melanistic domestic dogs are healthier or longer lived. Seeing how the melanistic Doberman is not part of the established standard and the national breed club (the DPCA) doesn't accept the melanistic as a valid coloration, I do not support the breeding of or for melanistic Doberman. At Jackson's Kennel we do not condone the breeding of melanistic Doberman. We feel strongly about adhering to the breed standard and the 4 accepted coat colors to preserve the breed.

[12] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6816562/