

PRECIOUS

*Misidentified and misunderstood,
the silver dilution gene has been
virtually unknown in the
Paint world until now.*



METAL

By IRENE
STAMATELAKYS

Have you ever seen a silver horse? Not a shiny gray, but a rare and intriguing silver dilute? Chances are, you never have. If you have, chances are you didn't know it.

Just ask Paint Horse owner Talia Chiodo, who first learned about them while surfing the Internet.

"I was just browsing equine Web sites when I stumbled upon a photo of a silver dapple

horse," recalled Chiodo. "I thought the color was stunning, I decided to learn more about it. So I Googled the term 'silver dapple.'"

Chiodo found the Web site of Meadow View Farm and Champs Guthrie AQHA, a brown silver stallion, and came across a page that had close-up photos of silver characteristics—mottled legs, flaxen-tinted mane and striped hooves.

"As I looked at the close-up of leg mottling, a light bulb went off," said Chiodo. "That's the same type of mottling Bella has! She also has the flaxen mane and striped hooves."

Living in Des Moines, Iowa, Chiodo owns two Paint mares—Bella, whose registered name is Wrangled From Heaven, and Bella's dam, Stars Angel Too.

"I had always doubted that Bella was a dun," said Chiodo. "As Bella aged, her coat got darker and darker. She is now the darkest shade of chocolate I've ever seen with no dun characteristics whatsoever."

With a chocolate-colored coat and other silver characteristics, Chiodo wondered if her Paint was possibly a silver. Did they even exist in the breed?

"I immediately called APHA and asked them if they had any silver Paint Horses on file," she said. "I was told that they did not."

Not to be discouraged, Chiodo took the next step.

"I knew it was a long-shot, but I decided to test Bella anyway [for the silver dilution gene]," continued Chiodo. "I got the results in about a

Right: Brown silvers are often mistaken for liver chestnuts. Notice the lightened mane and tail and dapples on Champs Guthrie AQHA, who descends from Bow Champ, one of the two known lines of silver Quarter Horses.



COURTESY, MEADOW VIEW FARM



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Above: Although not confirmed by genetic testing, BN Pecos Pete certainly looks like a black silver. With his light mocha coat, dapples, and a flaxen mane and tail with dark roots, he displays classic silver characteristics.

The 2004 solid gelding is by Black Ty Affairs Kid and out of Magnificent Nina Blue.

Right: Some foals with the silver dilution gene have white eyelashes, which they later outgrow. This is a secondary characteristic, not absolute proof that your foal is silver.

week. I was floored when I saw them. According to Bella's results, she was a black silver.

"I was even more shocked after I tested 'Angel' [also registered as dun]. Her results came back as buckskin silver. That means she carries both the silver dilute gene and the cream dilute gene—a rare combination indeed!"

Like many Paint owners, Chiodo was completely unfamiliar with the silver dilution gene and the unique colors it produces by lightening the black pigment in the hair. While silver colors are rare, they are growing in popularity and certainly in the future we'll find—or breed—more silver Paints.

SILVER CHARACTERISTICS

Before genetic testing for the silver dilution gene was available, silvers were usually identified by their phenotype or external appearance. Primary characteristics are diluted coat, mane and tail colors. Secondary characteristics include leg webbing, striped hooves, white eyelashes on foals and sometimes dappling.

This dilution gene is unique because it modifies only the black pigment in the hair, leaving the red pigment untouched. As a result, silver



CLARE CARVER

will affect black, bay, brown, buckskin, dun and grullo horses, without changing sorrel, chestnut, palomino and red dun horses. While those "red" horses don't express the gene, they are capable of passing it to their offspring, often with surprising results.

There isn't just one silver color but several that vary with the horse's base color. In the past, these colors were called silver dapple, silver chocolate and red silver, among other terms. However, to simplify and clarify the color names, today many breeders describe horses using the base color plus silver.

Breeder Julia Lord of North Liberty, Indiana, discovered Saddlebreds with the silver dilution gene in 2002.

“Silver on a black base color is the shade that comes to mind first when hearing the term ‘silver dapple,’ ” explained Lord. “The body color is diluted to a chocolate or mocha brown shade, sometimes light enough to appear similar to a sooty palomino.”

Black silvers are also mistaken for flaxen liver chestnuts.

“[In bay silvers], the red pigment on the body is unaffected, while the black on the legs is slightly diluted and the black of the mane and tail is more strongly diluted,” said Lord. “The horse is not quite bay and not quite chestnut either. Usually the legs are the main clue that the horse is not chestnut—they will be much darker than a chestnut.”

Brown silvers are often difficult to distinguish from blacks and bays, says Lord.

“The Agouti test [as the Agouti gene controls distribution of black pigment] may be needed to tell apart black-based from brown-based silvers,” she explained.

Like bays, brown silvers are often mistaken for chestnuts. The silver gene can also dilute buckskins, duns and grullos. These colors are rare and harder to identify visually, making them easily misclassified. Mane and tail colors are important clues that the silver dilution gene is at work.

“The gene tends to dilute the mane and tail much more strongly than the body, often to a silvery-white color, although this can vary and may darken with age,” explained Lord.

Manes can range from platinum blond, to flaxen, to slightly diluted. In some cases, the mane is described as “self-colored” or the same diluted color as the body.

Silver expert Lewella Tembreull of Pierz, Minnesota, breeds Shetland Ponies, where the color is quite common. She explains that in a typical silver, “the mane changes in shade from root to tip, with the core of the mane being the darkest part. The lower tail is the darkest part of the tail.”

The lower leg color is also affected, says Lord.

“They tend to have lighter hair on the lower legs, lightest close to the hooves, and the lower legs are often dappled, which is highly unusual in other colors,” she explained.

While it is difficult to identify a silver coat color in newborn foals, young horses do have other distinguishing characteristics.

“Foals often have hooves with a very strong and distinct striping pattern and white eyelashes,” said Lord. “These traits are helpful for identifying silver in foals but are gradually outgrown.”

“White markings themselves commonly cause striped hooves. The hoof stripes that we

are talking about occur on legs with no white markings. They seem almost universal among silver Icelandics and Minis, but pretty rare on silvers in other breeds.”

Also, since horses with a lot of head white frequently have white eyelashes, it is impossible to classify a Paint as a silver gene carrier based solely on this characteristic.

Some silver horses have pronounced dappling, while others do not.

“The term ‘silver dapple’ can be misleading because not all horses carrying the gene are silver in color or have dapples,” said Monique Matson, who owns Meadow View Farm in Gaston, Oregon, with her husband, Ken.

Not all silvers display these secondary characteristics, but they are helpful in identifying carriers when the changes in coat, mane and tail color are very subtle.

GENETICS OF SILVER

Experts say that the silver dilution gene was possibly present in Icelandic horse populations more than 1,000 years ago. However, the exact cause of the silver coat color was discovered only recently.

In October 2006, an international team led by researchers at Uppsala University in Sweden, in association with BMC Genetics, published its study, “A missense mutation in PMEL 17 is associated with the silver coat color in the horse.”

The study revealed that a mutation in the gene PMEL 17 on horse chromosome 6 causes one amino acid to be substituted for another and is responsible for a dilution of the black pigment in the hair. The team

In your mind, compare Andretti MVF AQHA with an ordinary bay and you'll see where the silver dilution gene comes into play by diluting the black in the body, mane, tail and lower legs.





TALIA CHIODO

Note how the silver gene has lightened the mane, tail and legs of this buckskin. Stars Angel Too also carries the sooty gene which makes her coat darker than most buckskin silvers.

confirmed that the silver allele (Z) is dominant and, if present, will almost always produce the silver phenotype.

“Horses that are homozygous (ZZ) for silver seem to exhibit a more diluted coat color compared to the heterozygous (Zz) horses, but this indication needs to be verified,” wrote the researchers.

The exceptions are the red-based horses. They do not show any effects of the silver mutation and are hidden carriers, capable of producing offspring with silver coat colors when crossed with horses carrying the black gene.

Once the silver dilution gene was mapped, a genetic test was developed and commercialized, giving breeders a definitive tool to distinguish silvers from other similar colors and identify red-based carriers.

When silvers are misclassified as reds, they usually go undetected until they produce a bay, brown or black foal with a red mate. This raises a flag with breed registries since two red horses can only produce a red. Before the silver test was available, the only other option was to test for the red factor to show the “chestnut” was genetically black.

“Very, very few people can tell certain shades of chestnut from certain shades of silver bay visually,” said Trembreull. “I have years of experience telling the two apart, and there are individuals that I will not even attempt to classify as silver visually. There are horses that the only way to determine if they are a silver bay or a chestnut is by red factor and silver testing.”

Geneticists continue to study the silver dilution gene because of eye abnormalities found in

Rocky Mountain Horses, Kentucky Saddle Horses and Mountain Pleasure Horses. For years, these problems have been attributed to Anterior Segment Dysgenesis (ASD), a congenital, inherited but not progressive disease that can affect horses of any breed or color. ASD was thought to be linked to the silver gene or color.

However, in a recent studies, the eye defects found in Rocky Mountain and Kentucky Saddle Horses were not those usually associated with ASD. Also, researchers are not certain if the problems are linked to a specific bloodline or to the silver gene. Other breeds have not found ASD in their silver horses. Further research is necessary.

SEARCHING FOR SILVER

Like any precious metal, silver is rare. Where did the silver dilution gene come from? Are there many silver Paints?

According to the Swedish-led study, silver coat colors are relatively common in Icelandic Horses, American Miniature Horses and Rocky Mountain Horses. They have also been found in the Morgan Horse, American Saddlebred and Shetland Pony.

In the Morgan breed, “evidence suggests Headlight Morgan as the possible source of the gene,” said Lord.

Why is this 1893 “liver chestnut” stallion significant?

“If he truly was carrying it, it may be much more widespread than we think, as he sired not only many Morgan foals, but was also used as a sire of Quarter Horses on the Burnett Ranch,” said Lord.

In 2002, the first silver Quarter Horse was officially discovered—Bar U Champ Binder, a 1981 silver stallion. His sire, Bow Champ, was registered as sorrel, but is probably a silver bay, as he sired at least one bay foal from a chestnut mare.

“It’s not 100 percent certain which side of the pedigree Bow Champ got it from,” said Lord. “Both parents are registered as sorrel.”

A few months later, another silver Quarter Horse line was identified—Ms Barbarella, a 1993 mare registered as chestnut but with a silver phenotype. Her pedigree included a long line of “roans” and “grays”—colors that could have been silver. That line leads back to Smoky Wheat.

“He is sired by Waggoner, a bona fide gray,” said Lord, “so Smoky Wheat and his offspring could have been gray plus silver. But his dam is just identified as ‘Mare by Headlight Morgan,’ which takes us full circle to the horse identified as the likely source of the gene in Morgans.”

Because APHA does not officially recognize the silver colors, it is impossible to accurately estimate the number of silver Paints.

According to silver enthusiasts, only the two registered Paints owned by Chiodo are known to carry the silver dilution gene, confirmed through genetic testing.

Stars Angel Too is a 1991 buckskin silver overo mare, registered as dun.

“Angel is not a typical silver buckskin,” said Chiodo. “She also carries the sooty gene, which makes her coat much darker than a normal buckskin silver. Many buckskin silvers look almost identical to traditional ‘butter-milk’ buckskins.

“Angel is a unique color. Her base color is a dark caramel. Her legs are dark, but not black. They are almost a deep burgundy. Her mane and tail almost look dark red, but with flaxen-tinted ends.”

Based on photos, Chiodo believes Angel got the silver gene from her dam, Silver Star Dust.

“I theorize that Silver Star Dust received the gene from her sire, Silver Buzz,” explained Chiodo. “His grand-dam, Painted Doll, looks like she might be silver by her photo. I haven’t been able to find any photos to trace the gene back any further than that.”

Angel passed her silver gene to Wrangled From Heaven, a 2003 black silver tobiano mare, registered as dun.

“Silver is notorious for ‘progressing’ over time,” explained Chiodo. “Bella is a completely different color than she was when she was a weanling or yearling. “Her mane and tail have always had dark roots with flaxen-tinted ends. She has striped hooves and marbling on her legs. In the summer, she usually develops a ton of gold dapples.”

A SILVER LINING

Undoubtedly, more Paints carry the silver dilution gene. Silver-colored horses are frequently misclassified and underestimated because it is so difficult to identify them visually.

“It can be hard to trace the silver gene because silver ‘hides’ on red-based horses,” explained Chiodo. “The silver gene can be passed down through generations of red-based horses without anyone even realizing it, since it will only show itself when it is passed to a foal along with at least one copy of the black gene.”

Most silvers are registered incorrectly as chestnuts, flaxen liver chestnuts or sooty palominos.

“Remember, it’s only been a short time that the test has been available,” said Lord, “and probably very few owners or breeders know anything about the color.”

As more breeders learn about the gene and its effects, they’ll turn to genetic testing for answers and perhaps find precious metal—silver Paints—hiding in plain sight in their pastures. **PEU**

“I had always doubted ‘Bella’ was a dun,” said owner Talia Chiodo. Dark chocolate and dappled, Wrangled From Heaven is actually a black silver with a flaxen-tipped mane and tail.

LEARN MORE

See more photos of silver horses and characteristics at silvrequine.com, an educational site developed by silver breeder and enthusiast Monique Matson, about the silver dilution gene and how it dilutes black pigmentation.

