

# Master's thesis

PRIP & Max F. Perutz Laboratories GmbH

## 2D tracking of *Platynereis dumerilii* worms during spawning

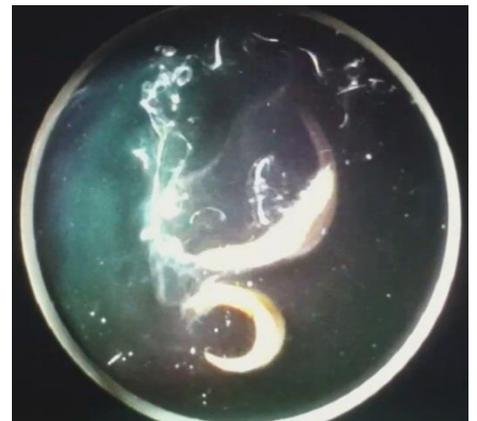
**Background infos:** The marine annelid *Platynereis dumerilii* reproduces by external fertilisation and is semelparous, meaning that it spawns only once in its lifecycle. To maximise reproductive success these worms synchronise their spawning events with the lunar cycle and spawn primarily during new moon (Zantke et al., Cell Reports, 2013). In addition, *P. dumerilii* exhibit particular swimming behaviours during spawning, which are collectively described as a 'nuptial dance'. The nuptial dance is initiated by excreted pheromones, stimulating male and female worms to swim in circles around one another and finally release sperm and eggs into the water.

**Motivation:** We hypothesise that characteristic male and female spawning behaviours are required for successful spawning and fertilisation. To address this hypothesis we want to establish a quantitative video-based assay to analyse spawning behaviours in *Platynereis dumerilii*. Our primary aims are to characterise and compare male and female spawning behaviours. Ultimately we want to understand how these sexual behaviours are controlled at the genetic, hormonal and neuronal levels.

**Aim of thesis:** Develop methods that enable 2D tracking of spawning worms from captured video and extract data to quantify specified behaviours (e.g. circling radius, swim speed and velocity etc.).

### Specific goals would be:

- Designing camera setup for capturing spawning videos
- Segmentation of worms
- Tracking of worms
- Extraction of trajectory of each worm
- Relationships between trajectories
- Defining specific behaviours, behavioural sequences, and quantitative parameters for data extraction together with Max F. Perutz Laboratories
- Extraction of qualitative and quantitative behavioural data from spawning
- Comparison of male and female spawning behaviours with regard to their motion and behavioural parameters



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