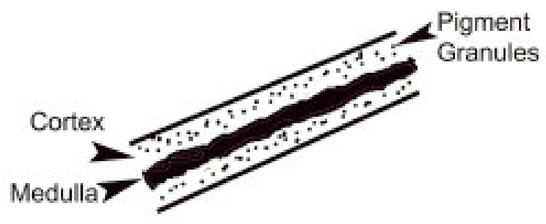
# The Thing About Iridescence



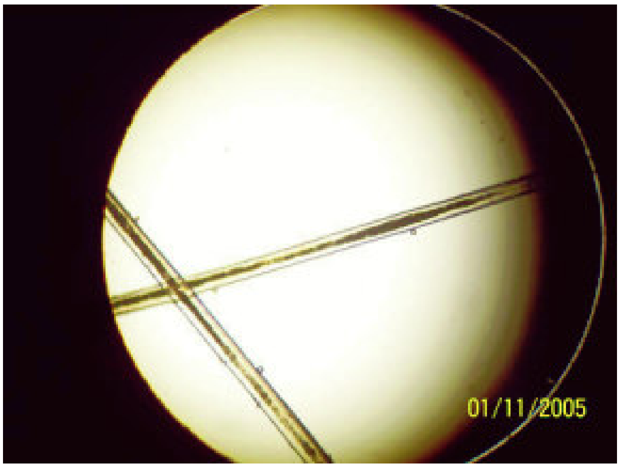

Basic structure of a hair shaft

Iridescence - it's that shimmering shine you see on some horses, with some colours (champagne and pearl most notably) and in some breeds like the Akhal Teke. It's also a desirable trait for the single cream dilutes, especially the palomino.

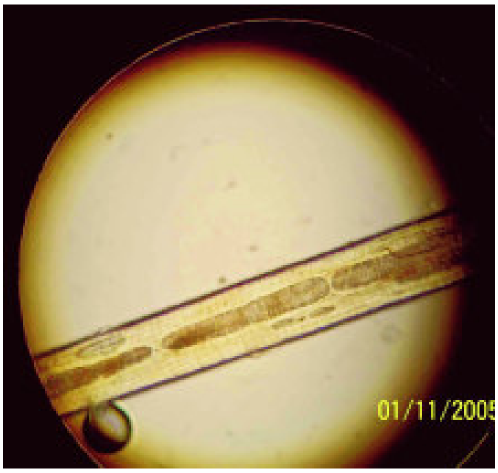
There are a number of theories about iridescence and whether it's a factor that can be inherited as part of the coat pigmentation process. However, analysis of hair shafts under a microscope reveal that it likely has a more mechanical cause. Quite simply, one of the main features of a highly iridescent horse is the structure of its hair shafts.

The internal structure of a hair shaft consists of the central core or medula, the surrounding cortex which carries the pigment granules - these are what we see when we look at the horse, and the outer cuticle. Microscopic examination of hair shafts reveals that the medula varies considerably between individuals. It can be very wide and dense, taking up most of the hair shaft or it can be very narrow and highly fractured.

It's this medula structure that correlates to iridescence ie it's directly related to the amount of light that can pass through the hair shaft. A broad dense medula blocks most of the light, resulting in a duller, flatter appearing coat. The horse may still have a nice shine but it won't have the shimmer of an iridescent horse. A narrow, fragmented medula on the other hand allows a lot of light to pass through each individual hair shaft, resulting in iridescence. The narrower and more fractured the medula, the higher the degree of iridescence. Some colours, like the champagne for instance, can have very little or no medula towards the tips of the hair shaft, leading to even greater iridescence.




Hairs from a gold champagne showing the highly fragmented medula.



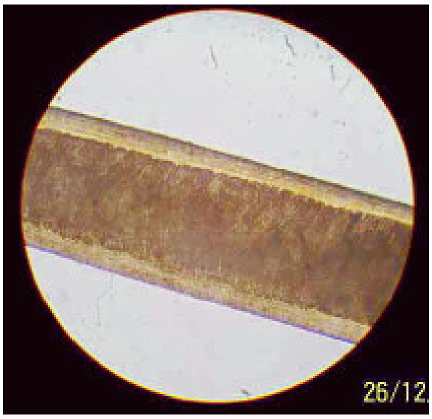

Close up of hair from same gold champagne showing the highly fragmented medula.

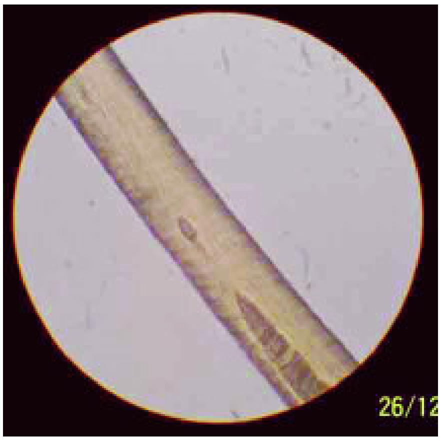
Sometimes with an iridescent horse you'll also notice a glitter as the sun hits them at certain angles. This we think is caused by darker pigment granules in the cortex. The sun hits them and bounces off.

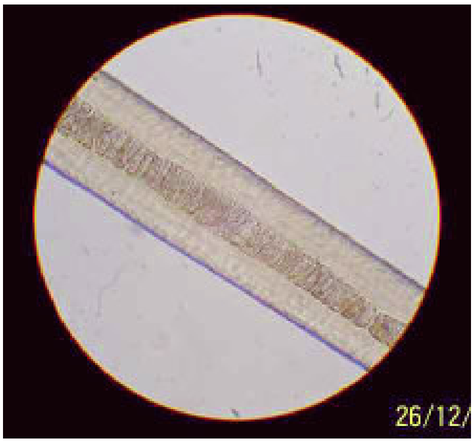
Now compare these with the hair samples from a burnt buckskin below. The buckskin coloured hair shows the clear tip common to the cream dilutes but the black hair lacks the clear tip - same horse however. You can also see from the rounded top to the hair that the horse has likely been clipped or the tips damaged in some way.

But it's further down the hair shaft that you can see the startling difference between the medula on this horse and the champagne! This horse likely has very little if any iridescence because, as you can clearly see, the wide, dense medula takes up most of the cortex and blocks the light.



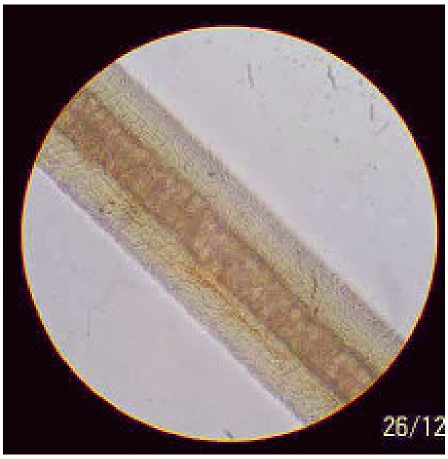






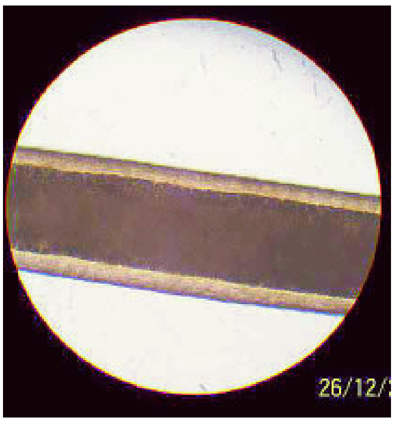
This group of photos belong to the palomino pictured. Note the very clear tip and absence of medula. When the medula does start, it's very fractured and it remains very narrow right the length of the hair shaft with numerous cracks and fissures. It's this narrowness, coupled with the fragmentation, that contributes to the iridescence displayed.

Obviously this characteristic is hereditary because the dark horse below is his son.



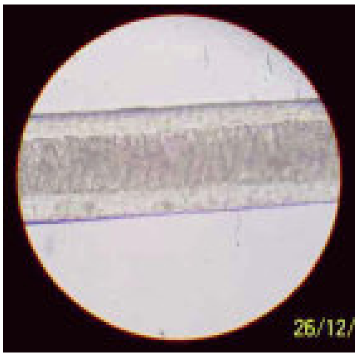

The hair in these two photos belongs to the dark palomino. Again, note the very narrow fractured medula. His hair tips would be very similar to the other horse. This horse though has another feature in his hair shafts which you can see reflected in his coat.

If you look closely, you can see he has more of a glittery uneven appearance to his iridescence compared to other one, who has a much more even sheen. This is probably caused by the darker pigment granules you can see in the cortex. They're apparent in both photos but particularly noticeable in the top one. In real life, you can also see the sun 'sparkling' off him like glitter and it's likely due to the sun bouncing off these darker pigment granules.

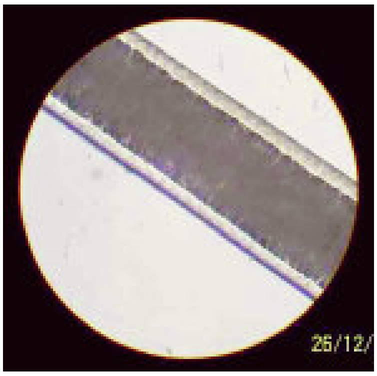

The photo to the left is another palomino but note the completely different medula. This one is broad, dense and takes up almost the entire cortex. The horse it comes from is a dark, orangy colour with very little iridescence, which comes as no surprise based on the appearance of the medula.

These hairs are from the two cremellos pictured. Again, the difference in the medula between the two is quite remarkable. The first has almost the same narrow fractured medula as her sire and her 'brother from another mother' on the previous page. You can also see her iridescence in this photo and she's also almost pure white in colour.




The other hair belongs to the second mare who, when in show condition, was a very dark ivory colour which is consistent with the much darker medula. She also never exhibited much iridescence and you can see why when you look at her medula. This mare has produced an iridescent son and a non-iridescent daughter to the same iridescent stallion on the previous page.

***All these microscope photos are the work of Amanda Massie who very kindly spent many hours peering at various hair samples through a microscope and photographing the results.***




# Megafaunal Mass Extinctions

from Wikipedia

**Timing and possible causes**

A well-known mass extinction of megafauna, the Holocene extinction (see also Quaternary extinction event), occurred at the end of the last ice age glacial period (a.k.a. the Würm glaciation) and wiped out many giant ice age animals, such as woolly mammoths, in the Americas and northern Eurasia. An analysis of the extinction event in North America found it to be unique among Cenozoic extinction pulses in its selectivity for large animals. Various theories have attributed the wave of extinctions to human hunting, climate change, disease, a putative extraterrestrial impact, or other causes. However, this extinction pulse near the end of the Pleistocene was just one of a series of megafaunal extinction pulses that have occurred during the last 50,000 years over much of the Earth's surface, with Africa and southern Asia (where the local megafauna had a chance to evolve alongside modern humans) being largely spared. The latter areas did suffer a gradual attrition of megafauna, particularly of the slower-moving species (a class of vulnerable megafauna epitomized by giant tortoises), over the last several million years. Remains of mammoth that had been hunted by humans 45,000 YBP have been found at Yenisei Bay in the central Siberian Arctic.

Outside the mainland of Afro-Eurasia, *these megafaunal extinctions followed a highly distinctive landmass-by-landmass pattern that closely parallels the spread of humans into previously uninhabited regions of the world, and which shows no overall correlation with climatic history (which can be visualized with plots over recent geological time periods of climate markers such as marine oxygen isotopes or atmospheric carbon dioxide levels).* Mainland Australia was struck first around 45,000 years ago, followed by Tasmania about 41,000 years ago (after formation of a land bridge to Australia about 43,000 years ago), Japan apparently about 30,000 years ago, North America 13,000 years ago, South America about 500 years later, Cyprus10,000 years ago, the Antilles 6,000 years ago, New Caledonia and nearby islands 3,000 years ago, Madagascar 2,000 years ago, New Zealand 700 years ago, the Mascarenes 400 years ago, and the Commander Islands 250 years ago. Nearly all of the world's isolated islands could furnish similar examples of extinctions occurring shortly after the arrival of humans, though most of these islands, such as the Hawaiian Islands, never had terrestrial megafauna, so their extinct fauna were smaller.

An analysis of the timing of Holarctic megafaunal extinctions and extirpations over the last 56,000 years has revealed a tendency for such events to cluster within interstadials, periods of abrupt warming, but only when humans were also