An Introduction to the Crested Gecko

KALEIDOSCOPE

Model of Inheritance

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Part 1

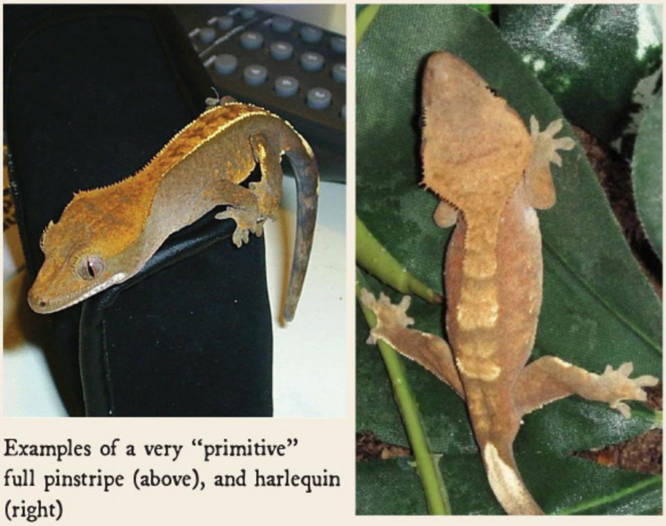
Harlequin & Pinstripe

Gaining insight from the past

When the pet trade potential of Crested Geckos was first realized in the late 1990s and early 2000s, a tremendous amount of selective pressure was focused on the Harlequin, Pinstripe, and Fire traits. This quickly demonstrated to the hobby how effectively this species responds to selective breeding. While these traits are now standard, (with "Fire" eventually evolving into "White Pattern"), their development was not a sudden event. It was a gradual process of steadily increasing the desired trait's expression from generation to generation.

Pinstripe development in Crested Geckos, for example, provides a fascinating example of this selective breeding in action. Early efforts focused on increasing Pinstripe coverage, progressing from 50% Pinstripe to 66% Pinstripe, and ultimately achieving the goal of Full Pinstripe. Through consistent selective breeding across the hobby, Full Pinstripe individuals became more prevalent. However, the careful selection processes employed two decades ago offer valuable insights into the underlying genetic mechanisms that drive Pinstripe development.

The advancement of the Harlequin trait followed a similar path. While there's no perfect metric to judge quality, early Harlequins versions were much simpler than their modern counterparts. Allen Repashy, a pioneer in our hobby, defined Harlequin in his 2002 article as a "combination of light and dark base colors", accurately reflecting the appearance of those early geckos. These early examples exhibited a simple yellow or orange shade contrasting with a darker base color. Over time, this phenotype became more impressive and complex as the "Fire" trait (areas of White Pattern) integrated with the Harlequin pattern. Today, we encounter geckos with nearly their entire bodies covered in a stunning combination of bright orange and white.

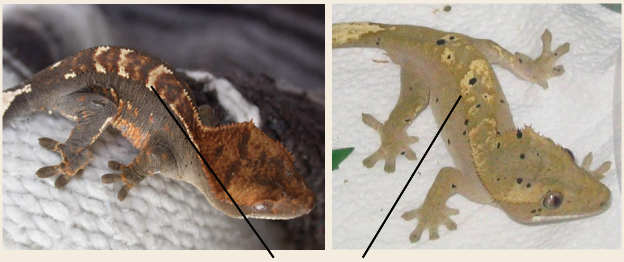


Examples of a very "primitive" full pinstripe (above), and harlequin (right)

These traits' history and rapid evolution will be discussed in detail later. However, these examples highlight an important principle of genetics underlying the phenotypes we observe today.

Not all genes are equal when selecting for a traits expression. Each gene present will carry a unique level of expression, which itself can be selected for (allele-specific expression) [1]. This breeding process, often termed "Gene Stacking" in the hobby, does not involve physically stacking multiple copies of the same gene. Instead, it represents a gradual process of selecting for higher-expressing genes while discarding those with lower expression. Breeders determine which geckos are paired, effectively selecting for higher-quality genes that contribute to the desired overall appearance (phenotype).

Therefore, while producing Full Pinstripes may seem straightforward today, this ease is a result of the significantly improved gene pool within the hobby. A single dominant Pinstripe allele (heterozygous) is now likely sufficient to produce a nearly perfect pinstripe pattern. Similarly, a single Harlequin allele exerts a more substantial influence on the overall phenotype than earlier generations. This principle applies to nearly all traits we select for in our geckos, emphasizing the crucial role of strong lineages in advancing our hobby.



"Fire"

The above examples point out areas that were referred to as "Fire" in the late 1990's and early 2000's.

Enter *Tiger*

Two decades later, while our fundamental understanding of Pinstripe, Harlequin, and Fire traits remains largely unchanged, significant refinements have occurred. The term "Fire" has been superseded by "Harlequin Colors," often further delineated as "White Pattern" (WP) and/or "Orange Pattern" (OP). Notably, continued observations have revealed the profound impact of the "***Tiger***" gene on the placement and intensity of these Harlequin Colors across the gecko's body.

Harlequin pattern follows the vertical, or "over the back" Tiger influence

Vs.

A Full Pinstripe combined with little to no Tiger Pattern

Aptly named, the Tiger morph is renowned for its striking vertical bands of contrasting color. Initially recognized as a pattern in the mid-1990s, the term "Tiger" has undergone a semantic shift, now encompassing both the Tiger morph itself and the underlying Tiger "force" or pattern. This vertical patterning exerts a significant influence across various phenotypes. While Harlequin phenotypes often showcase prominent Tiger influence, impressive Pinstripes, with their strong horizontal orientation, may exhibit minimal or absent Tiger patterning.

A dynamic battle for expression characterizes the interaction between Tiger and Pinstripe forces. Where Tiger exerts a strong vertical influence, Pinstripe (if present) intervenes, halting its progression with a horizontal force characterized by its dramatic row of enlarged scales along the gecko's back*.

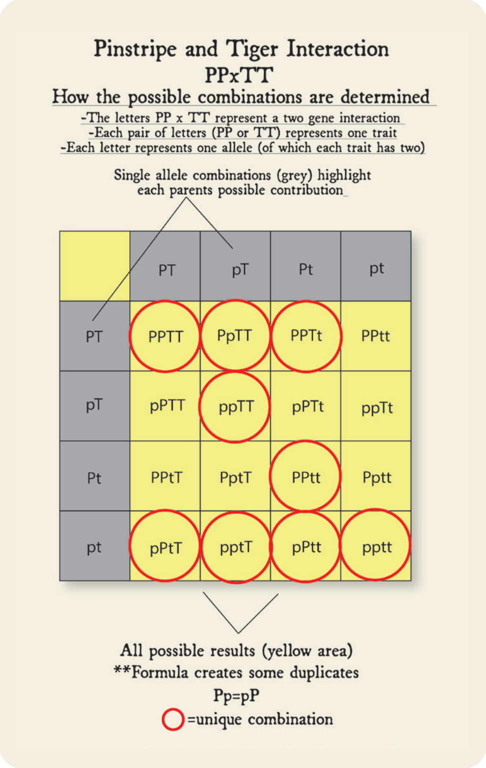
This unique combination displays an extreme Pinstripe influence with no visible Tigering.

When present in equal measure, these two forces exhibit a remarkable equilibrium. The full expression of either trait is only observed when its opposing influence is diminished or absent. The most extreme examples of Tigering are in individuals with minimal Pinstripe influence. Conversely, the most pronounced Pinstripe expression occurs without strong Tiger influence.

*While this prominent feature most readily identifies the Pinstripe (force), it was historically observed via "Flame".

This example highlights the interaction between the two major pattern influencers Tiger (dark vertical bands) and Pinstripe (horizontal "Flame" pattern) often accompanied by raised horizontal scales.

The dynamic interaction between Tiger and Pinstripe patterns is characterized as a polygenic trait. This signifies that the characteristic, (pattern in this case), is influenced by the interaction of two or more genes [2]. These patterns conform to a two-gene interaction model, as Punnett Square illustrates to the right.



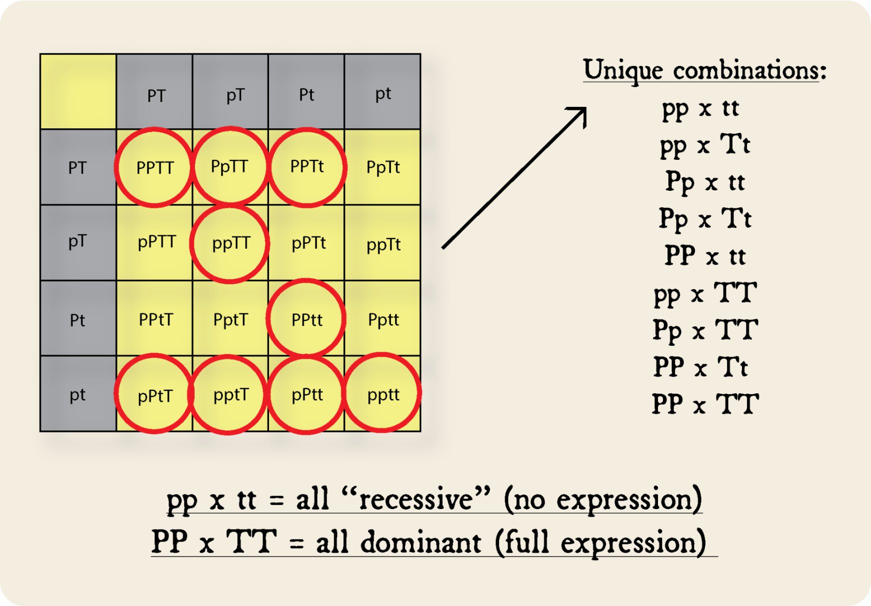
This Punnett Square graphically depicts all possible genotype combinations resulting from the interaction of parental "gametes" (genetic contributions from each parent). The top gray row and the left gray column represent the alleles, or different forms of a gene, contributed by the Sire and Dam, respectively (the order of the row and column is interchangeable). The yellow area within the square displays the resulting genotype outcomes for the hypothetical offspring.

Multiple genetic pathways can lead to the same visual outcome. Consequently, the red circles in the Punnett Square highlight only the unique gene combinations (nine in total). A capital "P" signifies a dominant Pinstripe allele, while a capital "T" represents a dominant Tiger allele. Lowercase letters (p and t) indicate recessive alleles, signifying the absence of trait expression. Due to the incomplete dominance of both Tiger and Pinstripe, these recessive alleles result in a lack of pattern expression.

The upper left corner of the yellow area represents the highest level of combined expression, while the lower right corner signifies a truly "patternless" gecko. It's good to remember that gene expression varies significantly, even with identical genotypes. The quality of the genes involved plays a critical role in determining the final phenotype

This unique combination displays both Pinstripe and Tiger influence. The slanted dashes and wavy lateral color (white) mark the interaction.

These nine unique gene combinations represent the primary influences on pattern expression within today's hobby. While factors like expression levels, color combinations, and the involvement of other genes contribute to significant variation, these combinations define the inherent boundaries observed in the interaction between Pinstripe and Tiger patterns.



Prove it Yourself!

Understanding the interaction between Tiger and Pinstripe patterns is best demonstrated through breeding. Pairing an Extreme Harlequin with a "Tiger-less" Full Pinstripe provides a clear example. Using the correct lineages, (TT x pp) x (tt x PP), all offspring will exhibit an intermediate expression (Tt x pP), similar to the gecko pictured on the following page.

A Deeper look

Tiger patterns are most pronounced when contrasting colors are present. Notably, the Yellow Base color is highly susceptible to Tiger's influence, as evidenced by its behavior within the Phantom phenotype (to be discussed later). In these instances, the "collision" of Pinstripe and Tiger often reveals underlying colors, providing insights into the base color beneath the Yellow surface. This leads us to our next topic: ***Base Color.***


Cowabunga Cresties


Cowabunga Cresties

Part 2

Base Color

The Physical Part

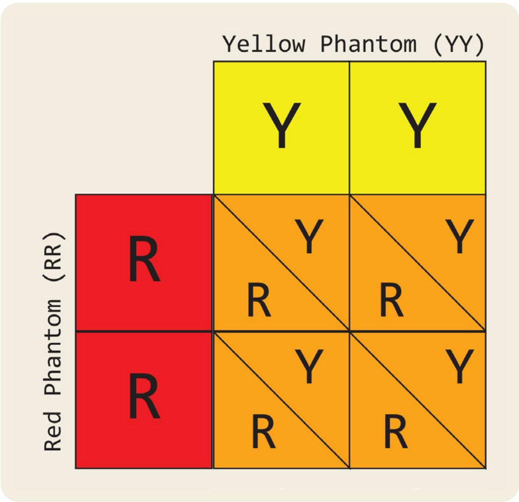
Crested Gecko coloration exhibits remarkable variability. While many attempts to understand the intricacies of this variability have been made, our current knowledge primarily relies on observation and the application of scientific principles.

Numerous resources exist to explore Crested Gecko inheritance, but it's crucial to acknowledge that these resources, including this text, are not based on definitive genetic research. As scientists and enthusiasts with a genuine desire to understand these fascinating creatures, we aim to interpret our observations to the best of our ability, utilizing available information and applying sound scientific reasoning.

A review article summarizing current research on reptile color inheritance suggests that "studies of color-variable species have enabled estimates of heritability of color and color patterns, which often show a simple Mendelian pattern of inheritance" [3]. This statement supports our "assumption" that Base Color in Crested Geckos follows a similar inheritance pattern. While acknowledging the potential influence of other factors, this assumption provides a framework for testing our observations against known inheritance models.

Further support for our understanding comes from scholarly articles suggesting the existence of three primary inheritable Base Colors (Yellow, Red, and Brown/Black) in many reptiles [4]. All available evidence points to these three base colors aligning in Crested Geckos. Assuming the simplest form of inheritance, Crested Gecko Base Color would behave similarly to the example on the following page. This example illustrates a simple Punnett square depicting the inheritance of Base Color between a Red Phantom and a Yellow Phantom gecko. In this idealized scenario, all offspring (100%) would inherit a R/Y genotype, resulting in an intermediate expression – an Orange Base color.

However, this idealized scenario rarely occurs in reality. Achieving this "Orange" phenotype requires both Phantoms to possess "pure" Base Colors, free from other pigments influence. In such cases, offspring would exhibit a "Strawberry Blonde" appearance when patterns are present, or a more blended "Orange Phantom" in their absence.

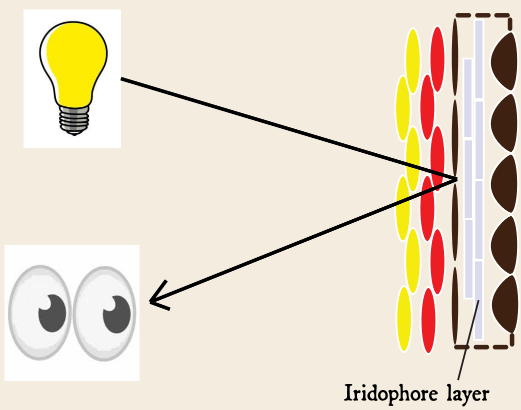


While instances like the Red Phantom and Yellow Phantom pairing, where the simple inheritance model appears to hold, are indeed observed, these scenarios are relatively uncommon. Once we introduce base colors that appear 'muddied,' 'lightened,' or 'combined' with other pigments – the simple inheritance model quickly breaks down, and predicting offspring outcomes becomes significantly more challenging.

However, by approaching Base Color systematically can unravel its intricacies, and construct a more comprehensive understanding.

Chromatophores are specialized pigment-containing cells located within the epidermis (skin) of Crested Geckos. [5] Scientific research has demonstrated that these cells are responsible for the dynamic color changes observed in these geckos, such as brightening and darkening of the skin. This is accomplished through a contraction and relaxation of muscle fibers within the chromatophores, a mechanism also observed in cephalopods (octopi/squid), fish, and other reptiles.

The light (Base Color) we see is "bounced" off of the reflective Iridophore layer.



While a comprehensive understanding of chromatophore function lies beyond the scope of this paper, recognizing their fundamental role is crucial for interpreting observed color variations in Crested Geckos. A key factor influencing phenotype is the intricate layering of these pigment-containing cells within the skin. Research articles suggest a typical layering pattern: Yellow pigment resides on the surface, overlying a layer of Red pigment, with Brown/Black pigment situated beneath the Red layer. [7] The following examples will help to visualize how this layered arrangement of pigments contributes to the diverse range of colors observed in Crested Geckos.

The Strawberry-Blonde example below results from a combination of Yellow and Red Base colors demonstrates a complex interplay of pigments. In this phenotype example, the Yellow pigment predominates, obscuring much of the underlying Red. However, the Red pigment does become visible in areas where the Tiger or Pinstripe patterns disrupt the overlying Yellow, creating a unique visual effect. Other factors, such as the presence and interaction of pattern forces like Tiger and Pinstripe, significantly influence the extent to which different Base Colors are visible.

Strawberry-Blonde Phantom Pinstripe

The darker regions of Tiger can show us what Base Colors the gecko carries.

This dark strip of color where Tiger and Pinstripe collide is often referred to as "Reverse Pinstripe".

Other areas to look for Base color inheritence clues are the upper cheek, stomach, and the mottling on the front and rear legs.

Strawberry-Blonde describes the interaction between the two base colors involved, Yellow and Red.

The next example is referred to as an "*Orange Reverse Pinstripe*". Reverse pinstripe refers to the clean line of darker coloration below the pinstripe, indicating a darker Base Color below (Brown/Black in this example). As witnessed, the *superior* Yellow Base Color can almost entirely cover the underlying Black Base Color.

"Orange" Reverse Pinstripe

With no visible Tiger pattern, the uniform color of this example is very bright.

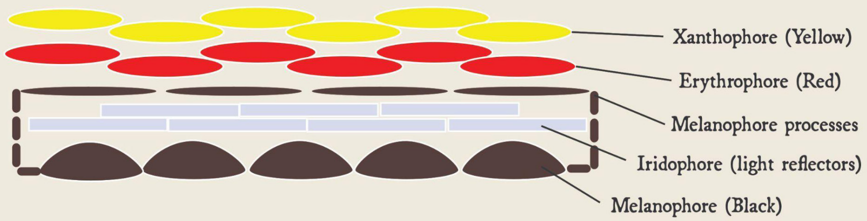
In this case, the Black Base is visible below the Pinstripe and above the lateral line.

This stunning orange coloration is the result of a Yellow Base Color that is influenced from the Black Base beneath.

Observations of color interactions like these examples have led some to erroneously conclude that certain Base Colors exhibit a simple dominant-recessive relationship. For instance, it might seem that "Yellow is Dominant to Red" or "Yellow is Dominant to Brown/Black." However, a more accurate description of these interactions lies in the pigment layering within the gecko's skin. For example, the Yellow pigment is positioned superficially, or above, the overlying Red and Brown/Black pigments. This spatial arrangement can create the illusion of dominance, as the overlying Yellow pigment can mask or partially obscure the colors beneath.

Understanding that this "masking" effect does not necessarily imply a true dominant-recessive genetic relationship between the base colors is crucial. The challenge lies in accurately interpreting the subtle interplay of these pigments and their impact on the overall phenotype. For example, consider the Orange gecko above. While the Orange hue may dominate the overall appearance, the underlying Brown/Black pigment likely contributes to the overall color depth and tone. Without this underlying pigment, the gecko's coloration would likely appear significantly lighter, reflecting the influence of the Yellow base color more prominently.

An alternative viewpoint of the layering order of Chromatophores; Yellow on the top, Red in the middle, and Brown/Black on the bottom. This example shows how Melanophores are often more complex than Red and Yellow Chromatophores in that their processes (ectensions) are seperated by the light reflecting Iridophore layer.



Once we grasp the concept of pigment layering and the intricate interactions between different color pigments, specific areas of the gecko's body become crucial for discerning valuable clues about Base Color inheritance. These areas include patterns like Pinstripe and Tiger, as well as regions like the stomach and legs. By observing how Base Colors interact with these patterns, we can glean valuable phenotypic evidence regarding the Base Color alleles within a gecko's genotype.

Prove it Yourself!

The most effective way to confirm the arrangement of Base Colors in Crested Geckos—from Yellow (Top) to Brown/Black (Bottom)—is through diligent observation. By consistently applying this understanding while observing Base Color inheritance, the reasons behind the vast diversity of base colors within the Crested Gecko hobby will become increasingly apparent.

The Genetic Part

Prior evidence suggests the existence of three distinct Base Colors in Crested Geckos. However, their interactions often exhibit complex and unpredictable patterns, strongly indicating a polygenic inheritance model.

This continuous spectrum of phenotypes observed further corroborates this model within the hobby, as well as the intricate interplay between unique Base Color variations.

Polygenic inheritance signifies that multiple genes contribute to the expression of a specific trait, such as Base Color in Crested Geckos. Each gene involved exhibits standard allelic variations (e.g., 'Y' for dominant Yellow and 'y' for recessive Yellow). However, the combined influence of all three Base Color genes determines the final outcome. In our context, a capital 'Y' denotes the expression of a particular Yellow allele, while lowercase 'y' signifies its absence. The following Punnett square illustrates all potential Base Color combinations in Crested Geckos.

It is important to remember that other factors influence Base Color, and will be addressed later in this text. Currently, our focus remains solely on the three primary pigments. Upon understanding all the factors presented, we will observe that Base Colors exhibit Incomplete Dominance. Incomplete Dominance implies that heterozygous individuals (Yy) display a phenotype distinct from both homozygous individuals (YY and yy).

Y,Y R,R B,B	Y,Y R,R B,b	Y,Y R,r B,B	Y,y R,R B,B	Y,Y R,r B,b	Y,y R,R B,b	Y,y R,r B,B	Y,y R,r B,b
Y,Y R,R b,B	Y,Y R,R b,b	Y,Y R,r B,b	Y,y R,R b,B	Y,Y R,r b,b	Y,y R,R b,b	Y,y R,r b,B	Y,y R,r b,b
Y,Y r,R B,B	Y,Y r,R B,b	Y,Y r,r B,B	Y,y r,R B,B	Y,Y r,r B,b	Y,y r,R B,b	Y,y r,r B,B	Y,y r,r B,b
y,Y R,R B,B	y,Y R,R B,b	y,Y R,r B,B	y,y R,R B,B	y,Y R,r B,b	y,y R,R B,b	y,y R,r B,B	y,y R,r B,b
Y,Y r,R b,B	Y,Y r,R b,b	Y,Y r,r b,B	Y,y r,R b,B	Y,Y r,r b,b	Y,y r,R b,b	Y,y r,r b,B	Y,y r,r b,b
y,Y R,R b,B	y,Y R,R b,b	y,Y R,r b,B	y,y R,R b,B	y,Y R,r b,b	y,y R,R b,b	y,y R,r b,B	y,y R,r b,b
y,Y r,R B,B	y,Y r,R B,b	y,Y r,r B,B	y,y r,R B,B	y,Y r,r B,b	y,y r,R B,b	y,y r,r B,B	y,y r,r B,b
y,Y r,R b,B	y,Y r,R b,b	y,Y r,r b,B	y,y r,R b,B	y,Y r,r b,b	y,y r,R b,b	y,y r,r b,B	y,y r,r b,b

Like the Tiger vs. Pinstripe Punnett Square, the Base Color Punnett Square reveals numerous duplicate combinations (gray sections), resulting in 27 unique Base Color combinations (white sections). A forthcoming discussion will introduce another factor that nearly doubles this number. Furthermore, considering the influence of other phenotypic factors like Tiger, Pinstripe, and Coverage (also a forthcoming topic), it becomes evident why nearly every Crested Gecko possesses a unique appearance.

In the Base Color Chart, alleles mirror the chromatophore distribution: Yellow (Y) at the top, Red (R) in the middle, and Brown/Black (B) at the bottom. Colored circles visually represent the corresponding alleles, with each half representing one gene allele. A fully colored circle signifies full expression, a half-colored circle indicates Heterozygous, or “partial” expression, and an empty circle represents no expression. Importantly, all colors are inherited independently from one another

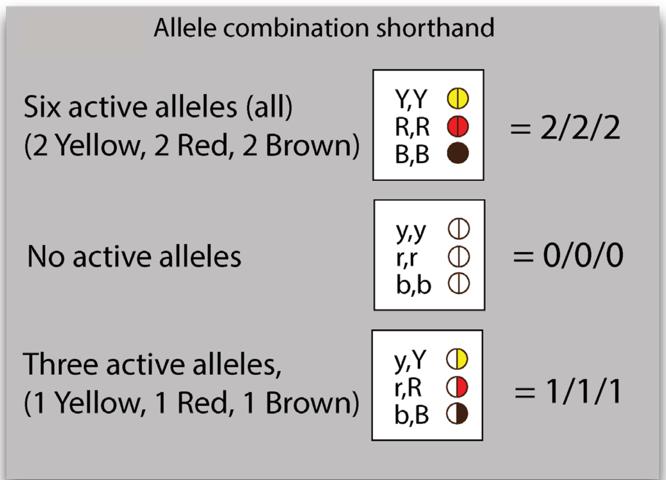
In some vertebrates, dominant alleles controlling skin color exhibit cumulative pigmentation. If this were true for Crested Geckos, the darkest individual would reside in the top left corner of the Punnett square, where six (6) dominant alleles converge. However, Crested Gecko coloration deviates from this pattern. Due to the hierarchical arrangement of chromatophores, color interactions can produce unexpected outcomes, sometimes resulting in lighter coloration despite the presence of multiple dominant alleles

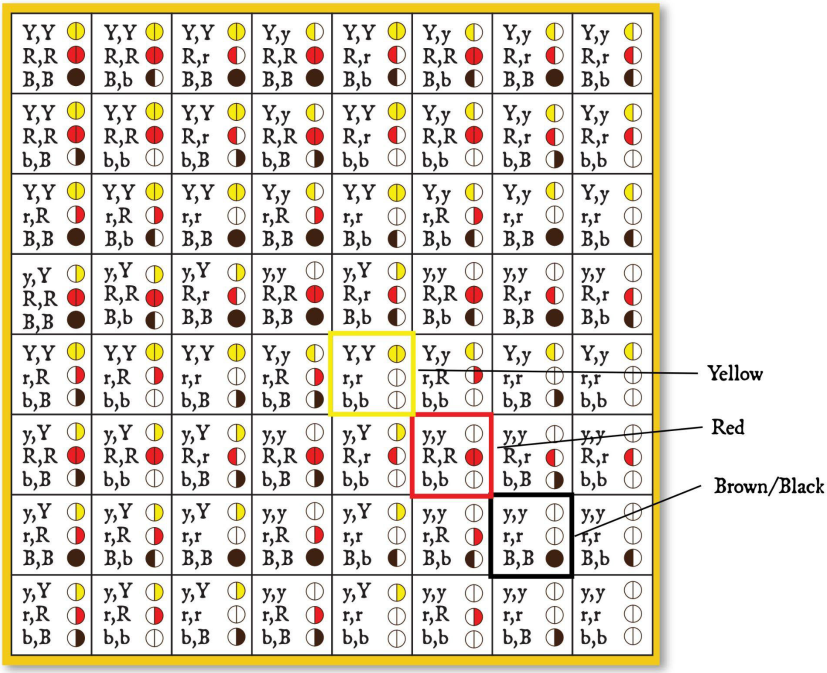
For instance, a Brown/Black Base gecko combined with a Yellow Base may exhibit lighter coloration than a dark base alone, highlighting that a higher number of Base Color alleles does not always translate to darker coloration. The most vibrant Red Base geckos typically lack any Black or Yellow Base Color influence. Similarly, Yellow appears brighter without an underlying red or black base. This interactive effect is reciprocal, as Black can also appear lighter with a single Yellow Base Color Allele above.

“Blushing” is referred to a Red coloration on the neck that indicates the presence of one or more Red Base Color alleles. Red Base Color readily blends with Black/Brown and in turn have a greater impact on diluting Yellow Base Color when in combination.

To facilitate discussion, we can abbreviate the information from the Color Chart using a numerical system ranging from 0/0/0 to 2/2/2. This system allows for rapid classification of a gecko's suspected or confirmed Base Color genotype. Dominant alleles are assigned a value of one (1), while recessive alleles are considered "inactive" and assigned a value of zero (0). For example, an entirely Red-Based Phantom would be classified as 0/2/0, and a pure Yellow Base as 2/0/0.

Geckos homozygous for any Base Color will always transmit a color influence for that respective Base Color, denoted by a "2" in the corresponding numerical position. A "1" in any position indicates a gecko heterozygous for the particular Base Color, signifying a 50% likelihood of passing down that color's influence. Importantly, this likelihood is independent of other inheritance considerations.





Pure Base Colors

The 'Pure Base Colors' are highlighted in the color chart by their respective colored square outlines, representing the brightest (Yellow), most vibrant (Red), and darkest (Brown/Black) expressions. It's crucial to remember how these Base Colors were established within the hobby. Similar to the selection process for high-quality Pinstripes, breeders meticulously isolated individuals with the purest colors over multiple generations, aiming to create 'clean' Base Colors.

Since camouflage is advantageous for wild Crested Geckos, this selective breeding process was not trivial. Natural selection would likely not favor brightly colored individuals, resulting in a majority of wild specimens exhibiting a combination of Dominant Base Color alleles that produce earthy tones. These pure Base Colors are most readily observed in their Phantom phenotype, a phenomenon that will be explained shortly.

Part 3

Coverage

Selection for, and its History

Oftentimes any section with the word "History" in its title is the one to skip over, Right!?

That is not the case here!

The history of the Crested Gecko hobby is a valuable resource for understanding the evolution of these fascinating creatures. This section summarizes the selective breeding of Crested Gecko traits, drawing from articles, forum discussions, interviews, and personal experiences. Allen Repashy, a pioneer in the Crested Gecko hobby, authored one of the first comprehensive care, breeding, and morph guides in 2002. An unedited version of his Reptiles USA 2002 Annual article can be found at:

https://www.store.repashy.com/rhacodactylus-ciliatus-the-perfect-pet-gecko.html

Below is a summary of some of the highlights pertinent to this text.

- The Crested gecko was introduced into the reptile hobby in 1994.
- Allen described the Crested Gecko as a breeder's "lump of clay", and notes the opportunity to select and create "signature" geckos has never before been such an opportunity.
- Allen surmised that base color and pattern seem to be independent from each other at this point, but could prove to have specific links with future studies.

Below are the morphs described (in Allen's words) after his experience selective breeding from the hobby's inception up until when the article was written (2002).

- **Brown Group:** Buckskin, Olive, Chocolate

  Buckskin - A color that is various shades of brown, yellow/brown, or tan. Many called this the "normal" phase because it is the ***prominent color in nature.***

- **Red Group:** Salmon, Orange, Red Rust

  Red - The "true red" coloration is an intense color that has ***evolved from selective breeding***, and is quite an attractive morph.

- **Yellow Group**: Yellow, Sulfur, Cream

  Cream - This spectacular color is actually non-existent in a unicolor morph at this time, but in only a few generations will probably develop. ***This cream is the same bright creamy white that is part of the "fire" and "pinstripe" morphs. Selective breeding has shown this trait to show up more and more with each generation***.

- **Patterns**: **Brindle** (faint Tiger/Marble pattern), **Dalmatian**, **Fire**, **Pinstripe**, **Bi-Color**, **Harlequin**

- **The Harlequin**: Allen explains this as "another trait name that has been imported from the mammal world, and it is a popular and good description for Crested Geckos. ***It is a combination of light and dark color morphs*** that appear in a variety of blotches and patterns. Typically, the mid dorsal area (between the lateral crests) is primarily light in color, and the sides are dark and patterned. This is ***independent of the fire morph, but they are commonly found in combination"***.

- **The Fire**: Allen describes this as "an ***exciting pattern*** that gives one the impression that the gecko has ***flickering flames on its back***. ***It is usually prominent between the lateral rows on the geckos' back, but now it is showing up on the feet and flank as well***. The term fire is not descriptive of the actual color it contains, (a ***bright creamy white***), but rather a unique random placement of this color that gives the appearance of a flickering flame. Many geckos also have this same color covering the top of the whole tail, but the ***color on the tail seems to be independent of the fire trait***."

Summary of the above

(1994-2002)

The gecko group's overall color categorized geckos in this early period. A significant majority (over 90%) of geckos within the hobby would likely be classified as patternless, or "Phantom", by today's standards. The term "Harlequin" was used to describe a combination of color groups, while "Fire" and "Cream" were recognized for their white pigmentation, which breeders actively sought to enhance through selective breeding.

2002-2007

Early Discussion Hub: Kingsnake Forums

The Kingsnake Forums (archived at http://forums.kingsnake.com/ and http://forums.kingsnake.com/) was the central hub for Crested Gecko enthusiasts during this era. These forums hold a treasure trove of discussions and photographs, some featuring interactions between prominent Crested Gecko breeders of today.

The Rise of Selective Breeding

The excitement surrounding Allen Repashy's "Fire" and "Harlequin" morphs fueled the hobby during this time. As evidenced by the forum discussions, more and more examples of these morphs circulated nationwide. This period also witnessed a focus on "Color isolation." Breeders aimed to create purer Yellows, Reds, and Darks, leaving behind muddier color combinations. Simultaneously, Harlequin coverage improved by isolating the contributing color patterns into their purest forms.

Shifting Priorities: White Over Base Colors

It's important to note that, until this point, breeders generally understood Harlequins to involve a combination of Base Colors. However, as the white patterning ("Fire" and "Cream") gained popularity over the accompanying Yellow/Orange hues, the Base Color aspect became less emphasized. Breeders prioritized animals exhibiting "fire" (white patterning) in areas that typically contrast with Harlequin markings, leading to a decline in "standard" Harlequins (no white pattern present).

2007- Present Day

The term 'Phantom' was not used in the hobby prior to 2007. Geckos were typically classified by their overall color, with pattern descriptions secondary. This period coincided with a surge in popularity of cream and white patterns, prompting hobbyists to delve deeper into their inheritance. Concurrently, the term 'Patternless' gained traction as 'Patterned' animals increasingly dominated the phenotype.

The term "Phantom" entered the hobby after the emergence of "Phantom Pinstripes" around 2008. By this time, breeders were producing Full Pinstripes (a complete row of raised lateral scales) alongside consistent white patterning. However, breeding two patterned geckos occasionally resulted in offspring lacking any noticeable pattern. This phenotype was particularly striking, as these offspring seemingly lost the prominent white and/or orange patterns inherited from their parents.

While not extensively analyzed initially, the term "Phantom" gained traction and over time, its definition broadened significantly. It remains unclear when the "Phantom is recessive" aspect of the current definition emerged, however, only recently (around 2019) have strict definitions arisen, which classify Phantom as a recessive gene primarily responsible for suppressing white coverage in an animal.

Two distinct interpretations have emerged regarding Phantoms entry into the hobby.

The prevailing interpretation, evident in current online discussions, suggests the following:

- Historical Presence: Phantom has been present in the hobby since its inception in 1994, albeit unnamed.
- Delayed Recognition: Only after nearly two decades of selective breeding did hobbyists recognize Phantom's role in suppressing white coverage, a trait actively selected for by breeders.
- Widespread in Wild Populations: The vast majority of Wild Type specimens likely carry the recessive Phantom mutation.

An alternate interpretation goes as follows

- Phantom as Wild Type: Phantom represents the wild type condition, aligning with the characteristics of wild populations and early hobby practices.
- Coverage as a Derived Trait: "Coverage" arises from a combination of Harlequin (as initially observed in the hobby) and White Pattern (a gene influencing Harlequin). These traits exhibit incomplete dominance in their inheritance and expression.
- Phantom as Absence of Coverage: The absence of this "Coverage" gene combination defines the Phantom phenotype.

So…What is Phantom?

By any definition, Phantom stands as a foundational trait within the Crested Gecko species. This phenotype overwhelmingly dominates the wild population. While comprehensive studies on wild populations are lacking, research on wild-caught and photographed specimens suggests that over 90% align with the current hobby definition of Phantom. This observation alone classifies Phantom as the Wild Type (WT), which is defined as the most prevalent phenotype in the natural population. In most hobbyist contexts, the WT serves as the baseline for understanding genetic variations.

- **The prevailing view within the hobby:**

  Phantom is a recessive mutation that acts as an "eraser" or "suppressor" of white and orange pattern (or coverage) on a gecko.

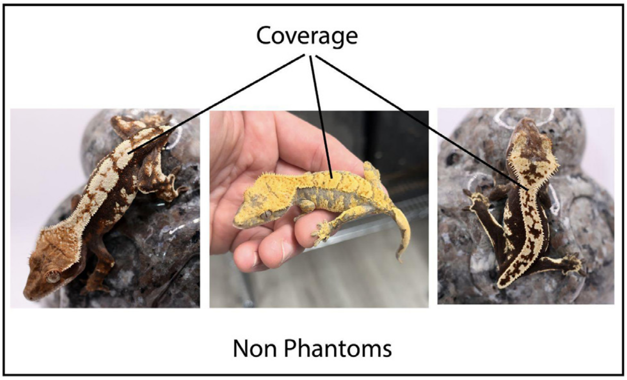
- **What the Internet tells us:**

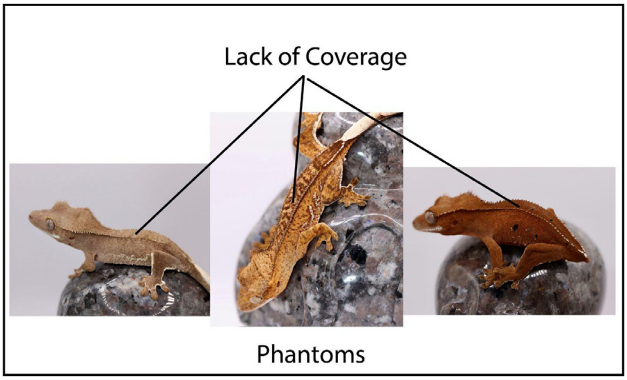
  Internet definitions of Phantom in Crested Geckos include one in particular that claims the following; Phantom involves an increase in melanin, leading to a darkening of the xanthopores (pigment cells). suppressing Dorsal pattern and lateral patterning, however, it claims that Phantom's dominance can vary, allowing for some pattern expression in specific areas like the base of the tail, fringe, laterals, portholes, or walls. This same definition states that Phantom has a range of dominance which allows for pattern color and lateral patterning as long as several rules are met. [8]

Current definitions like the one above can be complex and contradictory, often hindering understanding. Discussions pertaining to these complexities frequently lead to an attempt to accommodate unexpected outcomes by modifying the definition itself rather than re-evaluating the underlying assumptions.

This approach clashes with the historical reality: the hobby has consistently selected for increased "Coverage" (white patterning). Furthermore, the concept of "Het" (heterozygous) Phantom, suggesting predictable Phantom offspring from certain pairings, contradicts the typical behavior of a recessive gene. While some breeders have voiced these concerns, they have often been met with overly complex explanations or dismissed within the community.

Numerous internet sources present unverified information as fact, which adds to the confusion among hobbyists. These sources often assume a deep understanding of genetic interactions without supporting research or evidence. It's crucial to acknowledge that many claims within the hobby, including our own, lack rigorous laboratory validation.





Coverage: What Phantom Is Not

The term "Coverage" in the Crested Gecko hobby generally refers to the extent of white patterning across the gecko's body. It's important to understand that "Coverage" is a complex trait resulting from the interplay of multiple genetic factors.

Historical Perspective:

In recent decades, the intense selection pressure for increased "Coverage" has significantly shaped the modern Crested Gecko phenotype. Early in the hobby, the level of white patterning observed today was non-existent. Dedicated breeders have invested significant effort over the past two decades to achieve "Paper White" quality to extremely high levels of coverage. This selective breeding has led to the near-elimination of more primitive patterns like early forms of Pinstripe and Harlequin from the gene pool. This shift has made it challenging for newer hobbyists to grasp the historical origins of these patterns, such as the association between Harlequin and accompanying white patterning.

Understanding Coverage Through Base Color Inheritance:

A deeper understanding of Coverage can be gained by combining knowledge of Base Color inheritance with an analysis of pattern history. Recognizing the original significance of often-overlooked traits like pattern colors enhances our ability to predict phenotypic outcomes. For example, by associating specific areas of color (Orange Pattern) with a contributing Base Color (Yellow), we can more accurately track Base Color inheritance. Variations in patterned areas (dark yellow, orange, rust, red) can further indicate the presence of different combinations of Red and Black Base Colors. While this analysis becomes more complex in advanced morphs, the general principles remain valid.

Harlequin's Role in Coverage:

Re-examining the original description of Harlequin as a combination of contrasting Base Colors provides valuable insights. When tracking Base Color inheritance and observing Harlequin's consistent impact on the phenotype, we observe that Harlequin acts to segregate and redistribute the Yellow Base Color. It effectively "pushes" Yellow into the lateral and dorsal regions, thus creating its own distinct pattern. These Harlequin regions, composed of Yellow Base Color, remain significantly influenced by Tiger and Pinstripe patterns.

This analysis reveals a critical point: Harlequin can only influence the Yellow Base Color if that Base Color is present. This connection has been largely overlooked due to the dominance of White Pattern, which obscures the underlying Yellow/Orange areas of Harlequin, making it appear quite different from its original Base Color expression.

Prove it Yourself

Test the claim that at least one Yellow Base Color allele is present in all Harlequins (Non-Phantoms). You can use the Base Color chart, and tracking to prove that this is the case. All Non-Phantom geckos capable of directly producing Phantom offspring ('het-phantom'), regardless of their own Base Color, can also produce Phantom offspring with a noticeable Yellow influence when both copies of the Harlequin gene are not inherited.

To the left is an early example of a Harlequin Crested Gecko Produced in 2003. While Harlequins had been in the hobby for some time before this, it was considered to be an interaction, or combination, of Base Colors.

"Fire" (White Pattern) was, and still is, one of the most selected for traits. (2004)

Harlequin contrast more apparant in combination with Dark Base. (2005)

The gene pool in today's hobby has discarded lower expression versions of Harlequin.

Part 4

Harlequin & CvG

The Harlequin pattern in Crested Geckos is a complex, and perhaps highly misunderstood trait. Our model proposes a link between the Harlequin gene and a separate "Coverage Gene" (CvG), where CvG controls the white patterning associated with Harlequin.

Not All Harlequin is Linked to CvG: Phenotypes like Halloween and Flame demonstrate Harlequin patterns without the extensive white patterning associated with CvG. Even in these cases, Harlequin continues to function by segregating and redistributing the Yellow Base Color, pushing it into the dorsal and lower lateral regions. These Harlequin expressions also remain highly reactive to other patterns like Tiger and Pinstripe.

Linked Genes: Harlequin and CvG are inherited as a unit. This is a characteristic of "*completely linked genes*," which are located in close proximity on the same chromosome and therefore do not undergo recombination during meiosis. [9]

This Harlequin relationship with CvG is a critical key to advancing our understanding of the complex interplay between Pattern, Base Color, and other genetic factors that contribute to the diverse range of phenotypes observed in Crested Geckos. Notably, the traits currently attributed to the Phantom phenotype's "suppression" perfectly align with the characteristics of a Harlequin/CvG relationship..

Support for this can be found using the Base Color inheritance model, which by its nature, accurately predicts which phenotypes will exhibit coverage while also being able to produce Phantoms directly. Red Base Color (0/2/0), is seen only in its pure form in the Phantom form. Reds that do come with coverage (1/2/0) can still be *very* Red, but they often have indicators of a single Yellow's Base Color influence (body mottling/Yellow head, stomach pattern etc.). These primarily Red based non-Phantoms will *all* be able to produce Phantoms if paired together. When both copies of Harlequin are dropped, Phantom offspring are produced, some of which will inevitably inherit the Yellow Base Color that Harlequin was previously segregating.

This gecko highlights how the addition of coverage (CvG) is accompanied by a Yellow Base Color allele This phenotype results from a (1/2/0) or (1/2/1) Base Color Combination.

The only circumstance that this will not prove to be the case is in (2/2/0). This combination, both copies of Yellow base color are impacted by Harlequin and thus obligated to pass one copy to their offspring. Because Yellow Base Color is *highly reactive* to both pattern forces, these (2/2/0) examples may present differently, but will typically have a much higher degree of Orange/ White Pattern present.

Dark-based Non-Phantom geckos can also produce Phantom offspring when paired, provided that both parents carry only one Harlequin gene. Notably, these Phantom offspring from Dark-based parents can exhibit a homozygous Yellow Base Color influence in the same manner observed in the Red-based lineages discussed above. This unexpected expression of Yellow in Phantom offspring from Dark parents strongly supports the link between Harlequin and Yellow Base Color.

**In Non-Phantom individuals heavily influenced by CvG, White Pattern can effectively mask the underlying Yellow Base Color. This can make it challenging to recognize the presence of Yellow in these individuals. However, the previously masked Yellow Base Color becomes apparent when the Harlequin pattern is lost in Phantom offspring.

In Table 1 below, we revisit how the current "Phantom is recessive" theory (designated as PmR), can so easily be confused as the alternative "Harlequin/CvG" explanation (designated by CvG)

Table 1

Argument/Point	Assessment
Breeding two phantoms together results in 100% phantoms	In both cases (PmR, and CvG) the results are the same, making this argument null. In PmR's defense, breeding two recessives together results in 100% recessives. In CvG's defense, Harlequin is missing, resulting in no coverage addition.
A phantom can be produced from two non phantom geckos.	In both cases (PmR, and/or CvG) the results are the same, making this argument null. In PmR's defense, breeding two hets together (each with a 50% chance to pass down the recessive gene) results in 25% visual phantom offspring. In CvG's defense, the inheritance consideration and results are the same but for a different allele.
What about the color change noticed in phantoms? (There is a notable color expression variance between phantoms and non phantoms)	This confusion likely resulted from the impact that Harlequin's separation of the Yellow Base Color creates. In Phantoms, the Yellow Base can more readily blend with the darker bases beneath, so they appear darker, particularly in Heterozygous form.
Some geckos do not produce any phantoms when paired to a phantom, yet all of the offspring from this pairing prove to be "het phantom", and can subsequently produce phantoms in the following generation.	Scenario 1) PmR is not present in "non phantom carriers" making producing a phantom during a single generation impossible. Or Scenario 2) Harlequin can be homozygous, making producing a phantom during a single generation impossible. This argument is once again null.

What about the remaining White pattern that remains on phantoms where the gene

(Phantom) is claimed to "lose its dominance"? (base of tail, laterals, fringe).

This claim has several flaws and does not always conform to its own logic. Some claim that portholes are a result of phantom "suppressing White Pattern", yet we can witness that this trait is still spread in correlation to the Tiger/Pinstripe relationship. Many Phantoms have fringing, white tips, or a white tail base, and some do not... and many of these traits correlate to Pinstripe's presence and certain Base Color combinations. In short, it is at this point in the argument when things do not always add up. Definitions over the matter become fluid, and discussions often become more of a case of over-complicating the matter rather than using reason to reach a logical conclusion.

Understanding Yellow

Two conclusions regarding Yellow Base Color can be made based on extensive observations within the hobby. Firstly, Yellow appears to occupy the uppermost layer of pigmentation, aligning with scientific understanding of chromatophore layering. Secondly, Yellow Base Color is highly reactive to other pattern influences. These influences are apparent when observing how Tiger, Pinstripe, Tri-Color, and Harlequin patterns interact with and influence the distribution and expression of the Yellow Base Color.

Another key observation is that Yellow Base Color expression is significantly influenced by the presence and expression of underlying Base Colors. In Non-Phantom individuals, Harlequin restricts the distribution of Yellow Base Color to specific areas. However, in Phantom individuals, the absence of Harlequin influence allows for a more widespread distribution of Yellow pigment, often resulting in a more even coloration across the gecko's body. This observation highlights the complex interplay between Base Colors, Harlequin and other patterning in shaping the diverse range of phenotypes observed in Crested Geckos.

A compelling example of Yellow's interactions with Harlequin/CvG can be observed in the development of 'Orange' geckos. These vibrant individuals often arise from pairings between "Dark" Based animals (Non-Phantom and heterozygous for Yellow) and Yellow-based Pinstripes or Phantom Pinstripes. The 'Orange' coloration results from the expression of a homozygous Yellow Base Color (YY) superior a darker base, creating a visually distinct orange hue. Crucially, these 'Orange' geckos possess only one copy of the Harlequin gene, which allows the second Yellow allele to be fully expressed, while the other Harlequin allele creates the creamy white pattern manifested via CvG. Notably, all animals exhibiting this 'Orange' phenotype have the potential to produce Phantom offspring directly.

This example was produced by a Dark Based Harlequin (Non-Phantom) crossed to a Yellow Base. The area of "Reverse Pinstripe" marks the clear presence of a darker base beaneath.

Note that due to the lack of Tigering present this phenotype presents as an "Orange Base" color.

Summary - Het Impact

The Phantom phenotype in Crested Geckos is currently described as a recessive mutation, meaning two copies of a gene are required for the trait to be expressed. However, the concept of a "Het impact" presents a challenge to this traditional understanding. Typically, recessive mutations do not exhibit heterozygous effects. Yet, the concept of "Het Phantom" has been accepted within the hobby, likely due to a lack of alternative explanations.

The Kaleidoscope Model offers a compelling alternative to traditional understandings of Phantom Crested Geckos. This model emphasizes the link between Harlequin patterning and the presence of a Yellow Base Color. A key strength of the Kaleidoscope Model lies in its ability to accurately predict which individuals are capable of producing Phantoms directly which aligns with observed breeding outcomes. The model attributes the previous Phantom "Het Impact" phenomenon to the presence of a single "Coverage Gene" (CvG). While this text does not intend to promote any specific business, it's important to note that the Kaleidoscope Model has gained support from numerous breeders whose observations align with its predictions. A list of breeders who have observed these predicted outcomes is available on the Kaleidoscope website and continues to grow.

Phantom lessons

Phantom phenotypes have come a very long way since the early days of the hobby. Geckos which were once referred to by only their color, are today covered with various traits and patterns. Because of the exploratory fashion breeders often have in deciding pairings, we (as a collective), have been able to isolate *nearly* every phenotype contributor into its respective Phantom form. Aside from the pinstripe combination that Phantoms were initially named for, traits such as color, pattern, and newer genes (Lilly White, Axanthic) have found their way "back" into an isolated Phantom expression. However, Harlequin remains a trait often lost in the transition from Phantom to Non-Phantom. Most of the reason is that the *lack of Harlequin currently defines a Non-Phantom*, particularly when CvG accompanies it.

The above point may seem redundant or obvious to some, but it serves to drive an important point home. Phantoms, by current description, suppress the White Pattern on geckos, but once it has been "suppressed", these same animals do not suddenly become Phantom Harlequins. What is lost during the transition to the Phantom phenotype *is the Harlequin pattern* (and accompanying CvG).

We should note that there is a phenotype referred to as "***Phantom Harlequin***" that has recently gained popularity in the hobby, however these are relatively new, rare, and seem to be a unique combination of traits. Porthole, Snowflake, and an accompanying Tiger pattern influence are often involved in combination with a Red "Bi-Color" phenotype. The important point in our case is that these Phantom Harlequins are not produced by isolating Harlequins (and their accompanying Yellow Base Color) into *its* Phantom form.

A "Phantom Harlequin". This phenotype results from a combination of the Porthole and Snowflake traits. Extreme examples have thus far also showed a correlation with Red Bi-Color.

The Perfect Recipe 2/0/2

Tri-Colors are an extremely popular category of Crested Gecko morphs, and for a good reason. When lacking red influence, the contrast between the two homozygous Base Colors involved is at its maximum potential as the Yellow Base, (influenced from the Black Base beneath), takes on the very appealing shade of Yellow/Orange. Two copies of Harlequin are typically present, each impacting a copy of the Yellow Base Color, which allows room for the dark base beneath to show itself. These Harlequin alleles may, or may not be accompanied by CvG, however when at least one of them is, we are blessed with the third and final ingredient to the Tri-Color recipe...high levels of White Pattern.

Tri-Color appearances still vary, with some breeders favoring larger amounts of vibrant Orange coloration. This variation can indicate the presence of a "standard" Harlequin allele, (one without the accompaniment of CvG). Understanding this concept helps to explain why hitting the "perfect" combination when pairing two stunning Tri-Color's together is not always as easy as it might seem!

Through its evolution in the hobby, Tri-Colors initially started as Dark Harlequins, which were a combination of Yellow and Black base colors (2/0/2). Over time the alleles of Yellow Base colors involved were selected to be accompanied by higher expression CvG alleles (White Pattern), quickly making these dark Harlequins more distinct and desired. As expected, breeding two of these color combinations together (2/0/2) x (2/0/2), results in consistently colored offspring that were, (and still are) subsequently selected for maximum expression levels of other various traits such as structure, color quality, pattern, etc.

"Tri-Color" Crested Gecko morph (2022)

Understanding Lavender

Since the early 2000's, the term "Lavender" has been used to describe a specific Base Color variation in the Crested Gecko hobby . While more recent definitions often refer to "Lavender" as a "Hypo Black Base" expression, our research suggests that this may not be accurate. Instead, we propose an alternative explanation for the "Lavender" phenotype, explained in more detail below.

"Lavender" expression likely arises from various Base Color combinations, with (2/0/2) and (2/1/1) being notable examples. A key characteristic of Lavender is the presence of two Harlequin genes, each impacting a separate Yellow Base Color allele. This Harlequin influence, combined with low Tiger expression and strong Pinstripe presence, often contributes to the distinctive Lavender coloration. Notably, "Lavender" is primarily observed in Non-Phantom individuals, as its unique coloration appears to require the Harlequin-mediated segregation of Yellow Base Color. Variations in Lavender expression, such as those involving Tiger influence, may occur when Brown/Black is present in a heterozygous form.

More recently, the addition of a Tangerine pigment appears to impact Lavender's Hypo appearance even further. This pigment, which is believed to also act upon the Yellow Base Color, will be discussed in detail in future texts.

An early version of the "Lavender" Base coloration (2006)

This phenotype is reserved to the Non-Phantom phenotype due to its reliance on Harlequins impact. Each Harlequin allele acts on a single Yellow Base color allele, seperating it into the Dorsal and Lateral region. A lack of Tigering will further suppress Yellow coverage

The observation that "Lavenders can produce exceptional Yellows or Reds" aligns with our understanding of Lavender's phenotype. The absent, or reduced Tiger patterning often seen in Lavenders contributes to a "cleaner" expression of Base Color. Since Lavenders typically carry Yellow and/or Red alleles, strategic pairings can produce offspring homozygous for these Base Colors. Each Harlequin gene can only influence one copy of the Yellow Base Color, thus when it is not inherited, the suppression of Yellow is lifted. This allows for the full expression of homozygous Yellow along with a "clean"/Tiger-less pattern. This can result in vibrant Yellow offspring from seemingly unexpected pairings.

Hypo Base Colors

Y,Y R,R B,B	Y,Y R,R B,b	Y,Y R,r B,B	Y,y R,R B,B	Y,Y R,r B,b	Y,y R,R B,b	Y,y R,r B,B	Y,y R,r B,b
Y,Y R,R b,B	Y,Y R,R b,b	Y,Y R,r b,B	Y,y R,R b,B	Y,Y R,r b,b	Y,y R,R b,b	Y,y R,r b,B	Y,y R,r b,b
Y,Y r,R B,B	Y,Y r,R B,b	Y,Y r,r B,B	Y,y r,R B,B	Y,Y r,r B,b	Y,y r,R B,b	Y,y r,r B,B	Y,y r,r B,b
y,Y R,R B,B	y,Y R,R B,b	y,Y R,r B,B	y,y R,R B,B	y,Y R,r B,b	y,y R,R B,b	y,y R,r B,B	y,y R,r B,b
Y,Y r,R b,B	Y,Y r,R b,b	Y,Y r,r b,B	Y,y r,R b,B	Y,Y r,r b,b	Y,y r,R b,b	Y,y r,r b,B	Y,y r,r b,b
y,Y R,R b,B	y,Y R,R b,b	y,Y R,r b,B	y,y R,R b,B	y,Y R,r b,b	y,y R,R b,b	y,y R,r b,B	y,y R,r b,b
y,Y r,R B,B	y,Y r,R B,b	y,Y r,r B,B	y,y r,R B,B	y,Y r,r B,b	y,y r,R B,b	y,y r,r B,B	y,y r,r B,b
y,Y r,R b,B	y,Y r,R b,b	y,Y r,r b,B	y,y r,R b,B	y,Y r,r b,b	y,y r,R b,b	y,y r,r b,B	y,y r,r b,b

Hypo Base Color combinations

The color chart highlights "Hypo" Base Color combinations within red rectangles. These combinations likely emerged within the hobby sometime after the isolation of Pure Base Colors. Although often described as having a purely genetic origin, their inheritance patterns align with the principles of Base Color interaction discussed in this text.

A "Hypo" Base Color is a commonly used term to describe a *lighter than usual* coloration attributed to a lesser degree of melanin production. However, this term is subjective and can encompass a wide range of color variations.

What we consider "True Hypo Base Colors" are those that alleles are only present in Heterozygous form *and* on their own. These are a very Pale Yellow, Pink, and a Steel Grey. An even rarer form (0/0/0), is the lack of any pigment, which creates a very Pale Cream colored phenotype that does not fire as a typical Crested Gecko would!

"True Hypo" Base Colors, resulting from careful selective breeding over generations, can be found within various Crested Gecko breeding lines. While this text does not intend to endorse any specific breeder, examples of these exceptional lines are readily observable on social media platforms. Once familiarized with these refined lines, it becomes apparent that they exhibit a distinct coloration that differs significantly from the "Hypo" phenotype often resulting from Yellow's brightening impact in Phantom form, and/or lack of Tigering.

Careful selective breeding is necessary to isolate "True Hypo" Base Colors. This involves identifying and pairing individuals to isolate Base Color for subsequent pairings. The Base Color chart can serve as a guide in this process, helping breeders identify potential pairings that may produce offspring with the desired hypomelanistic phenotype. Typically, producing "True Hypo" Base Colors will take multiple generations to achieve.

Support for this approach comes from breeding two "True Hypo" individuals of various Base Colors. This will result in offspring that resemble either parent or exhibit a combination of their Base Colors, demonstrating that "Hypo" is not simply a single gene acting upon the base coloration. In the case of Red and Brown/Black Base Colors, "True Hypo" expression is reserved to the Phantom phenotype because when Harlequin is present, so is a Yellow Base Color allele.

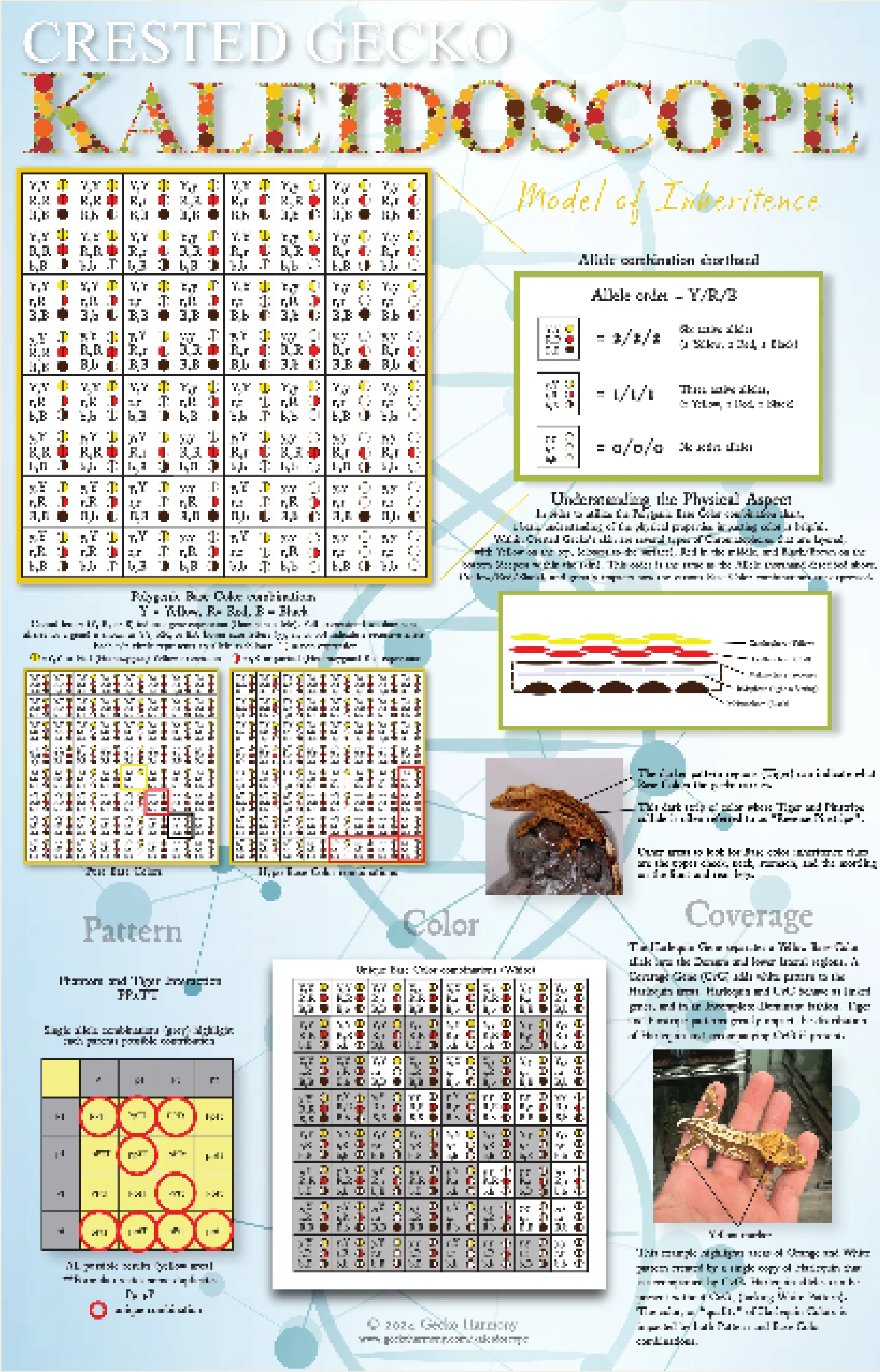
Hypo Base Colors represent the culmination of the Crested Gecko hobby's exploration into the species' phenotypic diversity. Through years of selective breeding, often involving intricate and unexpected paths, hobbyists have successfully transitioned from the earthy, "Muddy" Base Colors found in wild populations to the most extreme and visually striking color combinations imaginable

Some of today's most striking "Pale Dalmations" (0/0/0) exhibit a near-white or cream base color adorned with jet-black spots. Similarly, "Pink" lines (0/1/0) often showcase the precise coloration described by the term. "Hypo Yellow" lines (1/0/0) can be even more delicate in appearance. These refined color variations, often resulting from years of selective breeding within specific lines, clearly demonstrate the impact of careful selection on achieving specific color outcomes. These distinct colorations are not simply the result of a single "Hypo" gene but rather the culmination of careful breeding programs that have refined and enhanced the expression of specific Base Colors.

Summary

The above Inheritance Models for Pattern, Color, and Coverage come together to form what we are terming the "Kaleidoscope Model of Inheritance". Once understood, this model can account for all *standard* phenotypes (those lacking influence from additional genes), however many of these additional gene interactions serve to confirm its claims. The validity of this model's mechanisms cannot be confirmed without extensive laboratory research. However, we hope to continue the evolution of discovery by utilizing this model and getting help from the community to discover patterns, and create resources that advance the hobby's understanding of Crested Gecko genetics. The image of the Kaleidoscope Model on the following page can be a useful tool that shows us what is possible...and what is not. We continue to further our understanding of Red Bi-Color, Empty Back variants, and the Tangerine pigment to outline the intricacies of their relationship with Harlequin and/or CvG. While this text questions many common "genes" genetic origin, the terms used to describe them for the large part remain fitting. We hope that the Kaleidoscope model will provide our hobby with the much needed understanding of ***what genes are truly at work***, and that breeders both small and large will utilize this information to streamline their pairings to meet their goals faster, and more efficiently. A phenotype prediction tool, and a ratio calculator will be released in 2025. Stay tuned!

Peace, Love, and Gecko Harmony
-Daniel Foley & Nicholetta Donaldson


CRESTED GECKO
KALEIDOSCOPE
Model of Inheritence
Allele combination shorthand
Allele order - Y/R/B
Understanding the Physical Aspect
Polygenic Base Color combination
Y = Yellow, R= Red, B = Black
Pattern
Color
Coverage

Terms

Allele *- Alternative forms of a gene.*

Base Color *- Colors can vary widely, however this term typically defaults to the lowermost base color present in Non -Phantoms, or the uppermost present in Phantoms.*

Fire *- Term initially ascribed to today's "White Pattern"*

Gene Stacking *- A term used in the hobby to describe continual selection for a desired trait.*

Full Pinstripe *- Two rows of raised crests along the back (dorsum).*

Harlequin *- A term initially used by the hobby to describe a phenotype that resembled the combination of two base colors. More recently it is used to describe highly patterned and colored animals.*

Harlequin Colors *- Orange and White areas often seen in conjunction in areas of pattern.*

Hypo Gene *- What the hobby uses to explain the brightening impact seen in certain phenotypes.*

Morph *- A unique combination of physical characteristics described by a name.*

Pattern *- Areas of Tiger, Pinstripe, and/or Harlequin*

Pinstripe *- When used to describe a pattern, it is Tiger's opposing force.*

Pure Base Colors *- Base Colors not impacted by the presence of any other Base Color alleles.*

Tiger *- One of two major pattern influencers*

White Pattern *- White coloration in Harlequin areas.*

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