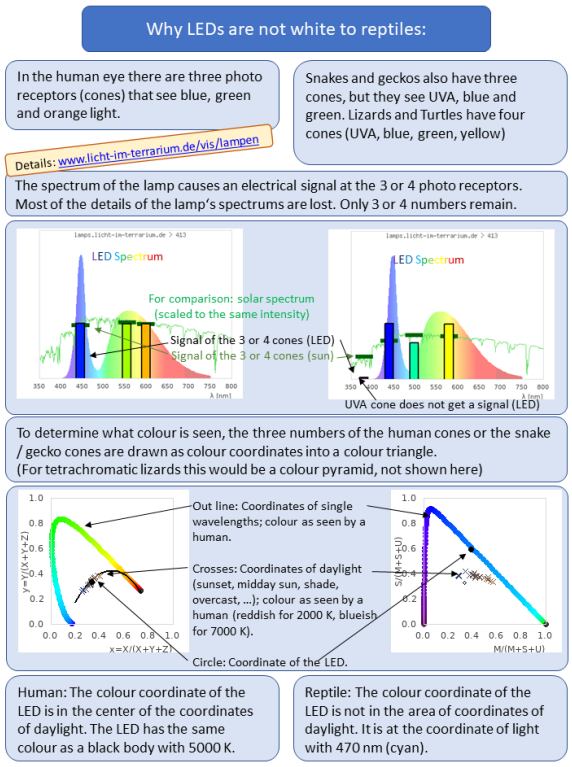
Many of you will know, that I am reserved against LEDs because without UVA they appear the complementary colour to UVA to reptiles. Light is white when all photoreceptors in the eye see approximately the same amount of light. LEDs, fluorescent lamps, metal halides, halogen lamps etc. are white to us humans, because they emit blue, green and red light, so that our three photoreceptors see light.

LED plant growth lights are a combination of red and blue LEDs. Only two of our three photoreceptors see light – the red cone and the blue cone. The green cone does not see light. The light emitted from a LED pant growth light is purple to us – the complementary colour to green.

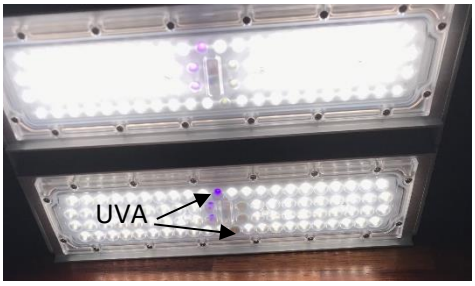
Normal “human-white” LEDs must look the same to reptiles. Their blue and green photoreceptors see light from a normal “human-white” LED, but their UVA photoreceptor does not see anything. So a normal “human-white” LED will have the complementary colour of UVA to them.




Does it do them any harm? We do not know. But as sunlight is white, I prefer to use white lights only until there is scientific proof, that it does no harm. Many reptiles have such a good colour vision and colour seems to matter to them (especially chameleons), that I do not feel good about disturbing their colour vision.

I have written more this topic here:
http://www.licht-im-terrarium.de/_media/vis/white_light_for_reptiles.pdf

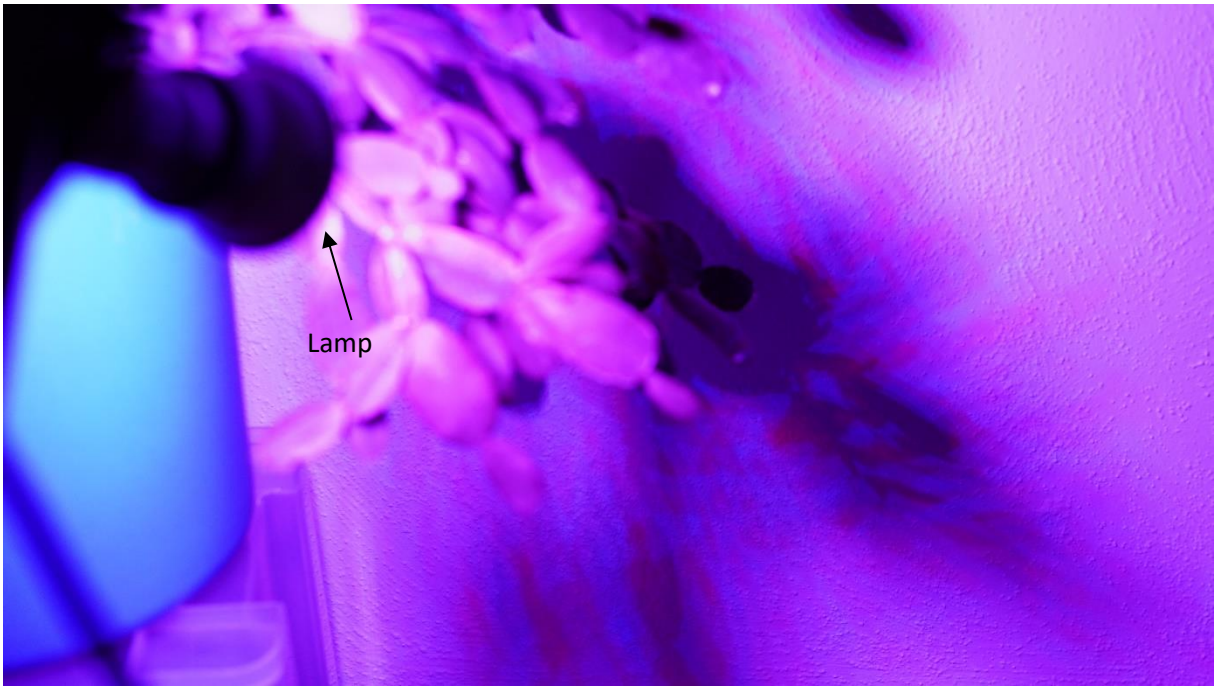
There seems to be a solution to the LED issue: Combine LEDs that do not emit UVA with lamps that emit UVA. We are used to that concept when combining heat, UVB and visible light. I believe that the skin does not recognize if UVB and heat are emitted by the same lamp (when using a UVB emitting metal halide lamp) or by two different lamps (when using a tungsten halogen lamp and a fluorescent tube). But what about visible light. Do the lights from different lamps mix? Is it possible to use a LED with no UVA and combine it with a fluorescent tube with UVA? Is it possible to put individual UVA-LEDs in an array with normal “human-white” LEDs? The photo shows such a lamp that combines “human-white” LED and UVA-LEDs (in the center, they look dark and purple to us)



But do the colours really mix? Can the LED plant growth light help answer that question? How well do the red and blue colours from the individual LEDs mix? At first glance, the array illuminated by the LED shows a very uniform purple colour, except for a small reddish spot very close to the lamp where many red LEDs are.

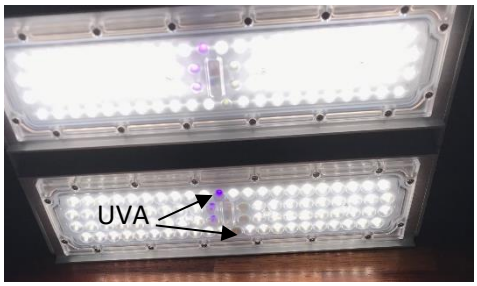

But in a real set-up, there are always objects in the light path. I have put a plant between lamp and a white wall and taken a photo of the illumination at the wall. In a terrarium the total setup will of course be rotated, with the lamp above, illuminating the ground. But as I do not have a white floor and the lamp is too small to use in a terrarium anyway and I only wanted to investigate the effect, I think that this is ok.

I have found very strongly coloured shadows. The multiple shadows of the plant leaves create an almost mesmerizing pattern of reds and blues on the wall. Every of the LEDs (52 red and 20 blue) creates its own shadow of every leave. And then the shadows overlap. Where no light from a red LED reaches the wall, but light from a blue LED reaches the wall, the wall will be blue. At some spots light from 26 red LEDs and 10 blue LEDs will reach the wall and there will be a shadow with the same purple colour as the fully lit area. But in other spots the light from more red or more blue LEDs reaches the wall and the colour will differ.



This lamp has 52 red LEDs and 20 blue LEDs that are really closely together and packed in a randomized pattern. There is a big chance that the effects from the individual LEDs are balanced out. It is very unlikely to find a spot at the wall where light from *all* the red LEDs reaches the wall but light from *all* the blue LEDs is blocked by the plant's leaves.

A terrarium UVA-LED lamp, like the one mentioned before but also others, has far less UVA LEDs compared to "human-white" LEDs and the individual LEDs have a larger distance. I assume the coloured shadows are much stronger in that case.




I personally find the coloured shadows of the purple plant growth LED quite funny in the little experiment. But I assume they are very disturbing when something similar happens in a terrarium. The plants or other objects that cause the shadows in a terrarium will move, because the reptiles climb through the pants. Thus the shadows will move and change their colour all the time.