

Applied Appaloosa color genetics

Part V: Sky eyes

By Robert Lapp with Gene Carr
Illustrated by Sean Murphy

Appaloosa breeders have known about “sky eyes” for many years, although old-timers were more likely to describe these Appaloosas as star gazers. It’s a fairly rare but not newly discovered ocular (eye) condition in which the position of the horse’s eye simply looks abnormal—something seems wrong.

More technically, it’s an upward tilting of the eyes, a deviation of ocular direction or gaze in which the horse is constantly looking upward—hence the earlier term, star gazers. (See photos A and B: sky eyes)

Although not even mentioned as star gazers in many veterinary reference books, most breeders and equine veterinarians familiar with the condition regard it as an undesirable and inheritable genetic defect. Why, then, have we chosen to discuss it? The short answer is very simple: There’s more to the story.

DISCOVERING SKY EYES

Gene became aware of sky eyes Appaloosas in the late 1960s and soon after discovered its relationship to coat-color homozygosity. Two

of his few-spot leopard Appaloosa mares were foaled with sky eyes, this at a time in the early 1970s when few-spots weren’t widely known to be homozygous and sky eyes hadn’t been studied.

He started watching for more sky-eyed horses and later observed the condition in a solid-colored filly with mottled skin that became a 100-percent color producer. Over time, he’s observed approximately 50 sky-eyed Appaloosas, all Appaloosa-to-Appaloosa bred and 100-percent color producers.

I initially became aware of sky eyes in the mid-1980s while exploring the back pens at an Appaloosa breeder’s production sale. Though the term was completely unknown to me at the time, I observed a pen full of solid- to marginally colored yearling colts, not part of the sale, including three that appeared to have something wrong with their eyes—they were continually looking upward even when their heads and necks were lowered.

Years later, while researching color production records, I found a mare with the registered name Sky Eyes, foaled in 1976. Over the span of 21 years, she produced 19 registered foals, all

colored, from 10 different stallions, including eight foals from five different Quarter Horse stallions.

This Appaloosa-to-Appaloosa-bred mare met all the criteria for homozygosity—except one. She wasn't a snowcap or few-spot. But she appeared to have these "sky eyes" we'd both observed years earlier.

The mare's uncommon production record supports and strengthens our evolving belief that sky-eyed Appaloosas might well be homozygous, yet raises more questions because the mare wasn't a few-spot, snowcap, classic leopard or blanket with spots.

After starting our genetic teamwork by focusing only on few-spots and snowcaps, we had essentially stumbled onto a condition that hadn't been addressed in any previous color genetics literature. "Sky eyes" was simply not part of the coat-pattern inheritance vocabulary.

A CONTROVERSIAL TOPIC

Early in 2000, we initiated an Internet discussion of sky eyes, requesting and receiving potential sky eyes photos to examine. The discussion of sky eyes has accelerated since that time, but not without controversy.

Sky eyes comprise a complicated ocular condition that warrants very careful examination. While Internet discussion of the topic has raised many legitimate questions prior to and even more-so following our reference to it in Part I of this series, we believe some of the answers provided by others reflect significant oversimplification and misunderstanding. We'll address those questions and the issues they've raised now.

Our analysis is based on our own research and consultation with Kay Schwink, DVM, an equine ophthalmologist who's board-certified by the American College of Veterinary Ophthalmologists. She's taught at Virginia Tech's College of Veterinary Medicine, co-authored studies of Appaloosa genetics, and most importantly, as a POA breeder since 1974, is personally familiar with the sky eyes condition.

UNDERSTANDING SKY EYES

The sky-eyes condition has been equated with an ocular condition known as strabismus, as if to suggest they are one and the same. However, the two terms aren't necessarily interchangeable.

Strabismus is a general medical term referring to any misalignment of the eyes. Also described as any ocular deviation from normal, its various expressions or types are found in humans as well as animals.

The sky-eyed Appaloosa is one type or expression of this general condition.

While other forms of strabismus can be found in different equine breeds, neither Gene nor Dr. Schwink have observed sky eyes in non-Appaloosas to date. We're aware of claims to the contrary, but remain quite skeptical until having the opportunity to evaluate pictures of supposed non-Appaloosa sky eyes.

IDENTIFYING SKY EYES

Identification of a sky-eyed Appaloosa is extremely difficult for many reasons:

- Some exhibit more tilt than others, ranging from nearly imperceptible to very obvious.
- Sky eyes is sometimes less noticeable in mature horses than in foals because the condition can change. On the other hand, it may be less noticeable in older horses than foals because of the height differences and viewing angles involved. Gene has found that some foals with sky eyes seem to lose the condition as they age.
- Some affected horses appear normal when relaxed but exhibit a greater deviation when agitated or startled.
- Photographs of Appaloosas thought to be sky eyed are easily and frequently confused with strong or prominent sclera. Gene has found that nearly all the photos received for examination confuse sclera and sky eyes (See photo B: non-sky eyes).
- Nonhereditary birth defects and injury can create the appearance of sky eyes
- We've never observed the condition to worsen over time

An observer familiar with strabismus



Photo A—Sky eyes



Photo B—Sky eyes

Sky eyes is sometimes less noticeable in mature horses than in foals because the condition can change.



Photo C—Regular eyes with prominent sclera

Ultimately, the owner of a potential breeding animal must weigh the sky-eyes condition against all other desirable factors involved in a mating.

but lacking experience with Appaloosas may well determine the presence of an ocular deviation that's not sky eyes yet confuse the two.

The camera angles involved when photographing the sky eyes condition can produce three problems:

- False indication of sky eyes if the head and neck are extended
- Failure to show the sky eyes even when already identified by live observation
- Inability to evaluate either their presence or absence

SKY EYES AND HOMOZYGOSITY

The question is clear: Are sky eyes a reliable indicator of homozygosity? The sky eyes condition isn't unique to few-spot leopards and snowcaps. Some Appaloosas with those patterns are clearly sky eyed while others aren't.

To date, virtually all the Appaloosas we've identified as sky eyed are Appaloosa-to-Appaloosa bred and have produced nearly 100 percent colored foals. While we're aware of several obviously heterozygous Appaloosas claimed to be sky eyed (products of cross-breeding, leopard or blanket with spots patterns), we're skeptical and would request specific registered names, appropriate photographs, and production records for closer evaluation.

A HOMOZYGOUS ANOMALY?

We don't discount the theoretical possibility that sky eyes may occur in an exceedingly unique genetic circumstance: In very rare cases, the gene(s) producing sky eyes might somehow be linked to pattern genes, producing both sky eyes and a homozygous pattern we haven't yet identified.

As noted earlier, however, after literally years of investigation, we've yet to find sky eyes or the homozygous state in the leopard or blanket-with-spots patterns.

A BREEDING ANIMAL?

Breeding a sky-eyed Appaloosa requires

an owner to weigh many variables very carefully. Because sky eyes are uniformly regarded as an undesirable and inheritable genetic defect, the decision to breed or not isn't always clear.

We're unaware of sky eyes occurring in both a mare and her foal, though the possibility can't be excluded.

Sky-eyed Appaloosas have produced foals without sky eyes, although the genetic mechanisms accounting for inheritability are unknown at this time.

The degree of deviation or tilt can improve over time to the point of becoming imperceptible.

Movement and/or vision problems can range from functionally serious to primarily cosmetic.

Ultimately, the owner of a potential breeding animal must weigh the sky-eyes condition against all other desirable factors involved in a mating.

We're continuing to research the inheritance of sky eyes, especially over several generations, but know specific, high-quality, non-sky-eyed Appaloosas have been produced even when one parent exhibits the defect.

Our investigation of sky eyes has always been a work in progress, relying on clear evidence documenting both the condition itself and what we believe is its homozygous state. Though we're clearly receptive to evaluating contrary evidence, we remain skeptical, considering the identification difficulties any observer must understand and overcome.

Editor's note: Your July Appaloosa Journal will wrap up Robert Lapp and Gene Carr's field-based research series on Appaloosa color genetics.

Later in the year, we'll talk with researchers involved in The Appaloosa Project (visit www.appaloosaproject.info/). In our November issue, Rebecca Terry Bellone, Ph.D., who identified the LP gene, will discuss Appaloosa color genetics; and in our December issue, Lynne Sandmeyer, DVM, DVSc, will reveal her latest on night blindness. 🐾