

At first light: The relationship between nature and dental technology

By **Leo Liao**, ceramist



THE NATURAL CONNECTION

Light plays an intrinsic and important role in our natural living environments – it is connected to our sense of sight; under natural lighting, we can observe objects in their most authentic forms. Likewise, all living organisms thrive with the nourishment of light. However, as we move indoors, the challenge of replicating natural lighting conditions emerges,

I have always been fond of nature, having grown up in the countryside before moving to the city for work. Whenever I have the chance to wander through the mountains and forests, I long for a corner of my home to be surrounded by nature as well. This has led me to develop hobbies such as insect breeding, specimen collection, and aquascaping.

Aquascaping, in particular, is an art that integrates aesthetics with creating a suitable aquatic environment for fish and plants within human living spaces. One of the most critical elements in maintaining a healthy aquatic ecosystem is lighting.

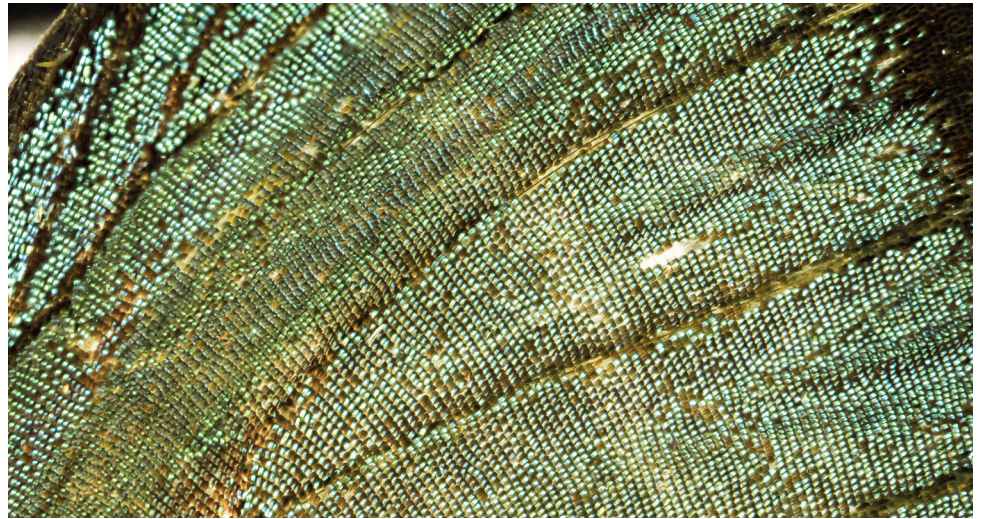
Initially, I assumed that any light source would suffice, so I opted for an affordable IKEA reading lamp. However, after some time, the aquatic plants in my tank began to wither and decay. I replaced them with new plants, only to see the same cycle of wilting repeat. It was not until later that I realised a healthy aquatic environment requires lighting specifically designed for aquariums.

These specialised lights have a spectrum closer to natural sunlight, effectively stimulating photosynthesis in aquatic plants. Understanding this principle has not only helped me establish a thriving aquatic ecosystem but also reduced the cost of repeatedly purchasing new plants, allowing me to enjoy the art of aquascaping even more.



IN DEPTH WITH

Another way I connect with nature is through specimen collection, particularly butterfly specimens. Their intricate patterns and vibrant colours are mesmerising. A large display case of butterfly specimens sits at the entrance of my lab. Beyond their elegance and dazzling hues, one discovers a whole new world when examining butterfly wings under a microscope. Their wings have a complex and delicate structure covered with tiny scales, and the pigment in these scales absorb certain wavelengths of light while reflecting others, creating the colours we see.



Under the microscope, the butterfly wing reveals the nanostructure of its scales, which reflect light.

Another mechanism behind their colouration is structural colour, where the nanostructure of the scales, rather than pigment, interacts with light. As light enters these microscopic structures, it undergoes reflection, scattering, and diffraction, producing a spectrum of colours.

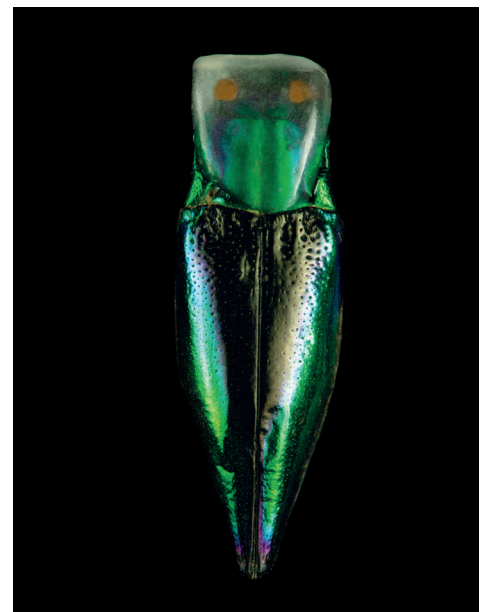
Interestingly, this principle shares many similarities with natural tooth colouration and dental prosthetic fabrication. Seemingly unrelated objects in nature often reveal unexpected connections, and the ability to integrate my interests with my profession as a dental technician is one of the most rewarding aspects of my work.

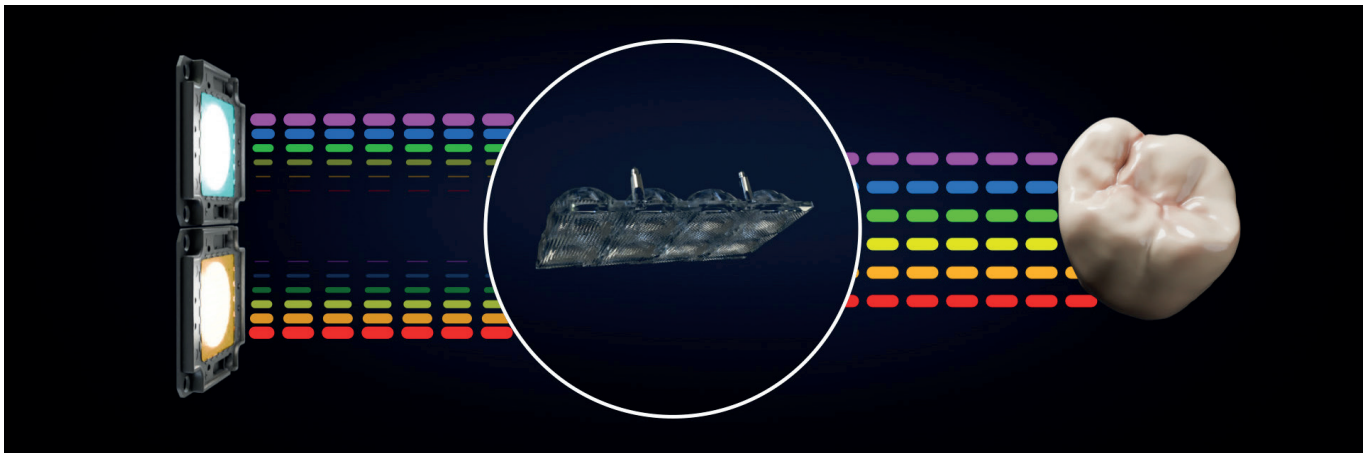


From the role of aquarium lighting in photosynthesis to the structural colours of butterfly wings, the quality of light is deeply tied to how colours are perceived in nature. However, I only truly appreciated this connection after adding a Renfert Light 1 to my dental workbench.

LET THERE BE LIGHT

Previously, I believed that as long as a light source had a high CRI (colour rendering index), sleek design, and reasonable price, it would be sufficient. Since dental lab lighting does not involve activating photosynthesis, I assumed that standard LED or fluorescent lights — similar to those





used at home – were good enough. I have also achieved very good results before, albeit with a high level of concentration that were especially straining on my eyes, and in turn took a toll on my health.



In that vein, what makes the Renfert Light 1 stand out?

The first factor is light diffusion. Typical lamp designs aim to provide bright and evenly distributed light across the work surface. However, the Renfert Light 1 features a lampshade that ensures uniform light distribution. This minimised the amount of scattered light entering my eyes, thus improving visual comfort.

What truly surprised me was that even when comparing it to another lamp with the same CRI of 97, the Renfert Light 1 made objects appear sharper and more three-dimensional. For instance, when viewing the same dental restoration, its internal details became more pronounced under this lighting. This experience is akin to the difference between Nikon and Canon cameras – one offers sharper images, while the other provides a softer aesthetic.



During the process of crafting lifelike dental restorations, I prefer the sharpest possible vision to meticulously replicate natural characteristics. This is why I use Nikon cameras for shade matching and colour science validation. Combining the Renfert Light 1 with this approach allows for even more precise visual observations, ensuring that the final restorations are as close to natural as possible.

Beyond improved colour accuracy, another tangible benefit of Renfert Light 1 has been reduced eye strain. Previously, my eyes were fatigued for nearly half of my working hours. However, with this new lighting, eye fatigue has significantly decreased, indirectly boosting my productivity. Shorter working hours mean more opportunities for my eyes to rest, creating a positive cycle that has even helped restore my eyesight – a real and unexpected benefit.

With Light 1, the world's first dental-specific lighting system, I have thus been able to improve not only my quality of work, but also

my understanding and appreciation of creating lifelike dental restorations. **DA**



ABOUT THE AUTHOR

Leo Liao is a ceramist specialising in high-end aesthetic dental restorations. With a deep passion for nature and art, Liao integrates organic elements and artistic expression into his daily dental creations. Since 2016, he has operated Leo Liao Arteeth Studio in Hsinchu, Taiwan, collaborating closely with Dr John Chu to deliver prosthetic solutions. In 2025, he expanded his vision by establishing a new branch, MONOTEETH Dental, in Taipei, further advancing his pursuit of excellence in aesthetic dentistry.