COLORFUL

A TOUCH OF PASTEL

In the second part of this three-part series, the author explains how the dilution genes modify the basic colors.

By Laura Hornick Behning

The formation of the Rainbow Morgan Horse Association in the summer of 1990 marked the beginning of a new era for color in the Morgan breed. Breeders interested in color banded together, sharing their enthusiasm and learning more with each new scientific advancement in the field. Some colors that were then in danger of extinction in the Morgan breed have increased their numbers as the years have passed, preserving their genetics for future generations to enjoy.

Some of the most popular colors in our breed recently have been what are collectively called dilutes. Most people associate the term dilute with palomino, buckskin, and the various homozygous creams with pink skin and blue eyes. They may not be aware that there are four additional known dilutions within the equine species: dun, silver, champagne, and pearl. Champagne and pearl, both thought to be fairly recent mutations, are not found in the Morgan breed, but we do have dun and silver. Each of the different dilutions has a unique effect on red and/or black pigmented hair. Most dilute colors, as their name suggests, end up as a paler version of their base color. Think of what happens when you add a bit of cream to your coffee!

CREAM

Horses from the cream family make up the largest percentage of dilute Morgans in the breed. If a horse inherits one copy of the cream gene, any red hair on its body will be diluted, and it becomes a buckskin, palomino, or smoky black, depending on its base color. But interesting things happen when a horse inherits two copies of this gene (one from each parent): the gene has an additive effect when two of them are present. Both red and black hair are diluted, and these homozygous cream dilutes are very pale, almost white, with pink skin and blue eyes. They are not albinos, as albinism does not exist in the horse. This different effect from heterozygous to homozygous is what is known as an incompletely dominant gene.

Palominos are the result of one cream gene on a chestnut horse. Palominos can range in shade from nearly white to a very dark, sooty brown color, often with heavy dappling. Sometimes these very dark palominos, where shade and/or sooty have overridden much of the effect of the cream gene, are mistaken for liver chestnuts or silver dapples. Palominos have a white mane and tail, although on very dark palominos, the sooty gene causes dark or silvery gray hairs to appear in the mane and tail. On these horses the mane and tail may lose all contrast and become as dark as the body. Historically, many of these palominos were thought to be chestnut, and in our breed especially, such dark palominos are not uncommon.

One cream gene on a bay or brown horse creates a buckskin. Like palominos, buckskins can vary in shade from very pale buttermilk through a very sooty, dark brown color. Very dark brown-based buckskins can be difficult to differentiate, visually, from browns. Color testing for cream will sort these out. Buckskins with sooty countershading (darker color over the back and neck) often have heavy dappling and a dorsal stripe. They can be mistaken for bays if they are more red than gold, for duns if they have a dorsal, or for seal browns if they are very dark.

Because one cream gene does not affect black hair, there is not much effect when it is present on a black horse. These are called smoky blacks. They can be some very odd shades, especially when in weathered or sun-faded coat, and so are often mistaken for dark chestnut, brown, or dun. All smoky blacks, palominos and buckskins will have at least one cream dilute parent. There is a test available for cream if there is any question about its presence.

Two cream dilution genes have a "double dilute" effect on both red and black hair on the horse's body and points. These homozygous creams are nearly white in color, though they may retain a golden cast, often with dapples. A bay or brown horse with two cream genes becomes a perlino; a chestnut horse a cremello; and a black a smoky cream. Homozygous cream dilutes all have pink skin and blue or bluish green eyes. Their skin may freckle from sun exposure, nature's way of protecting the light skin. Every offspring of a homozygous cream dilute will be cream dilutes of some type, which makes them valuable breeding animals for those interested in producing color.

DUN

Dun is a dilution gene that lightens both red and black hair on the horse's body, but not their points. It is also associated with primitive markings, which generally include a dorsal stripe and leg barring, and may also consist of dun colored frosting on the sides of the mane and at the tailhead, a transverse stripe over the withers, mottled dark patterning on the forehead (known as "cobwebbing"), white ear tips and dark rims on the ears, and a facial mask of darker hair. Because dun is a dominant gene, all dun horses have at least one dun parent.

Dun on a black base is called grulla or black dun. Grulla horses are very striking with a silvery gray body color, black points, mane and tail frosting and primitive markings. When bays or browns are diluted by the dun gene, they become a bay or brown dun, sometimes called a zebra dun. They are some shade of red-gold to cream on the body with black points and primitive markings.

DUN: *Dun is a dilution gene that lightens both red and black hair on the horse's body, but not their points.*

BAY DUN & GRULLA

GRULLA, DARKER SHADE

RED DUN

DUNSKIN

TOP TO BOTTOM, LEFT TO RIGHT: MARANA MACEY (Mirabellas Mondo x HCTF Kahlua Spice), 2012 bay dun mare, with HCTF MOONLIGHT MIST (Stormwashed x Kings Mystic Arrow), 2005 grulla mare. Both owned and photographed by Marilyn Vander Wekken. The sharply defined dorsal stripe of a dun can be seen on Macey; RAGTIME DUN D (Ragtime Voodoo Magic x Successful Outta The Blue), 2003 grulla stallion owned by Natalie Tanaka; ALPINEMIST BLESSING (Successful Sorcerer x Mary Mels The Black Widow), 2006 red dun mare owned and photographed by Susanna Schaenzer. Dun factor markings are typically less vivid on red duns unless the chestnut base color is a darker liver or black chestnut; MPLNMN FAR AWAY STORY (HMSTD Rum Runner x Lineback Hija de Sue), 2013 dunskin filly owned by Delynne Oliphant. Lighter dunskins, like this filly, look very similar to buttermilk buckskins, but the dun gene adds a crisp dorsal stripe, leg barring and other dun factor markings.

DUN DORSAL STRIPE

DUN LEG BARRING, FRONT

DUN LEG BARRING, BACK

LEFT TO RIGHT: ALPINEMIST CARAMEL RIPPLE (Successful Sorcerer x Bar D Paloma), 2004 bay dun mare, pictured as a yearling. The dun dorsal strip is very crisp and extends down into the tail, with lighter hairs, called "frosting" on either side of the stripe at the tailhead. Owned by Theresa Sheridin; The vivid leg barring on the brown dun mare AMBERFIELDS DUN LOVIN (Stormwashed x Finally's Just A Dandy). Owned by Dawn Wagstaff.

(Photos by Laura Hornick Behning)

SILVER: *Silver is a dilution gene that only affects black hair.*

BAY SILVER

BAY SILVER

LEFT TO RIGHT: UNCONVENTIONAL (Gone Gold x Foxton Frosty Dawn), 2006 bay silver stallion owned and photographed by Lyle and Cindy Dietz. The silver dilution lightens any black hair on a horse to chocolate (as can be seen on this horse's leg points) and adds silver gray hairs to the mane and tail; POSITIVELY CHARMED (Gone Gold x Foxton Frosty Dawn), 2007 smoky black silver mare owned and photographed by the author. "Charli" is a combination of the cream and silver dilutions on one horse, but since her base color is black, cream has not had much of an effect on her color. The silver gene has diluted her black hair to chocolate and added silver hairs to her mane and tail.

SMOKY BLACK: *Because one cream gene does not affect black hair, there is not much effect when it is present on a black horse.*

SMOKY BLACK

OGO SELLMAN HILL AND CO (OGO Tejon de Oro Hermosa x Ursula's Higuera Bandita), 2009 smoky black stallion owned by Wendy LeGate (Photo by Jessica Campmans).

Chestnuts with the dun gene are called red duns. Since red duns do not have black points to contrast with their body color like grullas and bay duns have, their dun markings may be less dramatic. Dun in combination with one cream gene creates dunalino (dun + palomino), dunskin (dun + buckskin), and smoky grulla (dun + smoky black). Like all colors, there is a range of shade in the dun colors, from so dark as to look almost non-dilute to very pale.

It is not uncommon for horses of other colors to have a dorsal stripe and even faint leg barring, which is thought to be caused by the sooty modifier. These horses are not genetically duns. There is now a test for the dun gene which makes it much easier to determine which horses are actually duns and which are simply very good mimics!

SILVER

Silver (sometimes called silver dapple; in the Rocky Mountain breed it is called "chocolate," an apt description.) is a dilution gene that only affects black hair. It does not express on chestnuts, since they do not have black hair to be diluted by the gene, but silver can be passed on by those chestnuts that carry silver. The silver gene dilutes any black hair on the horse to shades of chocolate through slate gray, sometimes with dappling, and has an added lightening effect on the mane and tail, turning them silvery gray, straw colored, or even platinum. Bay silvers have chocolate colored legs and lighter (sometimes strikingly so) manes and tails, and black silvers are a chocolate body color with a lighter mane and tail. Silver is often confused with flaxen or even gray, but it is neither. Because silver is a dominant gene, all silvers have at least one silver (or a chestnut that is carrying the silver gene) parent.

In the past most silvers were registered as, and thought to be, chestnut. Since chestnut bred to chestnut always results in another chestnut, this caused some confusion when the "chestnut" (actually silver) was bred to another chestnut and a black, bay or brown was the result! This has, however, made it easier to track the gene's source, as the production records of mistakenly registered silvers are loaded with such incidences.

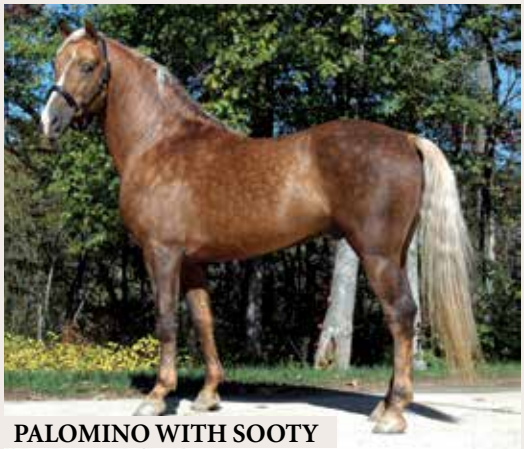
There is a test for silver. The 2006 Uppsala University (Sweden) study that identified the gene included four silver dapple Morgans, and the bay silver Morgan, Unconventional (Gone Gold x Foxton Frosty Dawn), and the chestnut (carrying silver) Morgan mare, Amanda's Suzie Q (Devan King x Taha Holly Q), are pictured in it.

Any of the dilution genes can be combined in a single horse, as the genetic controls for the different colors are found at separate loci. These combination dilutes are often very striking, but it can be confusing sorting out just what genes they have without testing or a good working knowledge of the effects of the various dilutions.

PALOMINO: *Palominos are the result of one cream gene on a chestnut horse.*

PALOMINO, LIGHT

PALOMINO, GOLDEN



PALOMINO WITH SOOTY

TOP TO BOTTOM: CORAL FOREST (World's Edge Goldoak x Kennebec Topaz), 2004 palomino mare owned and photographed by the author. Such extremely "white" appearing palominos are comparatively rare. They are often mistaken for a homozygous cream dilute (but do not have pink skin and blue eyes) or a mature gray; GONE GOLD (Adiel's Casino Gold x Kennebec Topaz), 2002 palomino stallion owned by Michelle Davis-Ralston. This horse is the typical shade one thinks of when picturing a palomino—a clear gold with a starkly white mane and tail (Photo by Laura Hornick Behning); GAB CREEK GOLDEN VAQUERO (PKR Primavera Brio x LBF Gay Enchantment), 2003 sooty palomino stallion owned by John Hutcheson. Sootiness tends to cause marked dappling, as seen here.

A NEW DILUTION IS FOUND IN MORGANS

In 2001, a filly named TL Champagne Sensation was brought to my attention by her owner, Pat Hardy of Abee, Alberta. I edit the Rainbow Morgan Horse Association newsletter, and Pat sent me pictures of Sensation for our annual Color-Foal Pictorial. Sensation appeared palomino, but had bright blue eyes and pinkish skin. Some thought she might be champagne, but the champagne dilution does not exist in Morgans. Her sire was originally thought to be a palomino stallion (her dam is black); was Sensation some type of unusual palomino? The mystery deepened when DNA testing, as part of the registration process required of all Morgans, subsequently discovered that the palomino stallion was not, in fact, the sire of Sensation. Instead, she had a bay sire! Neither of her parents are visible dilutes!

When the test for champagne came out, Sensation was tested and found to be negative. She has also tested negative for silver, pearl and cream. What this means is whatever is causing this odd coloring, it is a dilution not only not known in Morgans, but one not yet identified in any breed. It is something entirely new; possibly a recent mutation.

One might think this one mare was an isolated anomaly, but there have since been two others of this strange dilution produced! They are all from the same family of Morgans and were produced when the lines of Mehlwood Marybelle (Merry Bellmarch x Mary Todd), foaled 1971, a chestnut mare from two chestnut parents, were doubled up in the pedigree. This would seem to imply a recessive type of inheritance where the heterozygotes show no effects of the dilution at all.

Visually speaking these horses somewhat resemble silvers, in that any black hair on their bodies is diluted to a pale chocolate color. The manes and tails are light. Skin color is pinkish at birth, darkening later, though still retaining a bit of a pink/purple cast around the genitalia. Eyes are bright blue at birth changing to a very unusual pale greenish-gold. It is difficult to tell more about the effects of this dilution because there are so few of them—just three individuals at this writing, two bay-based and one chestnut-based. They have baffled and intrigued a number of color experts across all breeds, and it is hoped that more will be discovered about this new dilution in the future.

FOAL COLORING

Nowhere are foal colors more confusing than among the various dilutions! As with foals of the base colors, dilute foals generally are a more pale shade of their final adult color. This is not always the case, and some dilute foals, particularly heterozygous cream dilutes, can appear to be non-dilute. As an example, some palomino foals are born looking very much like a chestnut foal. There might be a bit less intensity to the color, and parting the mane to the roots will show white hair growing in. Dark or brown buckskin foals can look very similar to their brown-only brethren, and some buckskin foals are very much the same shade as a light red bay. All cream dilutes can have blue or bluish eyes at birth, but only the homozygous cream dilutes keep them.

Black based silver foals are born with coloring similar to that seen on a Weimeraner dog—pale gray with a pinkish cast to the skin. Their manes and tails are a silvery color. Bay based silver foals can look like a chestnut or bay foal at birth. Generally they have more light hair in the tail than a bay or chestnut foal would have, and parting the roots of the mane will show the lighter, silver gray hair coming in.

Dun foals can usually be identified by their pale color and a sharply defined dorsal stripe that looks painted on rather than smudged, which continues down into the tail. Any leg barring will not be visible until after they shed their foal coat. Fortunately for breeders today, color testing removes any guesswork about a foal's color. But for many color enthusiasts, it is a fun challenge to use only phenotypical clues to determine a foal's possible color while waiting on those test results!

BUCKSKIN: *One cream gene on a bay or brown horse creates a buckskin.*

BUCKSKIN, SILVER

BUCKSKIN, BROWN BASED

BUCKSKIN, LIGHT

LEFT TO RIGHT: BUCKSKIN SILVER: EDGEFIELD VERMEIL (Edgefield Sun Gold x Foxton Frosty Dawn), 2009 buckskin silver mare owned and photographed by Char Cook. The normally black points of a buckskin are diluted to chocolate by the addition of the silver gene. The mane and tail hair are also lightened by silver; KINGS FREEDOM QUEST (Kissn Make Me A Prince x Kings Mystic Miracle), 2011 brown buckskin stallion owned and photographed by Shelia Lomax. Since brown horses are mostly black, they are not much affected by one cream gene and remain very dark. The lighter-than-usual hair on the muzzle and around the eyes is typical of brown-based buckskins; KENNEBEC TOPAZ (Medomak Cavalier x Kennebec Opal), 1992 buckskin mare owned and photographed by the author. Topaz is a very light shade of buckskin often called "buttermilk buckskin."

BUCKSKIN, GOLDEN

BUCKSKIN, SOOTY

LEFT TO RIGHT: HMSTD SUN OF A GUN (R Two Little Zipper x High Stepping Buttercup), 2008 buckskin gelding owned by Dana Crossland; INDIGO SIERRA (DM Prairie Smok'n x Small Acres Wildsumr Nite), 2006 sooty buckskin mare owned by Dana Flaherty (Photo by Lisa Kunde Wong).

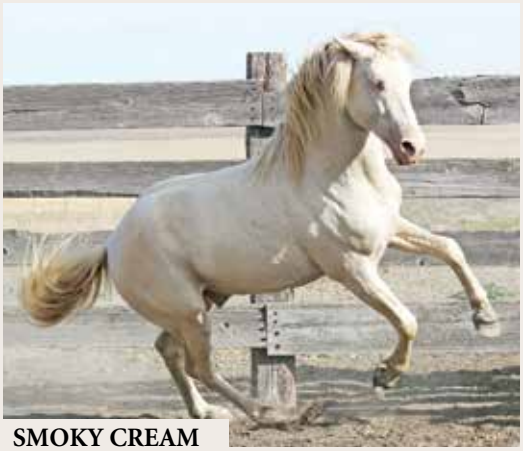
HISTORICAL DEVELOPMENT OF THE DILUTE COLORS, AND THEIR SOURCES IN THE MORGAN BREED

Ancient cave paintings depict dun horses, generally considered to be the oldest of equine colors. Bay dun was the ancestral color of the horse, with all other colors being the result of subsequent mutations. Dun is common in primitive European breeds of ponies like the Fjord, Icelandic, and Highland Pony. In the U.S., it is rare in light horses, including the Morgan, but not uncommon in the stock horse breeds.

All dun Morgans descend from the 1964 smoky grulla mare, Pendleton Buck Missy. It is a bit of a mystery where Missy's dun gene came from. Her dam, Cute, appears to be a smoky black in the pictures we have seen of her, and her breeding (by Ketchum, a smoky black who was also the sire of Chingadero, and out of Smokie Brown, who may also have been some sort of cream dilute) supports this. Missy's sire is given as the chestnut stallion King Richard. Pendleton Buck Missy is the only proven source of dun in the Morgan breed.

Cream dilutions were present during the Iron Age; testing on remains from a Sythian burial site determined that two of the horses were buckskin. Golden or yellow horses remained popular over the centuries in art and literature, though it is not always clear whether the horses were cream dilutes or another of the dilutions. Pale horses, including palominos, fell out of favor during the rise of the Thoroughbred race horse in the late nineteenth century, a preference that until recently extended to many breeds. This was less true in the Western United States, where colorful horses flourished, a fact that certainly contributed to their existence in the Morgan breed today.

DOUBLE DILUTE: *Two cream dilution genes have a "double dilute" effect on both red and black hair on the horse's body and points.*



SMOKY CREAM

CREMELLO

PERLINO

TOP TO BOTTOM: OGO EASTWEST COAST (OGO Tejon de Oro Hermosa x CFF Texas Tea), 2009 smoky cream stallion owned and photographed by Jessica Campmans. It might be hard to believe but this "white" horse is actually a black horse with two cream dilution genes! SFG INFINITY AND BEYOND (MEMC Tinseltown x Shatona's Empress), 2001 cremello stallion owned by Patty Clark and Marilyn Novak (Photo by Laura Hornick Behning); DEVINE SPIRIT OF HOPE (Blacksaddle Starbuck x KRP Pixie Pat), 2002 perlino stallion owned and photographed by Chris Holm.

All of the various cream dilutes in the Morgan breed originate from the following four sources:

1. The LU Sheep Ranch, where the color is possibly coming from Night Tide.
   a. Dawnglo (Night Tide x Ishawooa), 1939 palomino mare. Found in Californio, San Willidust, and Tio Lalo descendants.
   b. Carmel Snow (Night Tide x Kaycee), 1939 palomino mare. Found in horses of Pineland descent.
   c. Luxury (Night Tide x Mallow), 1939 buckskin mare (registered as dun). Found in the Aquila's prefixed colorfuls, Dickie's Pride, Desert Sands, and Yellow Bird descendants.
   d. Luellen (Night Tide x Ethete), 1939 smoky black mare. Found in descendants of Morgan Gold, Nugget Hanneman, and Rusty Walker.

2. The Cross Ranch, cream dilution originating from the X registered dams of these two horses.
   a. Ketchum (Joe Lewis x Du Noir Strip), 1950 smoky black stallion. Found primarily in the many horses of Chingadero descent.
   b. Buck (Imperial x Nellie), 1930 buckskin mare. Found in the numerous lines of descent from her daughters, Yellow Girl and Smokie.

3. Gwenie (Golden Jubilee x Gwenalan), 1951 palomino mare. Gwenie's color line comes down to us through horses of the Jan Mabie Pace lines.

4. Cotton Hill Daisy (Amigo Mick x Daisette), 1949 palomino mare. Cotton Hill Daisy's color line is represented by horses from Sunup Neptune lines.

Like the cream dilution, silver also dates from at least as far back as the Iron Age. It is most commonly found in Shetland Ponies and Icelandics, and is the signature color of the Rocky Mountain Horse and related breeds. It is the rarest dilution found in the Morgan, with less than 100 individuals in existence at present.

The only known source of the silver gene in Morgans is the stallion Dan, a chestnut (carrying silver) foaled in 1916 by Headlight Morgan. There are two silver lines descended from Dan that have survived to the present. They come from the 1966 chestnut (carrying silver) stallion, Topside Jolly Roger, and the 1975 chestnut (carrying silver) stallion, Crimson Jack. Topside Jolly Roger's color line comes down to us in horses from his brown silver son, Pegasus Persuader; Crimson Jack's silver dapple descendants, fewer in number, come from his chestnut (carrying silver) granddaughter Amanda's Suzie Q.

The color of a horse could be seen as a simple cosmetic detail, but many horse owners—indeed, entire horse-using cultures—have long attributed certain qualities to specific colors. Folk wisdom holds that duns are tough and durable horses, good for extreme situations. Palominos and buckskins are considered flashy and thus found favor as parade horses. Not all beliefs have been positive, however. Homozygous cream horses were thought to be weak, in the mistaken belief that the blue eyes are defective and that their pink skin was less durable than darker skin. We are fortunate to live in a time where scientific knowledge replaces old prejudices, and armed with that information, we can make intelligent breeding decisions regarding color. ■

In the third of this three-part series, we will conclude with a discussion of gray, roan, rabicano, and the pinto patterns.

For more information about color in the Morgan breed, with numerous photo examples, please visit the Morgan Colors website at www.morgancolors.com.