

## Rabbit Eye Color Biochemistry

By Amy Hinkle



This work is licensed under the Creative Commons Attribution-NonCommercial-No Derivative Works 3.0 United States License. This means you're free to copy and share this article (but not to sell it) so long as you don't change it and attribute the work to me. This notification may not be removed.

Color in eyes works very similarly to color in fur. Rabbit fur has two melanin pigments: eumelanin (dark brown) and pheomelanin (light brown/reddish brown/orangey brown). The iris (the colored part shaped like a doughnut) in the eye also has these same pigments.

Melanin particles in blue eyes are smaller in diameter and more dispersed. In brown eyes, the melanin is much denser. They are on a dark background of the iris epithelium comprised of eumelanin and pheomelanin which is found at the base of the iris. The index of refraction is higher in the iris than in the surrounding area so the color particles in the iris can spread the white light out, giving rise to the blue color. To see an easy example of how the index of refraction works, take a pencil and stick it in a glass of water, leaving some of the pencil in the air with the rest submerged. You will notice that if you view it from the side, the pencil seems bent. The bend occurs where the water and air meet. This is because the water has a higher index of refraction than the air.

With age, there is a gradual increase in the size of the particles so the light is not dispersed as much. Hence the eyes start to look more brownish (this can be slight or severe). This is why some dilutes as they age to be a few years old have darker eyes bordering on brown. Certain lines tend to do this more than others as there are some genetic components to this process.

In brown eyes, the melanin is concentrated so the radius where absorption of light occurs decreases, therefore it does not show the blue color. Instead, the yellow color of the pheomelanin will appear causing the eyes to be brown.

This also explains why albinos (REW's) have red eyes. When the C locus is homozygous recessive (cc) it impedes all color (melanin) production. The base of the iris is melanin, so without this there, the iris appears red because it will reflect instead from the blood vessels.

Blue eyes, such as seen in the blue-eyed-whites, have very little melanin in the iris stroma but still has pigment in the epithelium. Therefore, all the shorter wavelengths of light are absorbed and the shorter ones are reflected based on Rayleigh scattering. Blue-gray eyes as seen on dilutes have some melanin in the iris still which is why they appear to have a grayish tinge to them.