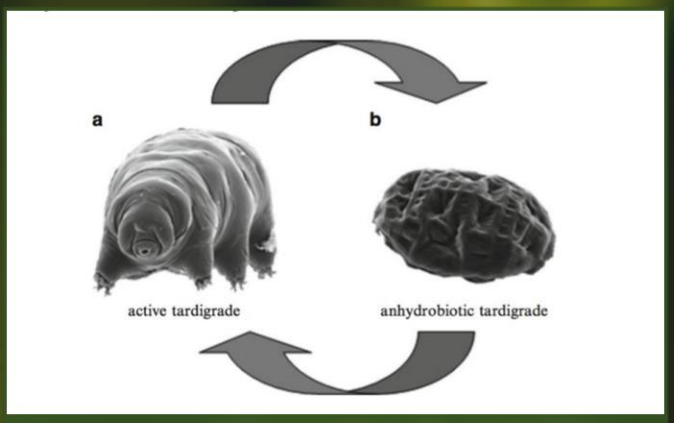
Tardigrades Under the Influence of Acidic and Alkaline Solutions, and UV-C Radiation

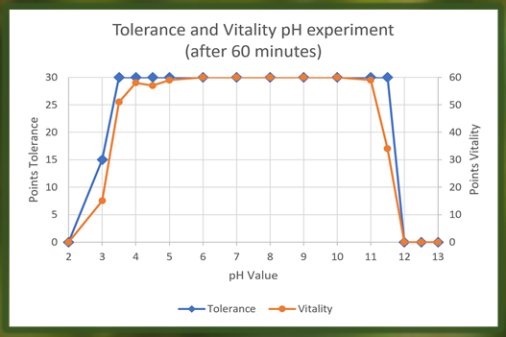
By Zamir Borojevic – representing Switzerland

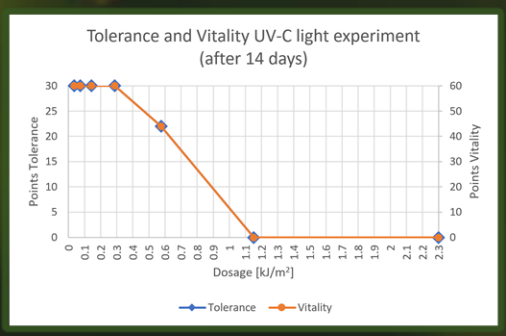
My work provides data on the **adaptability of *Hypsibius exemplaris* to extreme environments** and contributes to extending the existing knowledge on their adaptive skills. How exactly tardigrades adapt this fast to **changing environments** is still largely unclear, but those extremes may someday become common conditions with **adaptation being the only key to survival**. Understanding **one of the toughest animals** found in aquatic ecosystems may contribute to finding solutions to upcoming problems and to protecting the vast and fascinating world living underwater.

Hypsibius exemplaris is a freshwater tardigrade species. This species can be found all around the world and is one of the most studied and most common tardigrades. Like many aquatic tardigrades, *hypsibius exemplaris* is white to transparent and is capable of **cryptobiosis**. In two of the most common forms of cryptobiosis, **anhydrobiosis** and **osmobiosis**, tardigrades retract their legs, reduce their body surface, become impermeable, and create certain molecules in order to prevent irreversible damage within the body.



Tardigrade changing from active state (a) to anhydrobiotic state (b) and vice-versa. (Schill R.O. (2010), Anhydrobiotic Abilities of Tardigrades)





Results to the UV-C light experiment:

- *Hypsibius exemplaris* does not survive radiation over 1.152 kJ/m²
- No stages of resistance
- Tolerance: 0 kJ/m² to 1.152 kJ/m²
- Vitality: 0 kJ/m² to 0.288 kJ/m²
- No active protection against UV-C light
- Less resistant in comparison to terrestrial living tardigrades

Results of the pH experiment:

- *Hypsibius exemplaris* is capable of inhabiting almost every water body without relying on cryptobiosis
- Reacts differently to acidic and alkaline solutions
- Osmobiosis at pH 3
- Death at pH 2;
  no Osmobiosis after pH 3.5
- Tolerance: pH 2 to pH 12
- Optimum: pH 6 to pH 10 (taking vitality into account)

Hypsibius exemplaris in Petri dishes in preparation for the UV-C light experiment.

The results of both experiments show that ***Hypsibius exemplaris* withstands a wide range of environmental influences**. Especially the pH experiment reveals *Hypsibius exemplaris*' **capability of inhabiting almost every water body in our world** without relying on cryptobiosis, as long as there is enough food for them. In case of facing rapid adverse changes, this species uses cryptobiosis to outlast those changes until the environment shows more favorable conditions.