

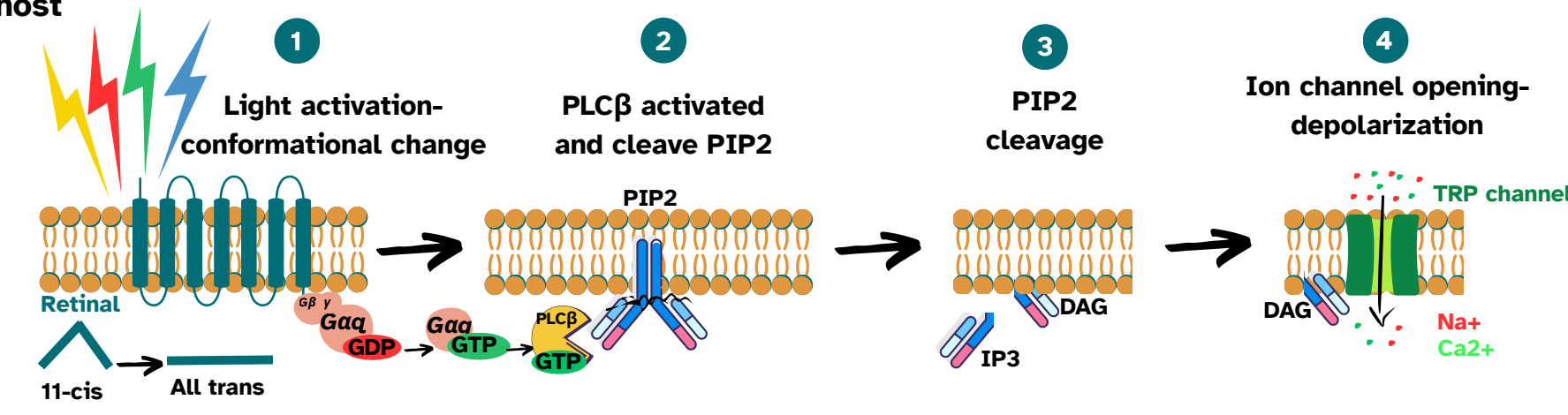
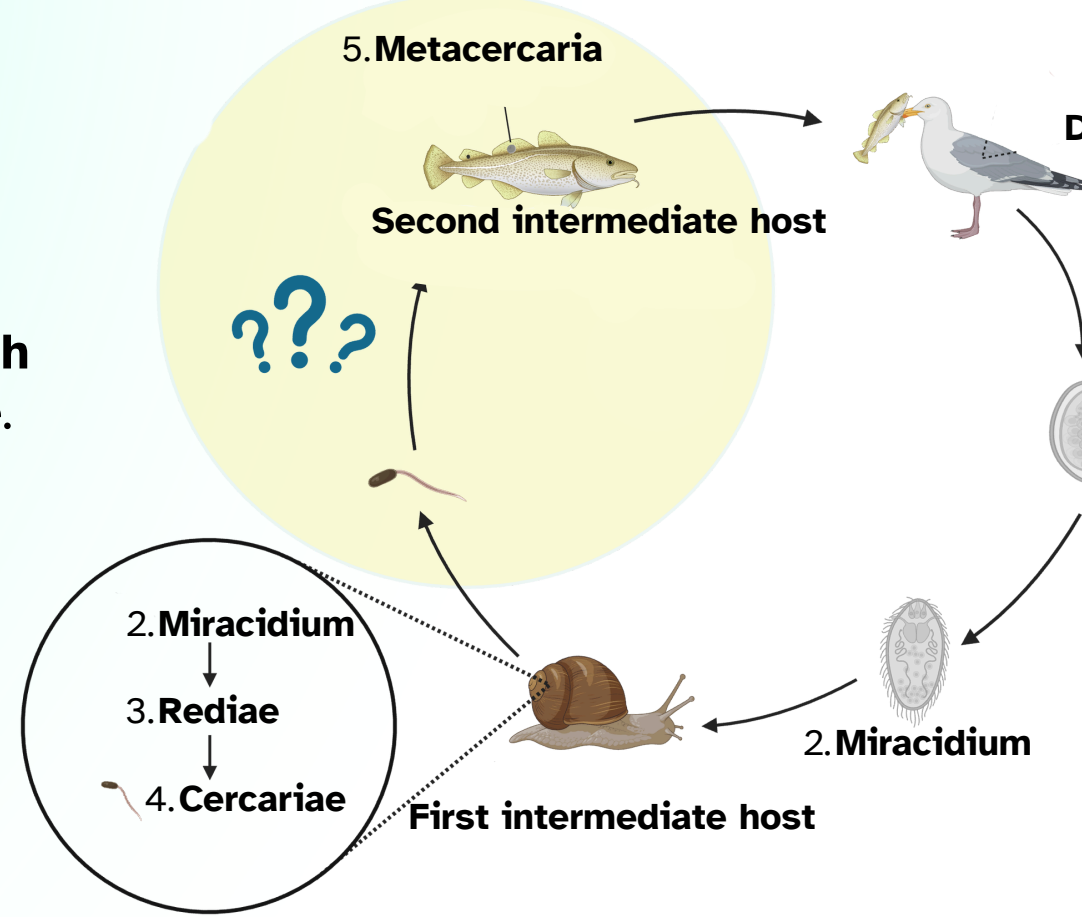
INTRODUCTION

BACKGROUND AND AIM

Cryptocotyle lingua is a **trematode parasite** that infects **fish** and causes **black spot disease**, reducing fish market value. As a potential **non-pathogenic and accessible laboratory model**, it can help us understand environmental sensing in related medically important trematodes such as the dangerous *Shistosoma*

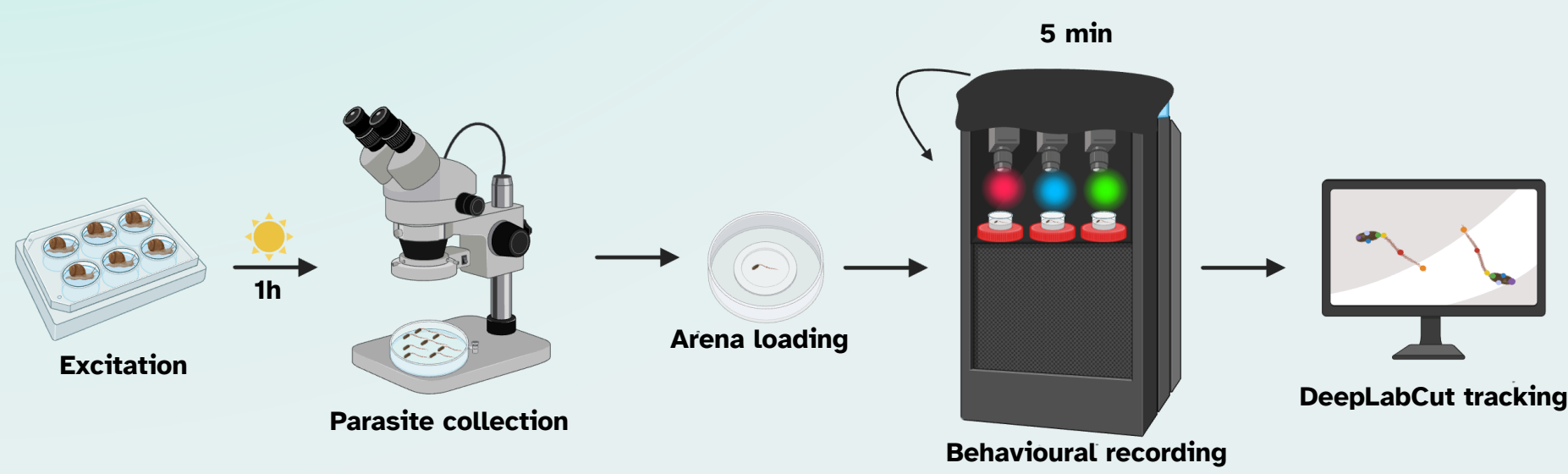
KNOWLEDGE GAP

The mechanisms underlying trematode **light sensing** and wavelength-specific responses remain **poorly understood**



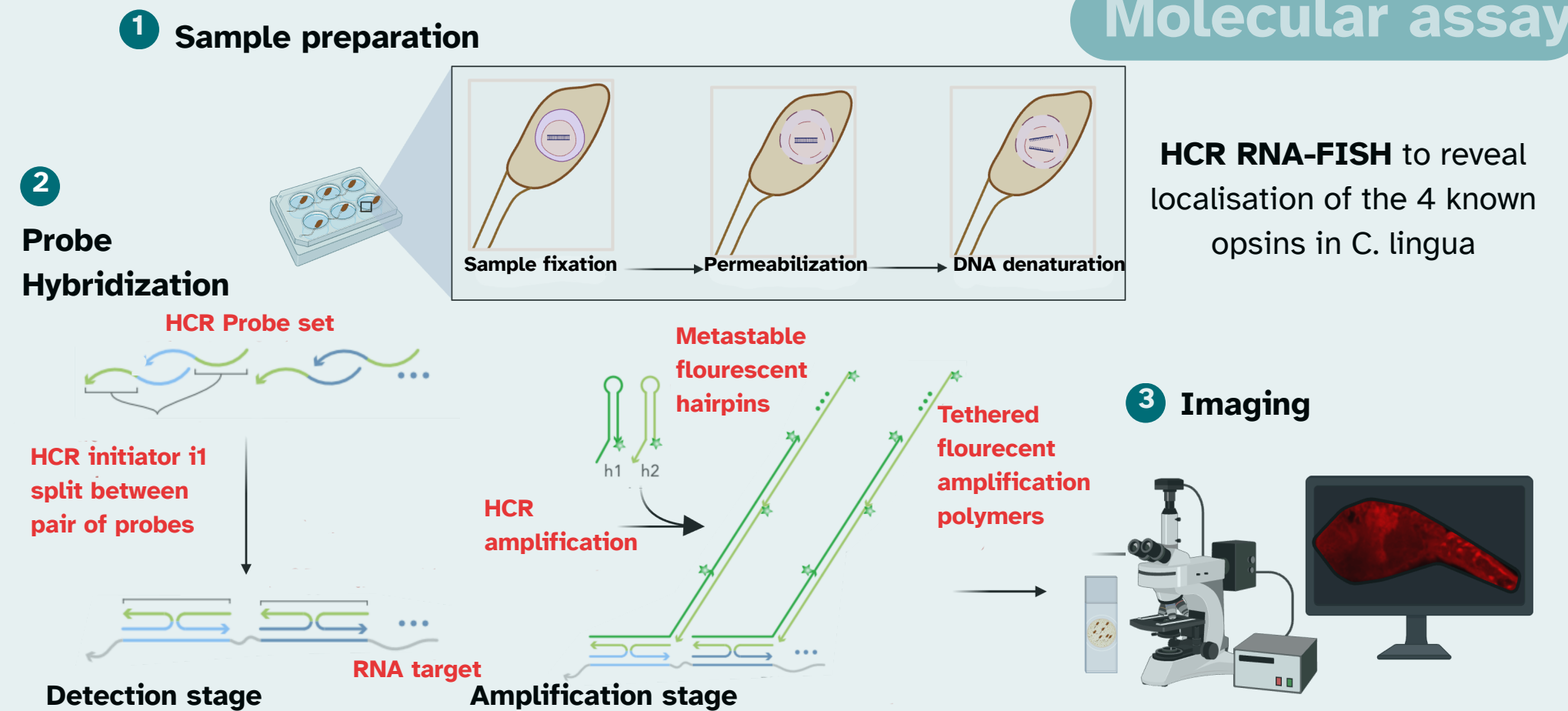
Rhabdomeric opsins (R-opsins) are light-sensitive GPCR-proteins. Photon with specific wavelength induces a conformational change (11-cis to all-trans retinal), which activates an intracellular **G-protein signaling cascade** (Gαq/PLCβ) and generate electrical signal (depolarization) via TRP-channel opening

Behavioral assay



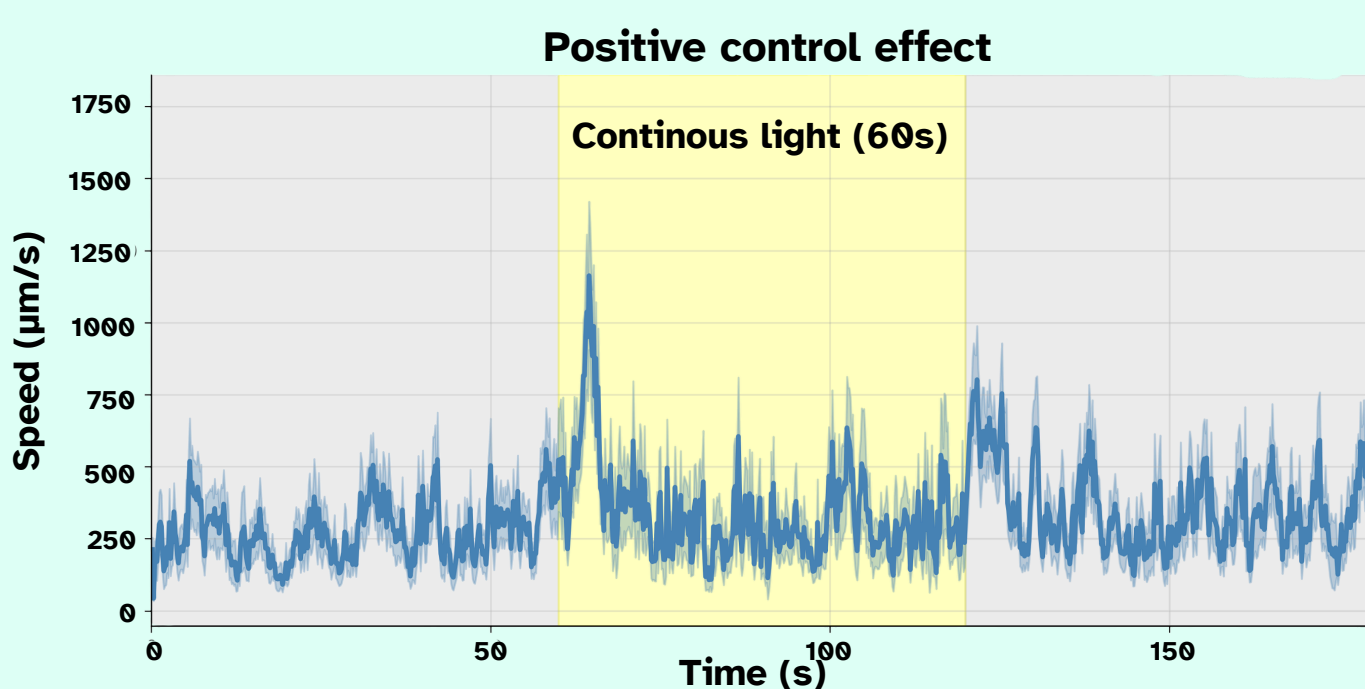
The parasites emerge from infected **snails** by light exposure and then placed inside a **light-controlled recording chamber**. Behavioural activity was recorded for 5 min using an alternating light/dark protocol, with **white, red, blue and green** light. Videos were analysed using **DeepLabCut** to track and estimate parasite movement.

Molecular assay



HCR RNA-FISH to reveal localisation of the 4 known opsins in *C. lingua*

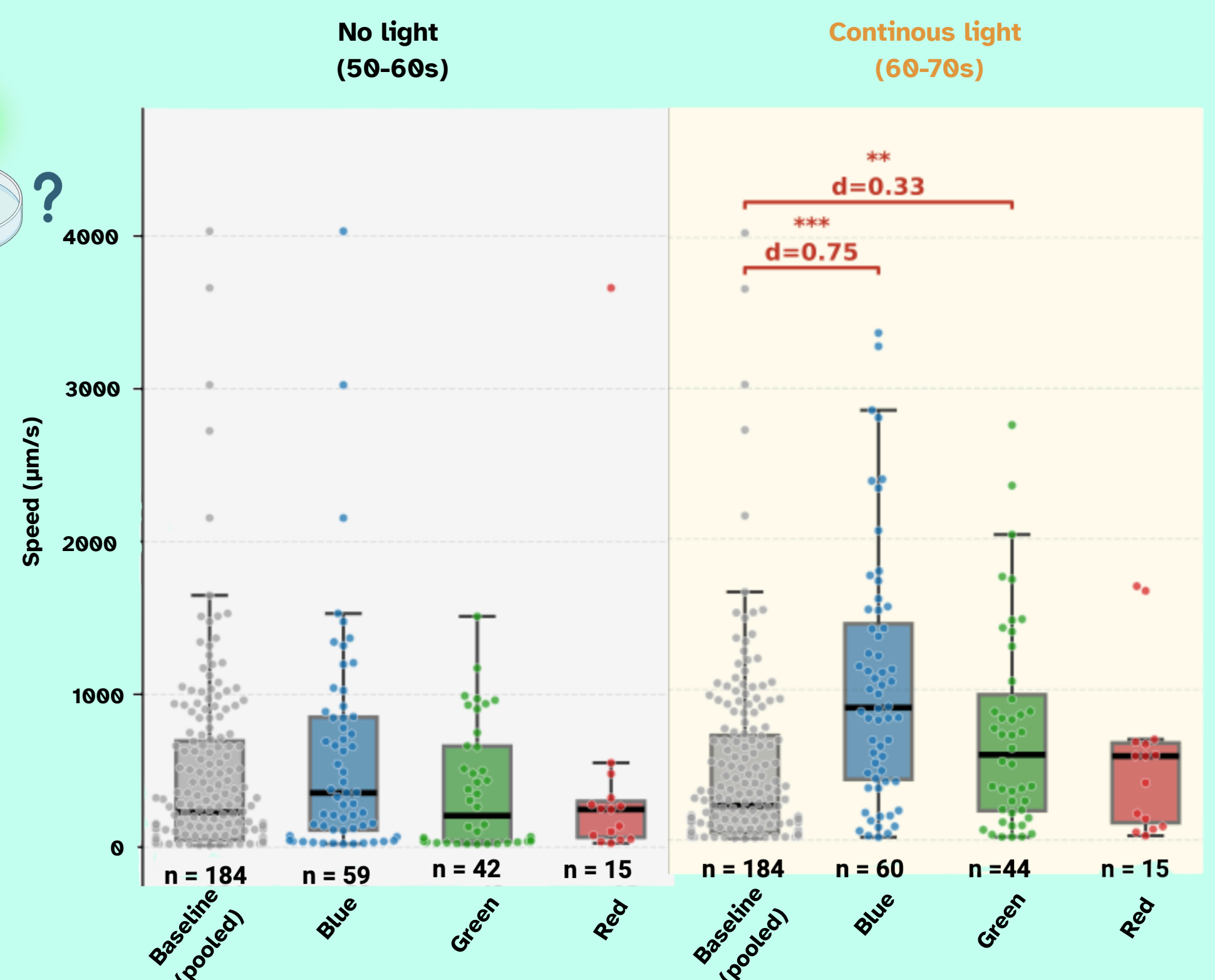
Sensitive to light



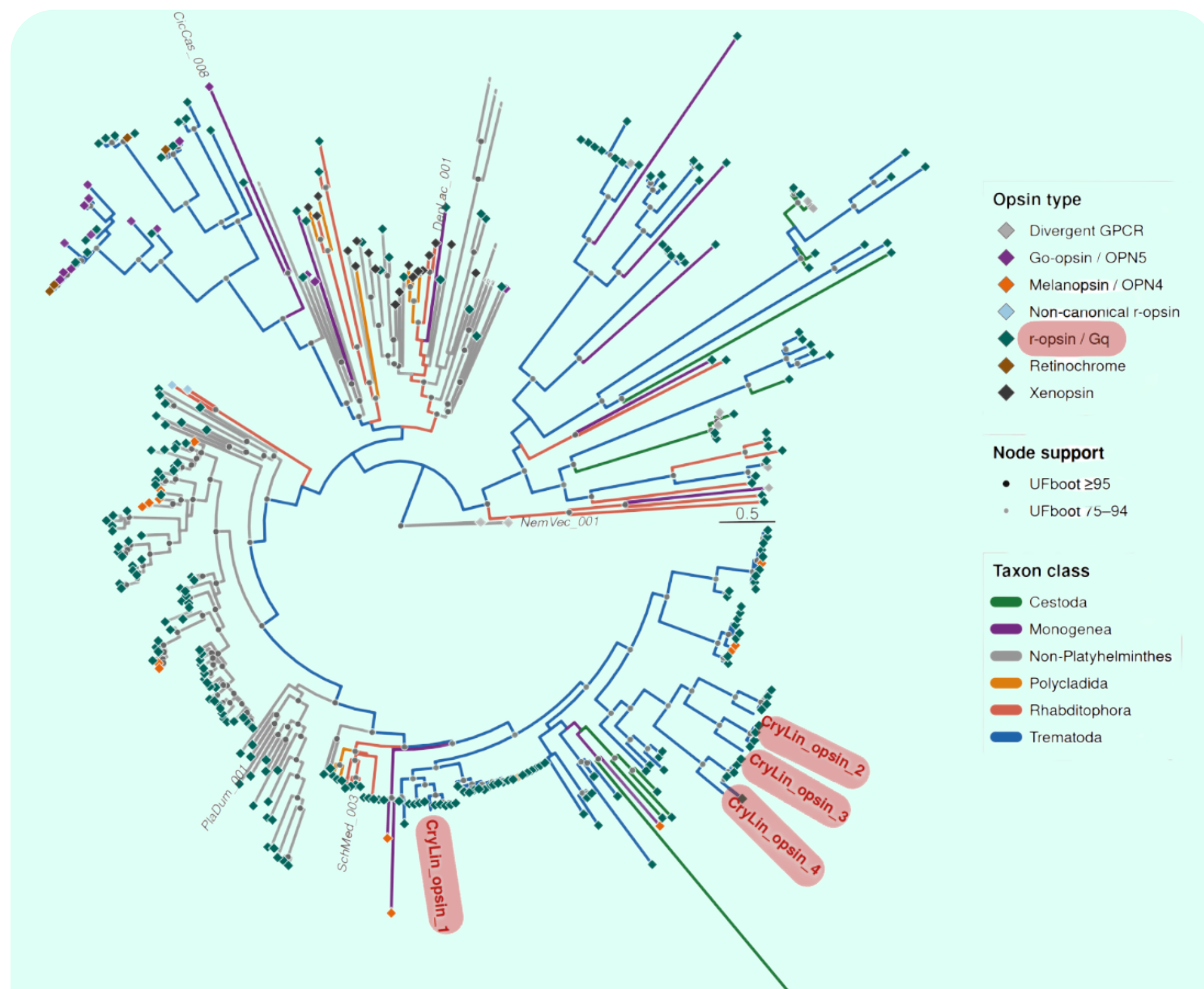
Swimming **speed** increases during white light exposure (yellow), demonstrating **light sensitivity**, more specifically an **ON response**



Blue light induces the strongest behavioural response

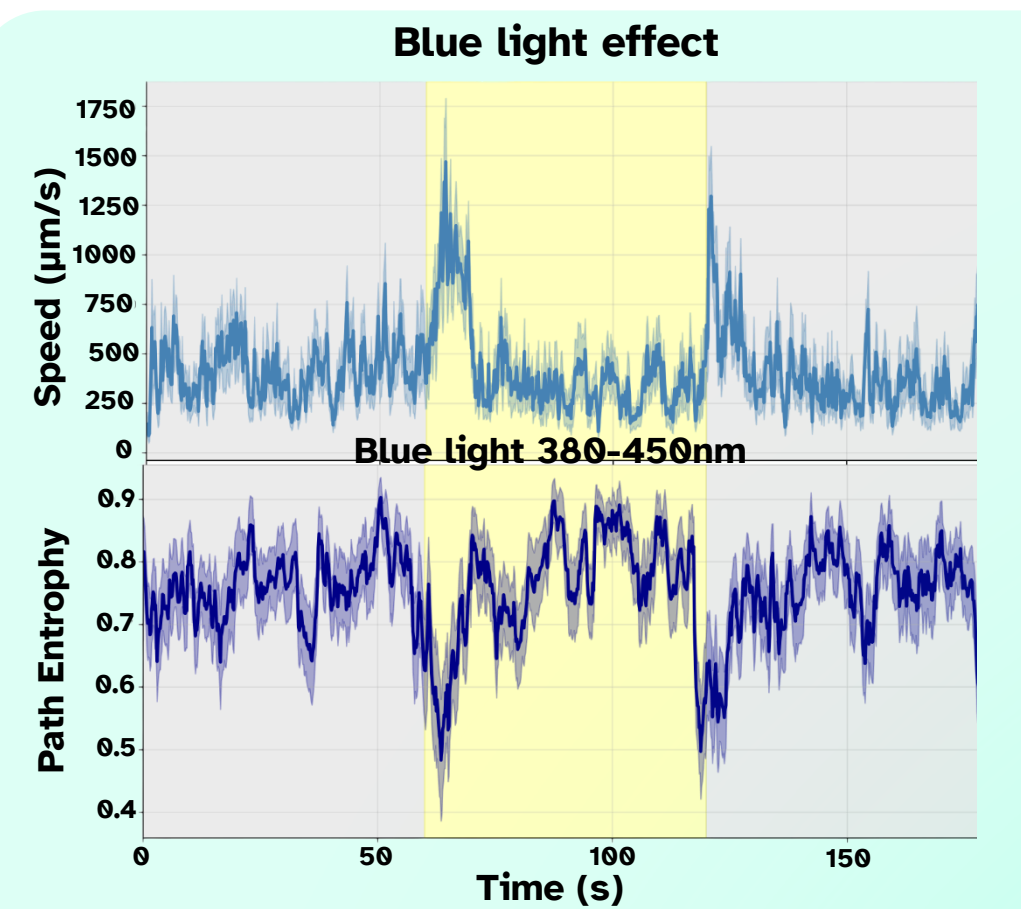


Trematodes possess only rhabdomeric opsins

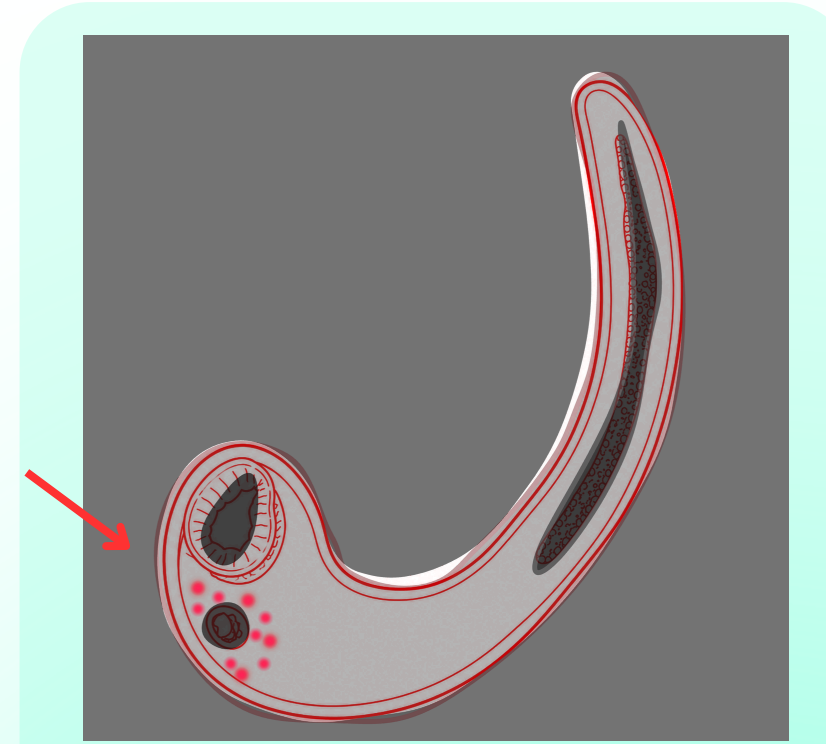


Phylogenetic analysis shows that *Cryptocotyle lingua* possesses 4 homologous **rhabdomeric opsins** (r-opsins), consistent with other trematodes. Making them more sensitive to blue light.

Localized around the eyes



Blue light elicits the biggest increase in **swimming speed** and **directional movement**



R-opsin **expression** is localised around the pigmented **eyespots**

- *C. lingua* expresses **only rhabdomeric opsins**, conserved across trematodes
- Opsins are **localised around the eyes**, forming a **functional photoreceptive system**
- **Blue light** triggers the strongest and most **directed swimming behaviour**
- The **behaviour response** likely exploits the reach of **blue light in water** to increase encounter rate with fish hosts, an **adaptive host-seeking strategy**

CONCLUSIONS

REFERENCES

1. Rea & Irwin (1992) Parasitology 105:295-306.
2. Tolstenkov et al. (2023) Commun. Biol. 6:1279. <https://doi.org/10.1038/s42003-023-05675-4>
3. Molecular Instruments. (2021). HCR RNA-FISH Generic Slide Protocol (Rev. 7). Retrieved from [Molecular Instruments.protocol.PDF](#)

