Is All Well in Subterranean LED-Land?

Andy Spate

The short answer to the above question is – maybe not?

Recently ACKMA conducted an online cave lighting forum with Dr Liz Reed of Flinders University presenting a comprehensive review on 9 October 2022. Unfortunately, the forum was not well attended but the presentations can be seen at http://ackma.org/Forums/cavelighting2022/index.html. Note part 1 is Liz's presentation and part 2 is discussion from the ten attendees.

We recall how excited the cave world was when LEDs came along – cheap 'white' light – cool – energy efficient – long lived – compact sizes – possible lampenflora suppression. All wows!

Now we could see our caves in their natural colors utilizing 'white' LEDs. But the natural color of caves is black! But this is not the only But! White LEDs have a great deal of 'blue' light in their spectrum. Liz looked across the scientific literature and found a number of sources pointing out that blue light can have adverse impacts on invertebrate species and some mammals such as bats. There can be promotion of biofilm growth on fossils, display bones and speleothems generally.

Her work with colleagues at Naracoorte has demonstrated considerable evidence of white LEDs damaging cave biota, fossil bones and speleothems generally.

Liz's research as outlined in the presentations is very comprehensive and far reaching. Her recommendations include:

- Ongoing photo and visual monitoring of biofilms (UV torch very useful – e.g. Eagtac MX3OL3).
- Monitor cave invertebrate populations.
- Test lights in cave – monitor and maintain.
- Limit light duration, tour length, frequency.
- Chemical and physical cleaning – weigh up impact to the natural biome.
- Warm white is better than cool. but they still have some blue.
- Limit light intensity; light placement.
- Apply filters to remove blue peak (LEE filter gels – which are inexpensive).
- Monitor cave environmental conditions know what is 'normal' (baseline).

She points out that lighting solutions are not "one size fits all" in caves.

This short summary of Liz's presentation will be supplemented by a more comprehensive paper to appear in the March Journal. This will also set out proposed guidelines for cave lighting using LEDs.

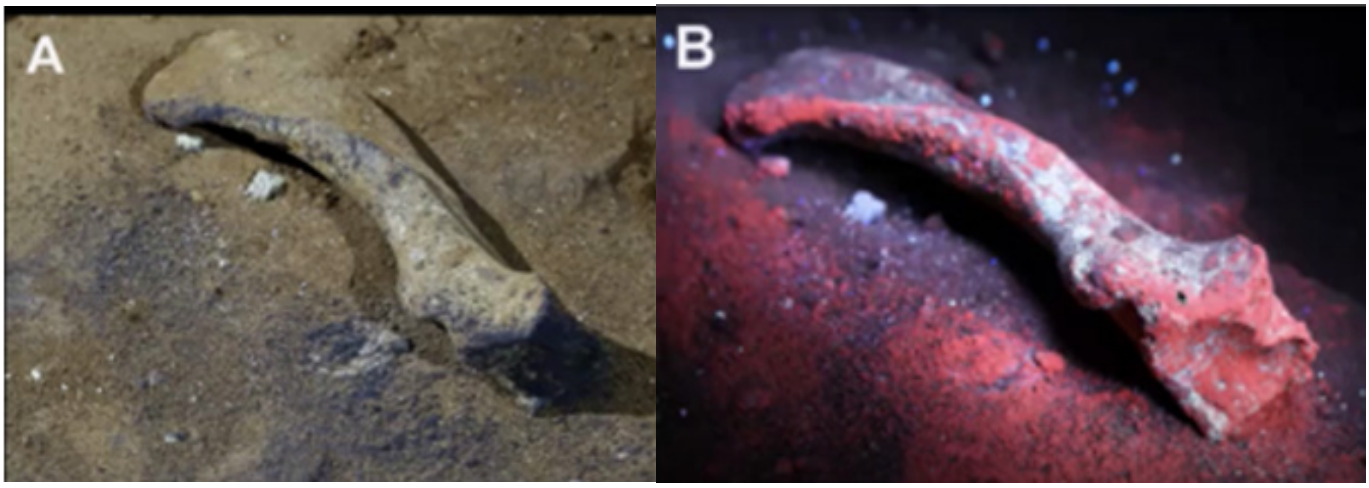

Photo: Liz Reed, Biofilms on bone. A. Cool white LED torch; B. UV torch 365 nm.