Light In The Underworld

By Martin Broen

Although I've been diving for 30 years, it only recently became a true passion, leading me to take up underwater photography, and both started with a visit to a Cenote in the Tulum 8 years ago

After several dives in the open sea around Cozumel, I decided to try a cenote called Angelita. I remember feeling disappointed when the guide explained that we wouldn't see any colorful fish, coral, or much life at all, but just go around a vertical sinkhole with sediment at its.

With very low expectations, we began our descent, staying close to see our dive lights in that tinted water. But a few meters down, the visibility became crystal clear, with no sign of being underwater except for our bubbles. As we continued down, a cloud with branches emerged beneath us, and I had the mind-bending experience of floating in mid-air above an enchanted forest.

I began diving in the recreational cenote caverns (accessible to all diving levels) with my first APSC mirrorless camera, progressing in both my diving and photography skills as I ventured over time deeper into the caves. The further I went, the more challenging the photography became, but also the more rewarding. Each cave in Yucatan is entirely different, offering unique experiences and photographic opportunities.

Today, as a full cave, technical, and CCR diver using a Sony a1, I've become proficient in capturing the essence and uniqueness of each cave. From tannic acid pockets that naturally modify the water's color (no Photoshop needed), to hydrogen sulfide clouds or haloclines, all in combination with unique speleothems that decorate the caves.

The more I dove, the more I discovered the beauty and secrets of these caves, uncovering unique fossils of extinct Megafauna, indications of the first Paleo Americans and Maya artifacts preserved in their

Cenote Angelita, x4 shot Vertical Panorama, capturing the cenote entrance above and the hydrogen sulfide cloud below, ISO 6400, f:4.5 and shoot at 1/30sec w/low natural light
This image captures that magical feeling I was experiencing. At the time, however, I wasn't an underwater photographer, and when I tried to capture the shot my GoPro 3 all I got were dark frames. Frustrated, I surfaced decided to learn photography.

One of the many failed attempts of a landowner to increase the open water of a cenote by digging the land; disrupting the normal underwater flow and causing the water to fill with bacteria, leading the owner to abandon the project after destroying it.

A perfectly preserved 200.000 year old turtle shell.

A Maya skeleton in the deep sinkholes of the ring of cenotes

Pristine Speleothems and a massive column highlighted by the perfect visibility of the filtered water

flooded tunnels. Collaborating with scientists to create photogrammetry models and 3D prints for them to study.

These caves hold the data of the first human-made mass extinction, where the local fauna faced a new predator that hunted at the distance with stone tools and sophisticated social organization, ending with 75% of all genera of an already stress megafauna population pushed to extinction. North American species like Lions, Camels, Horses, Gomphotheres (Mastodonts), Giant Sloths or sabretooth tigers got extinct and their fossils remain protected and hidden in the flooded caves.

Diving and photographing these caves feel like exploring another planet—an experience unlike anything else. However, it also pushes the limits of your skills and gear. You'll find yourself constantly pushing your camera to its highest ISO with acceptable noise, shooting your lens wide open rather than at the optimal aperture for a dome, and mastering the art of staying still while shooting at 1/15 second or even slower. All this takes place in a pitch-black, overhead environment, surrounded by fragile

The "God Rays" of the sun passing from the small Cenote entrance illuminating the Hydrogen Sulfide cloud below give a theatrical look that can only be achieved in this environment

While cave tunnels open in different directions in the same plane, it can also open up and down

formations, sometimes hours away from the nearest exit to the surface and safety. But the images you capture are truly unique, and they've helped me win over 50 different photography awards.

Over time, I've witnessed how we're destroying this environment before it's fully explored, the rapid urban expansion driven by tourism that lacks proper waste management, with toilets draining directly into the soil or inside the cave, with pig farms and agriculture fertilizer polluting the very water they rely on, the deforestation and wildlife habitat reduction, and developments like the Maya Train, along with failed attempts to enlarge the cenotes open water to attract snorkeling disrupting their natural flow, are all destroying this incredible natural wonder. Which has instilled in me a deep sense of responsibility. The phrase 'You will only protect what you love, and love what you know' resonates with me, especially when I realize that the landowners above the largest flooded cave systems in the world, and which sustain life in this ecosystem, are completely unaware of what lies beneath their feet.

That's why I created the book, Light in the Underworld. It's my attempt to make you fall in love with the Maya Aquifer, regardless of how claustrophobic you might be, or how much strong your pre-conception that in cave diving you will only see "wet rocks". And hopefully recruit you to help protect this environment as well. The book tells the fascinating story of the aquifer's formation, showcasing the immense variety of experiences you can find within through photos I took in over 250 cenotes, and revealing its secrets. I've employed a wide range of photography and lighting techniques, Using mostly off-camera lighting, to diffusers, High Dynamic Range, Panoramas, long exposures, light painting, infrared, or drones.

My background in design thinking, which encourages a 'make-to-learn' approach, drove me to explore, test, learn, adapt, and cross-pollinate techniques used on the

What's on my cave diving gear box for a typical shallow cave dive system in Open Circuit. Camera: Sony a1. Lens: Canon 8-15mm w/Nauticam mini glass dome. X3 BigBlue 33.000 lumen video lights. X3 BigBlue 1.2000 lumen lights for navigation. SeaCraft DPV. x4 tanks with Ean 32. Razor wing

A blue crab fishing in the flow of the waters close to the exit of the cave into the sea

The Blue Abyss, and in cave sinkhole, with it white walls reflecting the water column. Shooting upwards from 65m

surface. Instead of getting frustrated by the challenges and failures, I found joy in the process of achieving the perfect shot, treating it as underwater landscape photography, perceiving the directional natural light passing by the Cenote opening as it was a stage light and using the unique lighting conditions of the environment to my advantage.

This is the core of the photos in the book: approaching photography with no preconceptions and a willingness to experiment, which allowed me to capture the caves in the best light possible.

I was fortunate to get into underwater photography at a time when technology had reached the perfect stage for these types of photos. I started with a mirrorless Sony camera, in time when BigBlue lights of 15,000 lumens or more were available, and slim-profile Razor sidemount wings allowed me to squeeze into tight spaces. This setup enabled me to use off-camera lighting, eliminate the need for canister lights, and experiment with settings that experienced underwater

Pristine Speleothems and a massive column highlighted by the perfect visibility of the filtered water

photographers might have avoided—all while enjoying the process.

Another key to achieving these photos is my dive buddy, Nicolas Casella from CenoteXperience in Playa del Carmen. He's the model in most of these images, and after over 400 dives together, we can create these shots effortlessly. Nearly all the images were captured on our first visit to a particular cenote or cave with no previous photo planning. Following the rule of thirds: using one-third of our gas supply to penetrate and observe the cave, another third to exit while shooting the photos, and reserving the final third for emergencies in the unforgiving overhead environment. Our mutual understanding and quick communication in pitch-black conditions, using lights and single-hand signals for technical diving, are crucial for that fast approach, good composition and a safety.

Of course, proper training is essential to protect the fragile environment and ensure a safe dive. Managing the photography gear while handling multiple gas sources and technical equipment can easily lead to task overload, so it's vital to progress gradually and push your limits carefully.

You'll often hear that you should be able to operate your camera controls with your eyes closed— well, these are exactly the conditions you face in any cave dive.

As underwater photographers, we're privileged to witness the marvels of the natural world that few can access. With this privilege comes the responsibility to share our images with the public, raise awareness, and support conservation efforts. We are the visual storytellers that scientists and conservationists need as partners in protecting natural ecosystems. The stronger our images, the greater the chance that someone will stop and take notice. It's crucial that we shift from a competitive mindset to a collaborative one, as time is not on our side.

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The book Light in the Underworld, published by Rizzoli with a foreword by Dr. Alex Mustard and Paul Nicklen, will be released on September 3rd in the U.S., followed by a worldwide release. It will be available on Amazon, Rizzoli, and other major retailers

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