

# of *Cardiocephaloides longicollis* cercariae to infect its fish host

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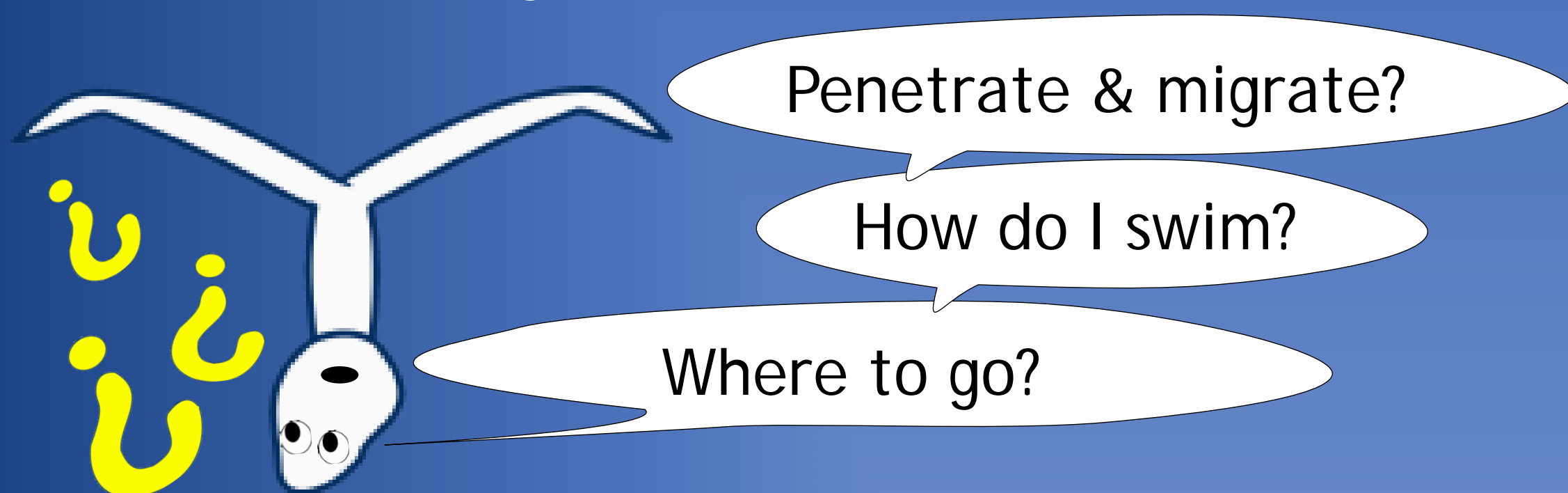
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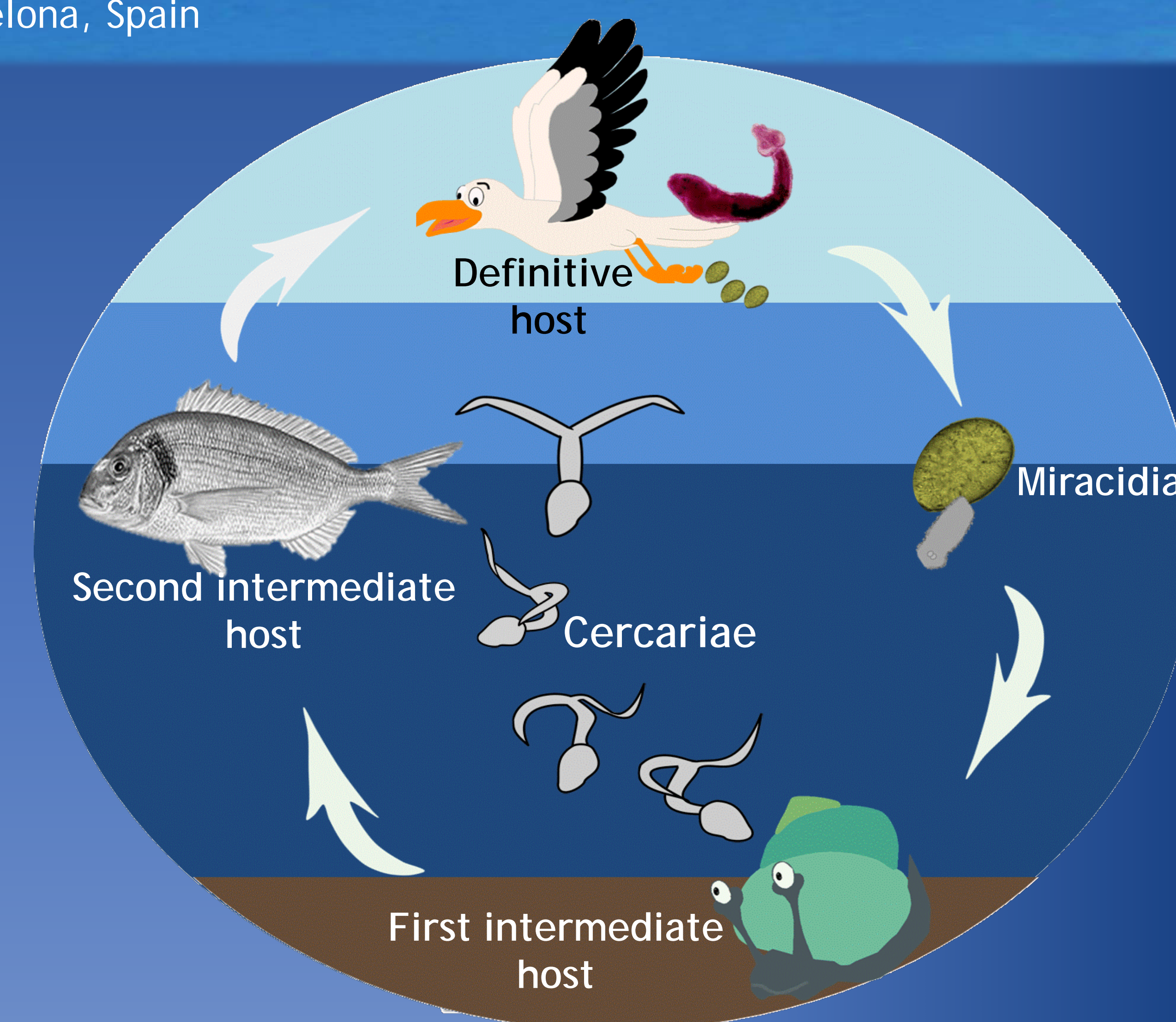
## INTRODUCTION

**Transmission** and **infection strategies** are crucial to complete trematode life cycles, especially in aquatic habitats. **Cercariae**, free-swimming larval stages, are at the mercy of environmental conditions during their short life span. To better understand the behaviour and locomotion of cercariae, we studied the strigeid *Cardiocephaloides longicollis* (Rudolphi, 1819) Dubois, 1982. These cercariae are released into the seawater, where they **swim**, **locate** and **penetrate** the skin of fish hosts, **migrating** and **encysting** in the brain as metacercariae before they are consumed by the definitive host, gulls.



## AIMS AND OBJECTIVES

In this study we analyze the behaviour of *Cardiocephaloides longicollis* cercariae after being released into the water, where they swim, locate, penetrate and migrate in the fish hosts.



Modified from: Born-Torrijos et al. (2016) IJP, 46: 745-753, and van Beest and Born-Torrijos (2020) Front. Young Minds

## MATERIALS AND METHODS

**Freshly-emerged cercariae** were collected from a pool of six infected snails and were used in different assays (A, B, C)



### A. Swimming cercariae locomotion

16 cercariae:  
-placed in the water column (7mL)  
-each one recorded with a video camera under the stereomicroscope for 300 seconds

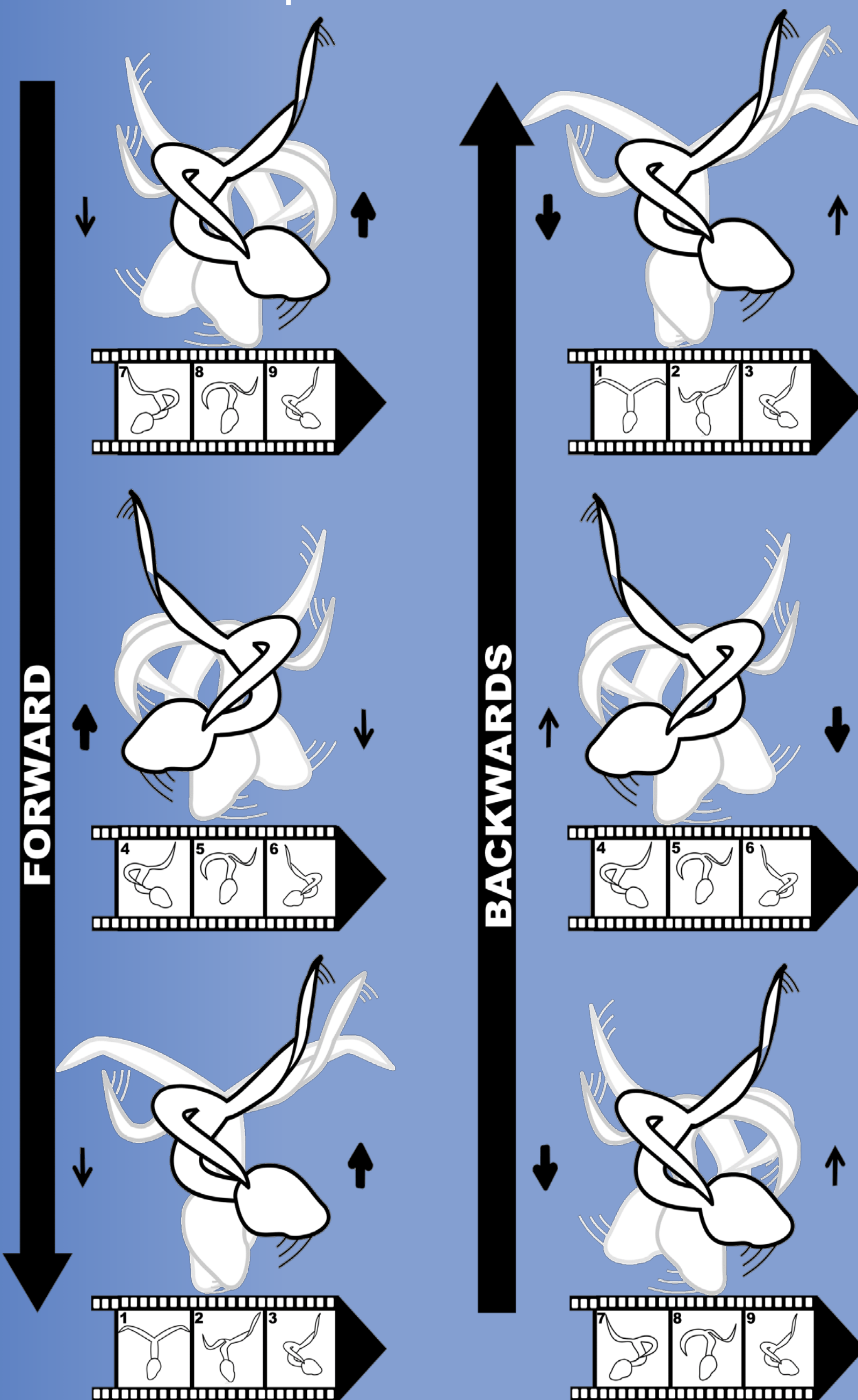
#### Observations of 80 min video

It shows 6 different behaviours:

1. Resting position
2. Swimming backward
3. Swimming forward
4. Rotation
5. Swimming in motion
6. Swimming in place

80% resting position  
20% swimming

**Swimming direction:**  
established by the force applied in the movement (bold arrows)



### B. Cercariae locomotion within host



**Infection**  
100 cercariae  
1 h 30 min

**Histological analysis**  
Fish samples sequentially obtained at different time points post-infection

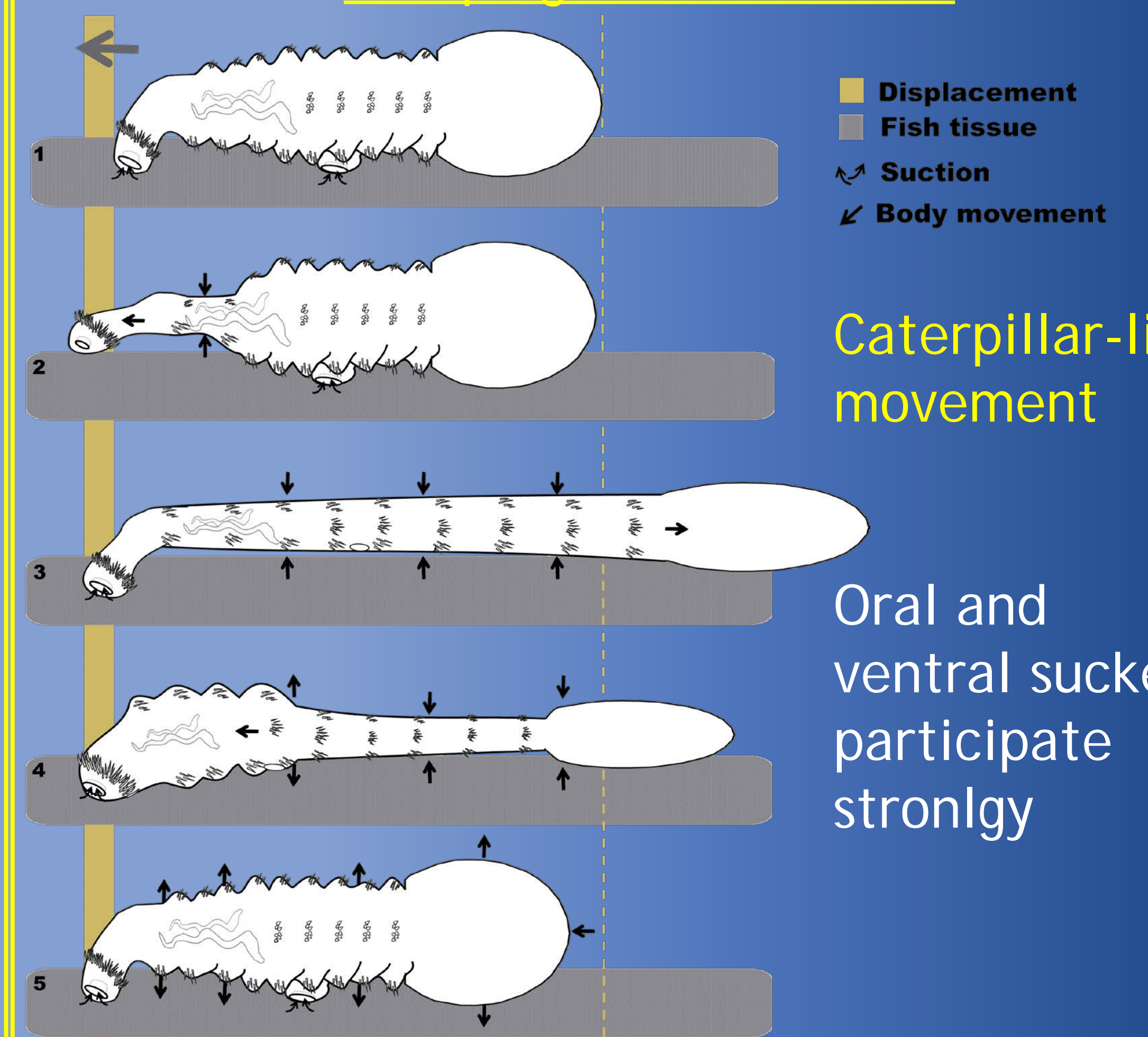


- 1) Parasite move in **connective tissues** of the fish.
- 2) **NO relevant tissue damage** or host reaction was detected in fish tissues during cercariae migration

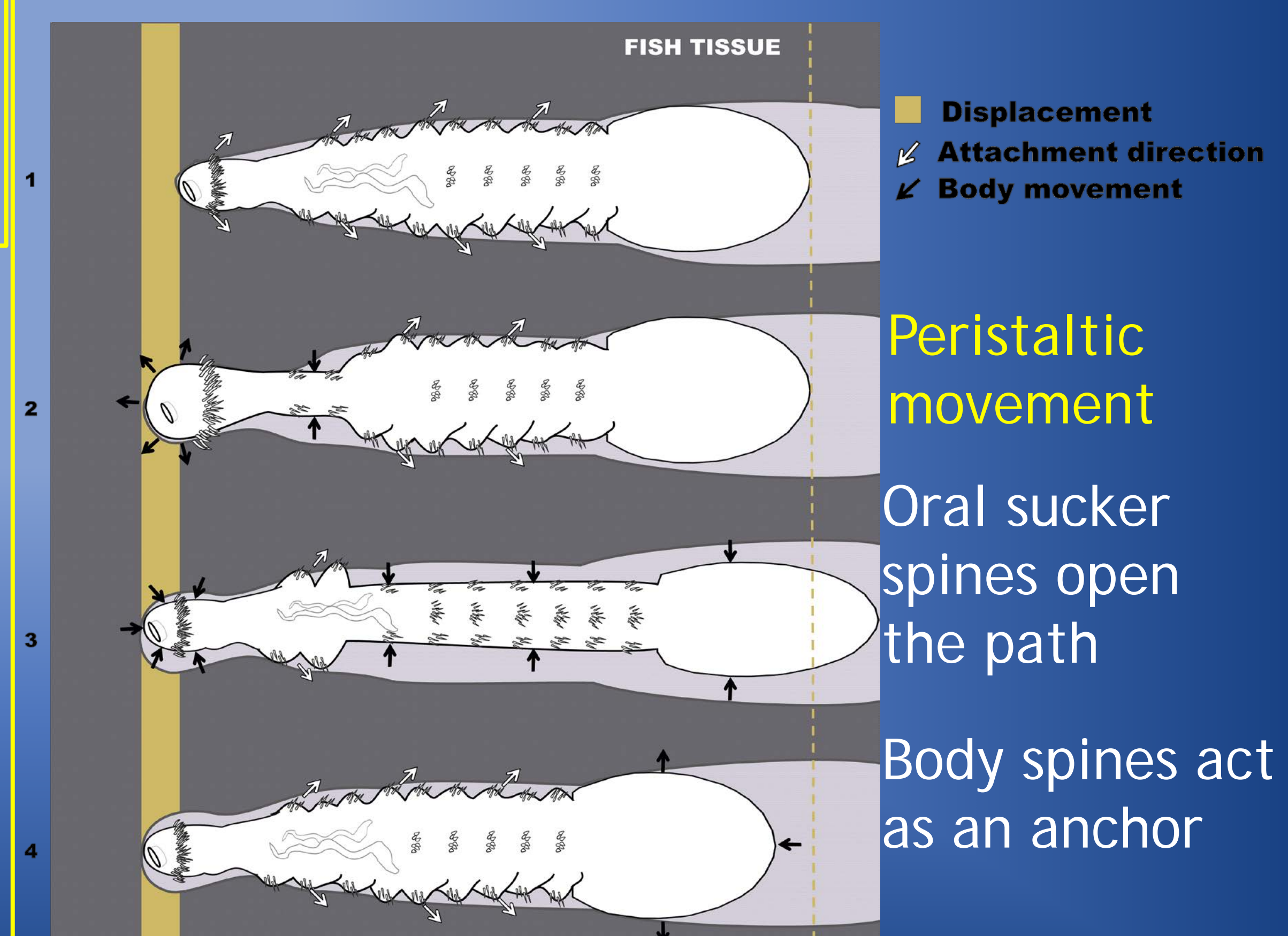
### C. Cercariae locomotion after host encounter

neutral red dye  
30% succesful attachment on fish surface

#### Creeping on fish surface



#### Burrowing inside fish



## DISCUSSION & CONCLUSIONS

Our results suggest that *C. longicollis* cercariae show strategies that help to find the fish host environment by their efficient swimming strategy, integrating a variety of behaviours that allow the successful transmission of larval stages.

The response strategy to host proximity seems less specific, even though, the penetration spot into the fish has been previously observed that is very specific.

Once the cercariae are attached, they use the caterpillar-like movement to reach the entry spot quickly. However, once they penetrate the fish, they show a slow peristaltic movement.