WHITE IS BEAUTIFUL

BY: NORMA VINSON

White is a PARTIAL color in Saint Bernards, and as such, has no genetical implication of albinsism or "lethal genes," contrary to reports. The white markings of this breed, even to the white mismarkings, are determined by a set of genes separate from the bugaboos of the albino white and defective white.

Such a set of genes is termed Locus (plural Loci), designation location on the chromosome. Of the 10 Loci determining color inheritance in dogs, only 3 are origins for white. Although color is determined to a large extent by interaction (quantitive inheritance) of genes within each locus, the "sets" of genes and their actions are distinct.

The "S" Locus determines the amount of white on the Saint Bernard, governing whether the dog will be a solid color, a full mantle, a torn mantle or a splash coat, with plus or minus modifiers expressing various degrees inbetween. The genes forecast how large an area the white will cover, and so-called mismarkings of too much white are determined in this Locus. Genes included on the S Locus are, in order of epistatis (dominance):

1 (S) -Solid color, absence of white, except for an occasional small spot on chest of feet.
2 (si) -Irish spotting, white extremeties in more or less definate pattern. Includes feet and legs, chest and belly, tip of tail, muzzle, sometimes extended to form a collar.
3 (sp) -Piebald spotting, variation of Irish spotting, with as much as 80% of the body white. Would include torn mantles.
4 (sw) -Extreme white piebald, all white exept for an occasional splash of color. The colored patches are not diluted to lighter shades by this gene in itself.

Note: Arbitrary numbering of genes is for the sake of simplicity and later reference in this writing. Actual genetic terms for the letters in parents; the capital letter designating the most dominant form of the gene.

For practical purposes, solid colors have been eliminated from this breed, and easily enough, as with any dominant acting gene. The breeder need only cast out those showing it. A dominant cannot remain as a hidden factor. A solid color produced in this breed now would have to be attributed to mutation (permanent change in gene, usually deleterious).

Therefore...full mantles are the most dominant marking in the breed. Marking of additional white are often carried recessively (concealed). Splash coats are not apt to have the full mantling gene, and not expected to produce mantles if paired to another of the same marking. Exceptions do occur, as few genetic theories hold true in EVERY case due to modifiers, interaction, mutations, etc.

Torn mantles and splash coats are of equal value in our standard, and except in a personal preference to produce full markings, should be of equal value to the breeder. The splash coat, if carrying fully pigmented splashes, is not linked to the type of white next listed. (Reference: THE IHERITANCE OF COAT COLOR IN DOGS, by Clarence C. Little, Sc. D., quote, "In basic coat color genes of dogs, no evidence of linkage has been established....each gene locus being a difference chromosome.")

The "C" Locus...Dilution of color, genes listed again in order of relative dominance:

1 (C) -Maximum pigmentation of brown, reds, oranges.
2 (c cn) -Color reduced slightly, includes fawns, beige and tan.
3 (ce) -Extreme dilution, almost white, cream colored.
4 (ca) -Complete albinism, no pigmentation, pink or red eyes.

Gene #2 accounts for the diluted colors produced in many bloodlines in this breed. Note that light colored individuals do not carry the gene for rich pigmentation, by decree of dominance. The reverse, however, is sometimes true as maximum pigmented individuals can produce light colored progeny if they have inherited the recessive gene for it.

The extreme dilution gene, #3 coupled with the limited extension of color, gene #4 on the S locus, produces almost complete white color coat evidence in 7 AKC recognised breeds, including the Westie, Pyrenees and Samoyed.

Gene #4 of the C locus is the only possible origin of the albino. Most genetisists report never observing the extremely rare albino dog or cat, and its existance is a matter of theoretical, rather than practical interest. The albino's lack of pigmentation is caused by failure to produce the enzyme which results in melanin production. The pigment melanin give color to the hair, skin and iris of the eyes. The eyes are pink due to unpigmented irises, which fail to cover the blood vessels on the retina.

Certain research has advanced the theory that a human being with a white streak in the hair may show a degree of albinism. This may or may not be true, however the theory is not applicable to dogs, whose inheritance of color and markings involve considerable complication. Partially white markings are a sound color pattern in dogs, with "Irish and Piebald Spotting" indicated in standards of 30 AKC recognized breeds, in varying degrees of preference.

Third and last of the genetic areas governing white is the "M" Locus, the Blue Merle factor, characterized by dappling, blotches of dark pigment on a light background. Only two genes make up the set. The blue merle is evidenced in Collies, Shelties, Harlequin Danes and dappled Dachsunds.

1 (M) -The dominant merling factor, absent in most breeds. A double dose of the gene produces white dogs, usually deaf blind and sometimes sterile. Approximately one-fourth of the puppies of paired Merles will be white.
2 (m) -Absence of the merling factor.

Those dogs who are not merled can only have the gene forecasting absence of the factor, therefore defective whites are not expected from non-merled individuals.

The conclusion is obvious: splash coats and mismarks are not to be associated with albinos or defective whites by reason of their coloring. Only by inheritance of separate causitive genes will detrimental whites be produced.

Other Loci interesting to the obvious marking of the Saint Bernard include: the "T" Locus:

1 (T) -Pigmented flecks of color on the white areas, appears at 3 to 4 weeks of age, strongest expression in Dalmations.
2 (t) -White areas of clear, unticked, freckling restricted.

As freckling is a dominant trait, it is readily eliminated when non-freckled dogs are paired. Non-freckled dogs cannot carry the dominant gene for this type of ticking.

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Liver colored noses are effected by the "B" Locus, which causes dilution of otherwise black areas by the coupling of the recessive. Recessive genes are more difficult to weed out. A suspected carrier can be proven by a test mating to a known carrier and then culled if the condition merits loss of other possibly advantageous traits. This particular gene is carried in true Mendelian fashion, expressing itself by pairing of two carriers.

"E" Locus...appearance of black on red to tan colors, as a solid color, a mask, or by brindling.

1 (Em) -Black mask pattern of foreface, sometimes ears.
2 (E) -Allows dark pigment evenly over the total coat.
3 (e br) -Allows band of pigment, brindle, on backgrounds of tan or yellow.
4 (e) -No black pigment formed, restriction of black.

A mutation on this locus is suggested as the cause of irregular and undesirable black spots occuring unexpectedly through the red coat.

The word "mask" as used genetically would cover the entire foreface as in Great Danes and Pugs. The mask on Saints is further complicated by the "S" Locus which places white on the muzzle area. The irregular mask of too much black on the muzzle can be attributed to incomplete white coverage of the area, and should actually be termed "too little white".

Black splotches of skin on the muzzle with covering of white hair (often seen as freckles) probably are a result in imcomplete coverage of white from the "S" locus. Supporting this theory is the observation that freckles on the Saint are usually black on the muzzle, yet red (or the body color) on the legs and white splashes. This theory gives credit to the belief that individuals strong in white (splash coats, torn mantles) generally trend toward cleaner white areas.

Considering longevity...a shortened life span could be expected from a genetically defective individual, as well as from congenital problems, nutritional deficiences and a host of other environmental failures. No known basis, however, connects a short life span to PARTIAL white markings and its assumption is a fallacy. The assumption, in itself, is destructive to good breeding practice.