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By Diana Thottungal

You've seen it. Glowing animal eyes like something out of a grade B (or C or D) movie. By the way, it's not the same red-eye that results from a camera flash.

At night in the Garden we can see eyeshine, not just in the occasional raccoon or deer, but even in moths, whose eyes make tiny orangy sparkles in the dark. Not all tiny sparkles are moth eyeshine though; some spiders, including Wolf Spiders (often found in the Shelter), also have it.

Rabbits don't tend to hop around at night, so you're not likely to see them, but at dusk they show eyeshine, too. While we're at it, should you catch a crayfish out at night, or go down to Wirth Lake to see the fish, there's a chance you'll spot their eyeshine. And if you're very, very lucky and spot an owl, you may see their reddish glowing eyes.

So. What good does it do an animal to have eyes that look to us like flashlights but for them are more like headlights to see better in the dark? And how do they do it?

To answer the second question first...there are several different ways animal eyes are modified to catch and reflect or scatter light. With a profound lack of imagination, all these modifications are called *tapetum lucidulum*, which translates as, basically, light reflecting layer.

Since seeing better in murky water, glaring sun or just plain dark is such a good idea, each animal group seems to have figured out a different way to get the job done. Owls and many fish, for instance, just put a reflecting layer on the surface of the retinas of their eyes. Since fish have this, you'd think that other forms would be evolved from that, but no. Whales, rodents and sharks, among others, put the reflecting layer behind the retina (that layer is called the choroid) in cells filled with crystals to do the reflecting job.

Deer, cows and their relatives use fancy fibers between, not in, the cells of the choroid layer.

And, it gets stranger. Insects move some of their air processing structures (tracheoles) over and behind their eyes to get the same effect. And critters as different as spiders, crayfish and scallops have a layer behind the retina, all right, but the layer is made up of structures designed to scatter, rather than just reflect, the light rays. This is just dandy underwater or in low or hazy light, but during bright daylight rather messes up the sharpness of their vision.

Now, to answer the first question second, enabling the animal to see better in the dark or in murky water is probably the reason this feature evolved so many times. It's a great example of convergent evolution: getting to the same function by different methods.

As a last neat tidbit ... some of these tapetums are occlusible, which means that the effect can be blocked by various methods, depending on which organism is doing the occluding. Sometimes you just don't want your shining eyes advertising where you are.