

Exotic Genetics

By **LORRAINE SHELTON**
Featherland Cattery



You are holding a bag with 20,000 green M&Ms. You add 20,000 red M&M's to the bag, shake them up and dump half the candies into a second bag.

You look into both bags and keep the one that appears to have the most red M&Ms in it.

Repeat, adding 20,000 red M&Ms to the bag you've kept, and again keep the bag with the most red M&Ms in it, with the condition that at least ONE green M&M must be in the bag of candies you keep.

After you repeat this exercise 10 times, there is a very good chance that you could have a bag of 19,999 red M&Ms with one green one.

Congratulations, you've created a modern Exotic Shorthaired cat!

The Exotic (aka Exotic Shorthair) breed was created by crossing Persians to a variety of shorthaired cats and then crossing the resultant shorthaired cats continually back into the Persian breed to ultimately attain the extreme type of the Persian cat.

Since the shorthaired trait is dominant, "backcrossing" to the original cats that were the source of the

shorthaired trait in a particular line was not necessary to maintain the trait, as it was in the development of the Himalayan, which is based on a recessive albinism gene variant.

Within the group of 20,000 genes that create the genome of the cat is a gene (not yet unidentified) that codes for a protein that triggers a shift in fur production from anagen (the growth phase) to catagen (the phase where fur growth ceases).

In Persian cats, this gene is "broken", so this signal is delayed and fur growth continues for a prolonged period.

In Exotic Shorthairs, the normal "wild-type" gene is present, and the signal to stop fur growth proceeds normally. Every gene is inherited as two copies, one from the cat's sire and one from the dam.

Even if a cat has only one normal copy of the hair growth signaling gene, the signal will be sufficient to stop fur production and the cat will have short hair.

When a cat receives two copies of the broken gene, it not only will be incapable of producing the



**Ormerlys
Woody Austin**
Brown classic tabby
Exotic Longhair male kitten
(pictured at age 8 months)

normal fur growth "stop signal", but it will be incapable of passing a functional gene for this signal to its offspring.

That is why two longhaired cats can never produce a shorthaired offspring. For the normal "stop" signal to occur in a kitten, at least one of the parents must have a functional copy of that gene.

Pedigree research of the most prolific, successful, and influential lines in CFA demonstrates that the current gene pool of Exotics in the United States trace their ancestry back to only a handful of original outcrosses to reintroduce the normal (short) coat length gene: three Burmese, one Russian Blue, and approximately a half dozen American Shorthair/Domestic Shorthairs in the 1960's and 1970's.

It should be noted that the crosses to Burmese occurred prior to the widespread distribution of the birth defect commonly known as the "Burmese head defect" throughout that breed.



**GIC Ormerlys
Karl Gustaf**
Blue spotted Exotic
Longhair male
(granded as a Persian)

The pedigrees of the Burmese used to create Exotics do not share ancestry (within at least four generations) of cats in the same time frame known to carry this birth defect.

A recently released paper out of Dr. Leslie Lyons' laboratory at UC Davis has at last provided an overview of the genetic relatedness of our cat breeds and has provided insight into their origins.

This research has put to rest any notions of the Persian being a "natural" breed from the Middle East.

Today's Persian is, indisputably, a man-made, Western European Cat. No allelic differences were found between the Persian and the Exotic breeds with the markers used. No genetic evidence of Burmese hybridation remains in the Exotic cats tested.

At a genetic level, Persians and Exotics could not be distinguished from one another.

Unlike the Himalayan breed, which had to double back on the foundation cats in order to produce cats with the desired recessive trait of Siamese coloration, the vast majority of Exotic Shorthair cats, until relatively recently, have been crossed with registered Persians in virtually every subsequent generation from the original outcross.

This makes the genetic contribution from the original outcross cats a fairly straightforward calculation.

As an average, thirty (30) years in the cat fancy represents approximately 10 generations. In the early years of the Exotic breed, generational turn-around in order to establish extreme brachycephalic type occurred even more rapidly, but of the lines I have researched (admittedly biased towards catteries that produce cats for show), the minimum number of generations away from the initial shorthair crosses that I have been able to find is 8.

As an example, the Best of the Best Winner at the CFA International Show in 2005, GC DW One-O-One Mascalzone Latino, is 15 generations away from a single Burmese used to create the New Dawn Exotic Shorthair line.

This Burmese cat appears in his pedigree 298 times among the over one million cats in his 20 generation pedigree. The genetic influence of the Burmese breed in his pedigree is 0.43 percent.

In contrast, this cat's degree of relatedness to a single Persian, GC NW Bar-B VIC DM, is 16.3 percent.

As a point of reference, the Himalayan GC, BW,



**Laurenden Suri
of Catortionist**
Seal lynx point
Himalayan Exotic
Longhair female kitten.

Suri, who was bred by Hope Gonano and is owned by Alicia Gastgaber, is a regional winning kitten in TICA.

This level of relatedness between the Exotic Shorthair population and the general Persian population means that it is impossible to differentiate the two groups with DNA testing, either now or in the future.

NW Catsafrats Tea Time, CFA's 2004-2005 Cat of the Year, has a genetic influence of a pointed domestic longhair found in a churchyard in England of 0.85 percent and an influence of one particular Siamese cat of 1.28 percent.

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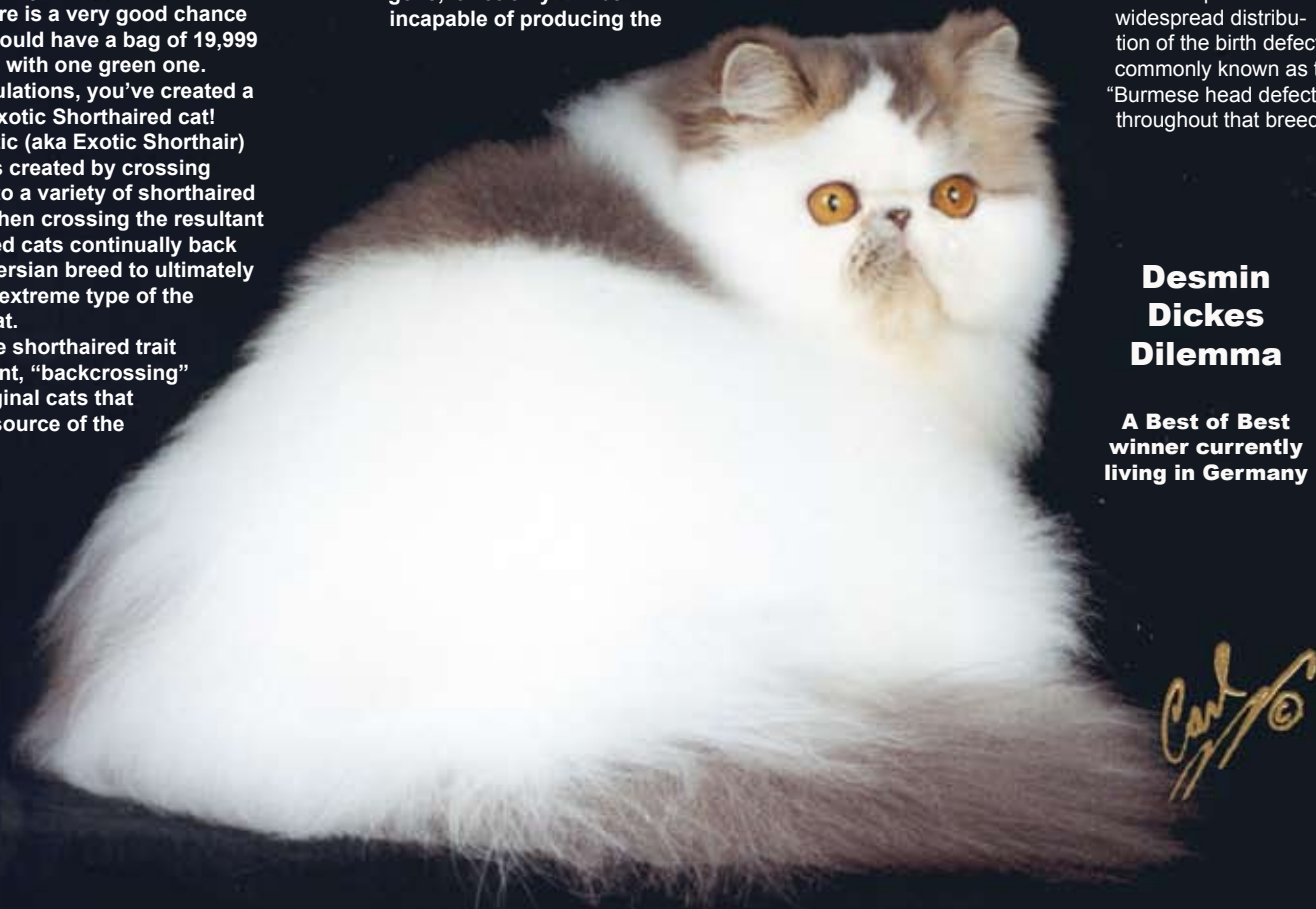
This is because the genetic difference between a colorbred blue Persian and a colorbred silver Persian (for example), with no common cats in a five-generation pedigree, is as much or more than the genetic

difference between an Exotic Shorthair and any randomly selected cat in the Persian breed.

Because the Exotic Shorthairs have used some of the most prolific and influential Persians of their day to improve type, these cats are extremely closely related to today's top winning CFA Persian lines.

Not even a DNA test specifically for the shorthair gene exists, so current DNA testing could not even differentiate a SHORT-HAIRED Exotic from a Persian cat, let alone a longhaired one.

CFA currently requires five generations of pure Persian ancestry for a cat to be registered as a Persian. 🐾



**Desmin
Dickes
Dilemma**

**A Best of Best
winner currently
living in Germany**

Carl



Diehl's Make A Wish
Shaded silver Exotic Longhair male.
Evelyn Diehl, breeder/owner

Exotics

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A single outcross cat in the sixth generation would contribute 1.6% of its genetic makeup to that cat. Therefore, CFA only requires a level of purity of 98.4 percent in a cat applying to be recognized as a Persian from another registry.

The genetic influence of the shorthair outcrosses in today's Exotics, to the best of my calculations and pedigree research, falls at around 0.5 percent, resulting in a cat that has approximately 99.5 percent "Persian blood."

The chances that a Burmese, Russian Blue, or ASH specific marker has made it way down through 8-14 generations to a particular Exotic cat, without selective breeding for that specific trait (as the shorthaired gene has been selected for in shorthaired Exotics), is less than 0.5 percent.

For ALL Exotics to have randomly inherited a "specific" marker from the shorthaired outcrosses is a statistical impossibility, given the number of Exotics registered by CFA.

Therefore, there is not, and WILL NEVER BE, a DNA test to determine whether a cat is an Exotic Longhair or a Persian.

Any test that would be sensitive enough to determine the difference between the two populations of cats would simply be an identity test for that particular cat, differentiating it from any other cat, but not useful as a tool to categorize the cat as "Persian" or "Exotic."

The populations are simply too closely related to one another.

This genetic analysis and the associated statistics assume that there is no selective



Ormerys Orsetta, JW
Blue classic Exotic Longhair female

breeding taking place (no "looking into the bag of M&Ms").

Selective breeding for Persian traits will reduce the genetic contribution of a cat with non-Persian traits, occurring many generations back in the pedigree, even further.

Another gene variant that has been identified in the Exotic Shorthair is the sable ("Burmese brown") albinism color allele. Selection is again a factor that has limited the penetrance of this gene into the breed. Heterozygosity at this locus in an Exotic could potentially cause unsoundness of coat color and poor eye color in an Exotic.

This would cause a breeder to naturally select away from cats carrying this allele. Its presence was more common in the

breed 20 years ago, primarily due to the lack of widespread availability of the chocolate gene for breeders to work into their programs.

In attempting to create a "brown" cat, it was easier to do so in Exotics by bringing out the sable gene in this population of cats.

Now that the chocolate gene is more prevalent in the Persian breed and judges are more familiar with the appearance of true chocolate and lilac colored cats, breeders no longer select for the sable gene to create brown colored cats.

Whether the Exotic Shorthair should be considered simply a variant within the Persian breed, as Himalayans and chocolate/lilac Persians commonly are, is a matter for registries to decide.

Familiarity with the genetics involved in this breed is, I believe, helpful to facilitate an informed discussion on this subject.

Lorraine Shelton is an accomplished linechaser who has bred chocolate and lilac Persians under the Featherland prefix for more than a decade. In addition to her beloved Selkirks, she recently has ventured into Turkish Angoras. Shelton has a bachelor of science degree in biological science from the University of California in Irvine, CA and is one of the cat fancy's top experts in feline genetics, especially in regards to both color and health. Shelton moderates both the Persian-Fanciers and Fanciers Health lists on Yahoo. Shelton is the co-author of the recently released fourth edition of "Robinson's Genetics for Cat Breeders and Veterinarians."



FiFe GC
Dilemma
Dearest
of Berlin

A Best of Best
winner residing in
Germany.

CFA Exotic proposal

Divide the Exotic breed into Longhair and Shorthair Divisions. Exotic Longhairs would be registered in the appropriate Exotic color class and be identified by specific registration prefix numbers/letters as Exotic Longhairs (example: 7XXXL prefix numbers, the addition of "L" would indicate "Longhair").

1. **Proposed:** Create LH/SH Divisions of Exotic. Provide coat descriptions for both the Exotic Shorthair and the Exotic Longhair. Delete any AOV reference to Longhair.

Current: GENERAL: the ideal Exotic should present an impression of a heavily boned, well balanced cat with a sweet expression and soft, round lines. The large, round eyes set wide apart in a large round head contribute to the overall look and expression. The thick, plush coat softens the lines of the cat and accentuates the roundness in appearance.

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Shorthair and the long thick coat of the Exotic Longhair softens the lines of the cat and accentuates accentuate the roundness in appearance.

AND
Current: COAT: dense, plush, soft and full of life. Standing out from the body due to a rich, thick undercoat. Medium in length. Acceptable length depends on proper undercoat. Cats with a ruff or tail-feathers (long hair on the tail) shall be transferred to the AOV class.

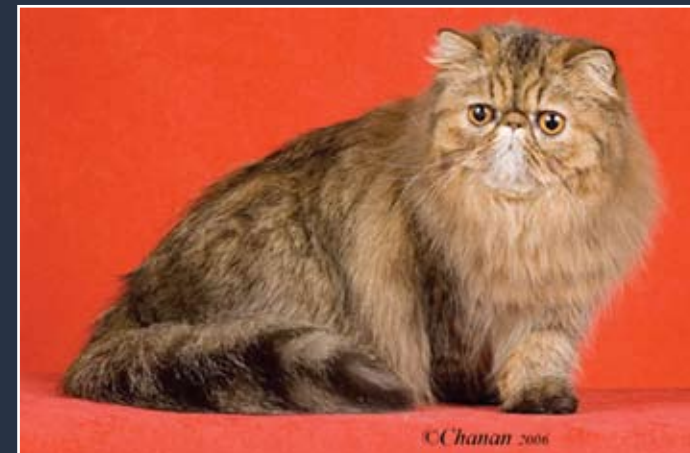
Proposed: COAT: Exotic Shorthair: dense, plush, soft and full of life. Standing out from the body due to a rich, thick undercoat. Medium in length. Acceptable length depends on proper undercoat. Cats with a ruff or tail-feathers (long hair on the tail)



Diehl Love At First Bite
Shaded silver Exotic Longhair female



Milbury Bridge Mixture
Blue-cream Exotic Longhair female.



IC Ormerys Emma, JW
Brown classic tabby Exotic Longhair female (shown as a Persian)

shall be transferred to the AOV class. Exotic Longhair: Long and thick, standing off from the body. Of fine texture, glossy and full of life.

Long all over the body, including the shoulders. The ruff immense and continuing in a deep frill between the front legs. Ear and toe tufts long. Brush very full.

RATIONALE: In an Exotic breeding program both shorthair and longhair kittens are born. Many Exotic Longhairs are of top show quality and they are phenotypically indistinguishable from Persians.

Almost 53 percent of last years Persian BC voted in favor of accepting the Exotic Longhair for Championship status.

The designated speaker for the Persian Breed Council has asked the CFA Board last year: "What we ask is very simple: Please extend the Persian Breed Council the courtesy of acknowledging its votes to prevent the Exotic Longhairs from being registered and/or shown as Persians."

Ninety-three (93) percent of last year's Exotic Breed Council members voted in favor of accepting the Exotic Longhair for Championship status but by offering three options the votes got split up. By adding a Longhair division to the Exotic breed, we respect the wishes of the Persian Breed Council. It is the best possible compromise for all parties involved at this moment. If the Board chooses to accept this change, look-alikes will be shown in both the Exotic and the Persian

breeds. It will require an inactivation of the WIAB policy.

YES 60, NO 15

2. **PROPOSED:** Add the following sentence to the end of the description of the HEAD:

When viewed in profile, the prominence of the eyes is apparent and the forehead, nose, and chin appear to be in vertical alignment.

RATIONALE: This addition mirrors the change made to the Persian standard this past year.

YES 70 NO 5

Note that results for the following question will be for informational purposes only given the fact that outcross rules are part of the registration rules and not part of a breed standard.

3. **PROPOSED:** The Exotic breed will be allowed to continue to outcross to the Persian breed. No cut off date will be determined.

RATIONALE: By continuing to outcross to Persians, we can continue to improve the health and the beauty of our Exotics. Closing the Exotic gene pool for Persians will limit our possibilities to breed for a healthy cat that complies with the Exotic standard, a standard that is written to mirror the Persian standard.

YES 69 NO 5

The results of the vote by CFA Exotic Breed Council members follows each section and the rationale.