



# Chemical pollution affects the behaviour of mosquito larvae

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## INTRODUCTION

TWO SOURCES OF ANTHROPOGENIC POLLUTION

Acute pollution  
Rain water | Atmosphere

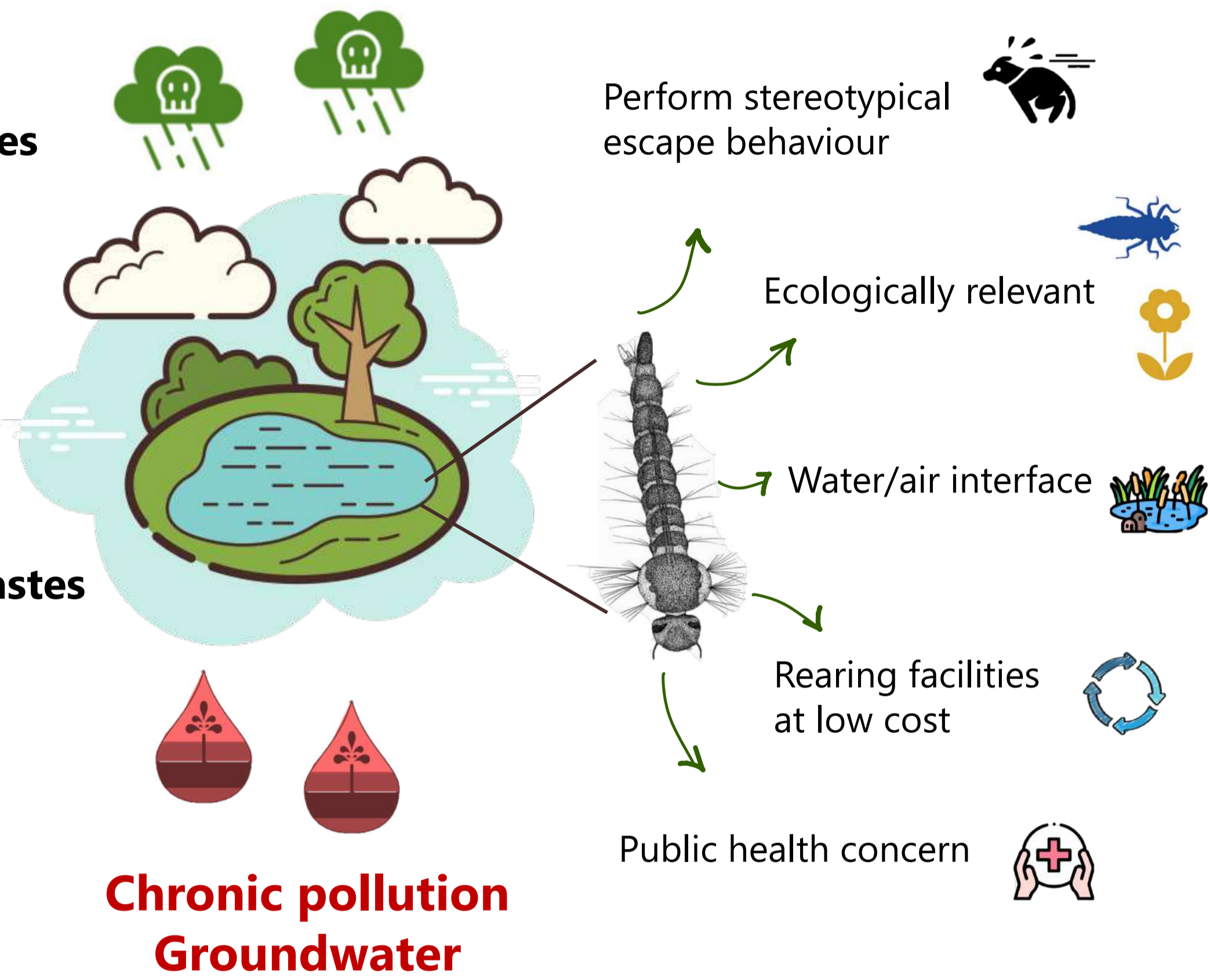
MOSQUITO LARVAE AS A BIOLOGICAL INDICATOR

Domestic & industrial wastes

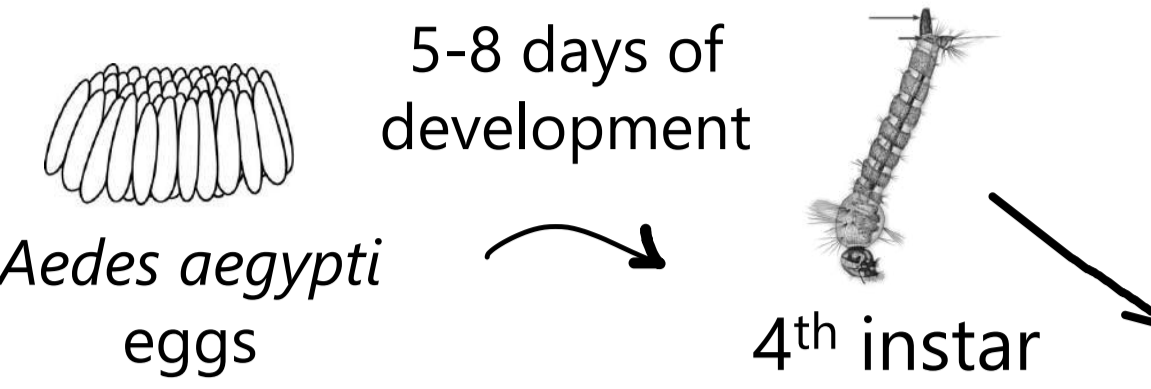
- Medicine drugs
- Detergent
- Heavy metals

Agricultural run-off and wastes

- Pesticides residuals
- Herbicides residuals
- Fertilisers



## 1) MOSQUITO REARING

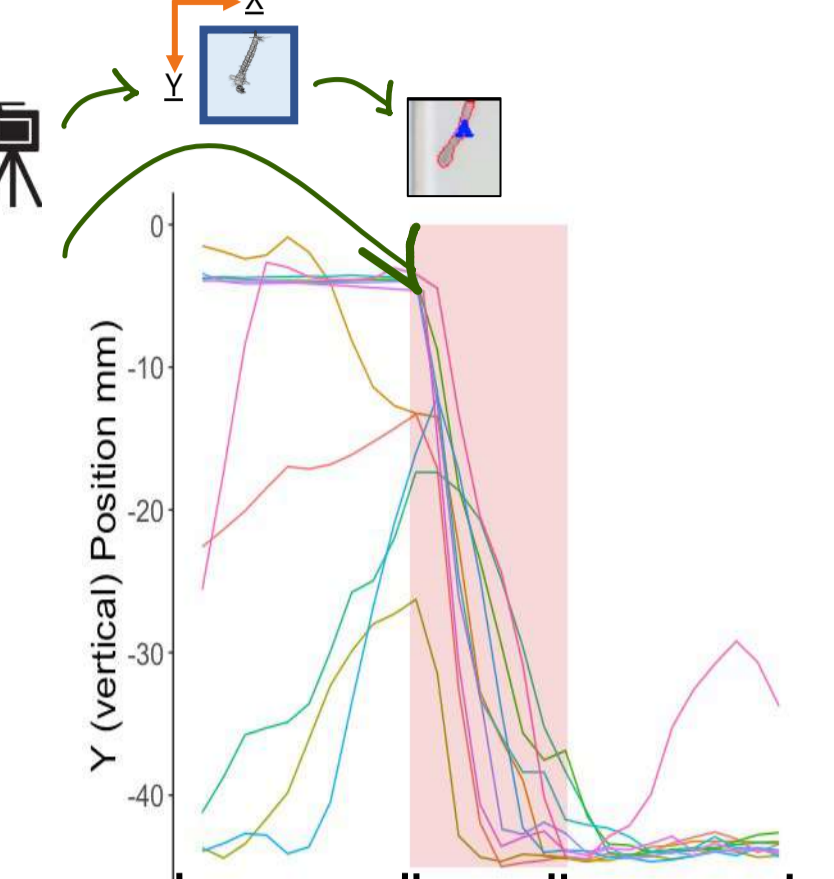


## METHODS

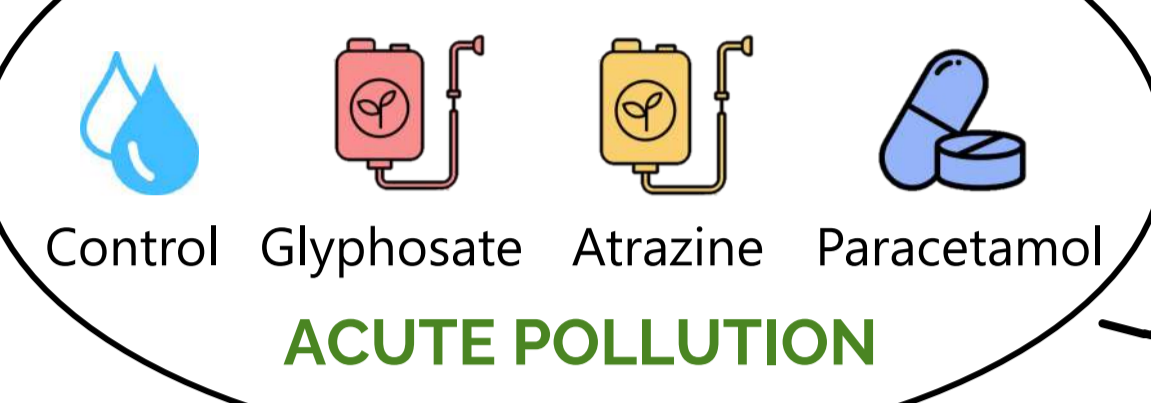
### 2) AUTOMATIC DEVICE



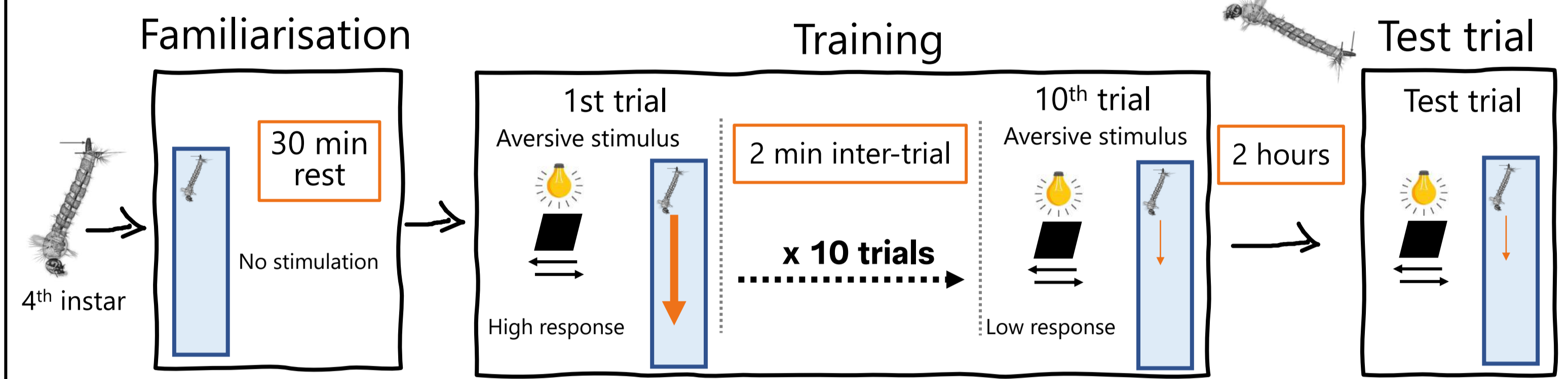
### 3) DATA EXTRACTION



### CHRONIC POLLUTION



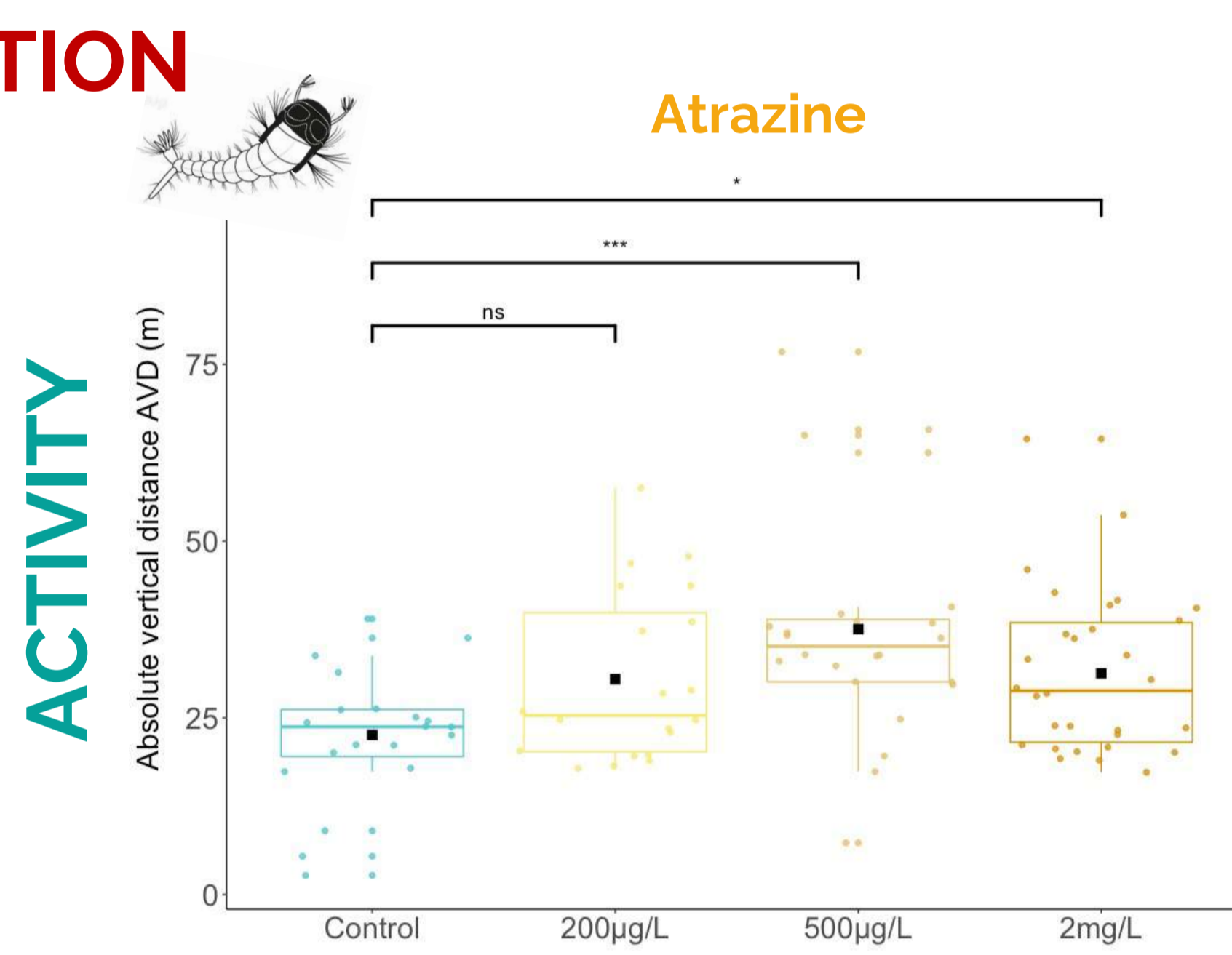
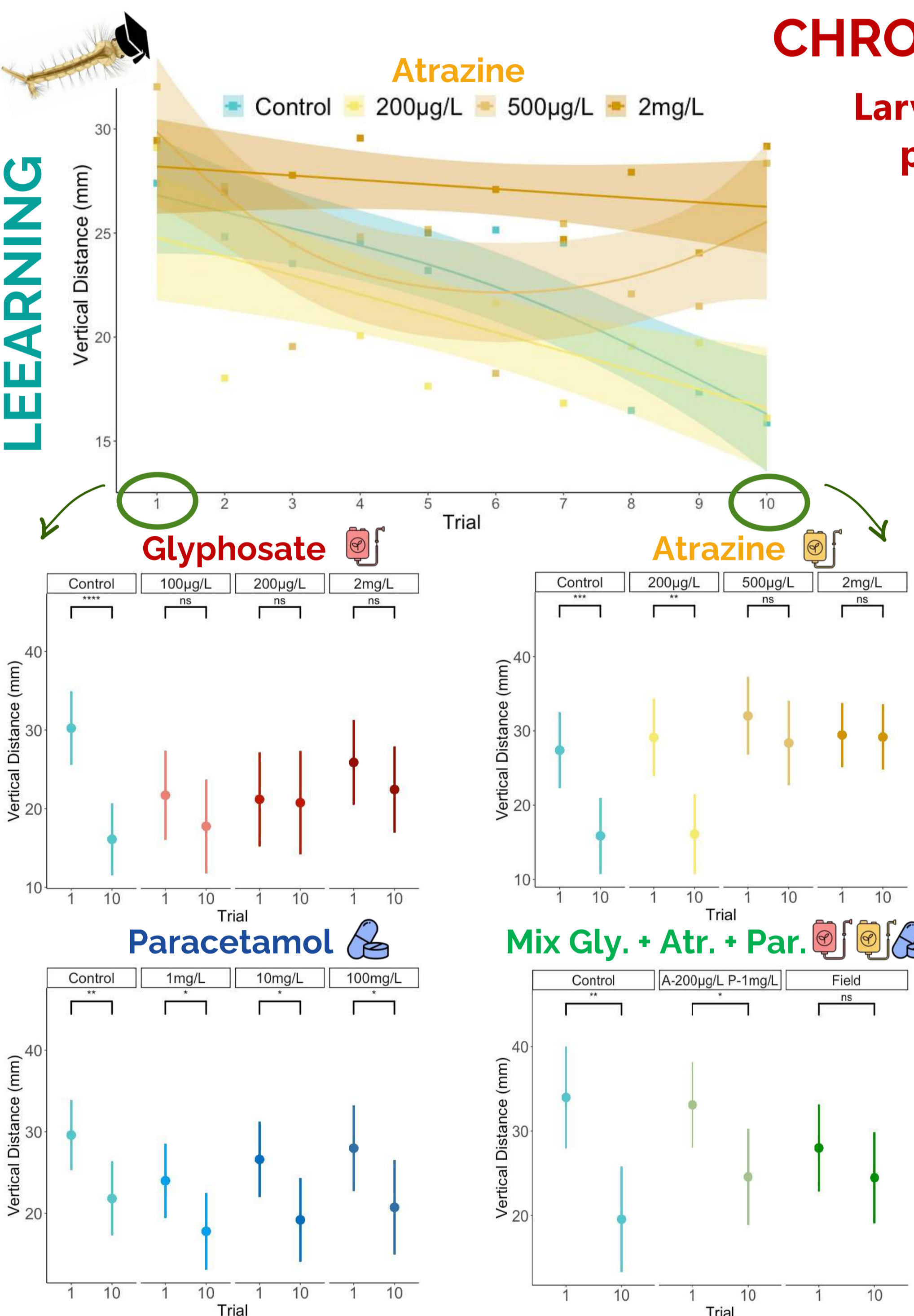
## EXPERIMENTAL DESIGN



## HOW ACUTE AND CHRONIC POLLUTION AFFECT MOSQUITO LARVAE LEARNING & MEMORY ABILITIES ?

### CHRONIC POLLUTION

Larvae are reared in polluted water

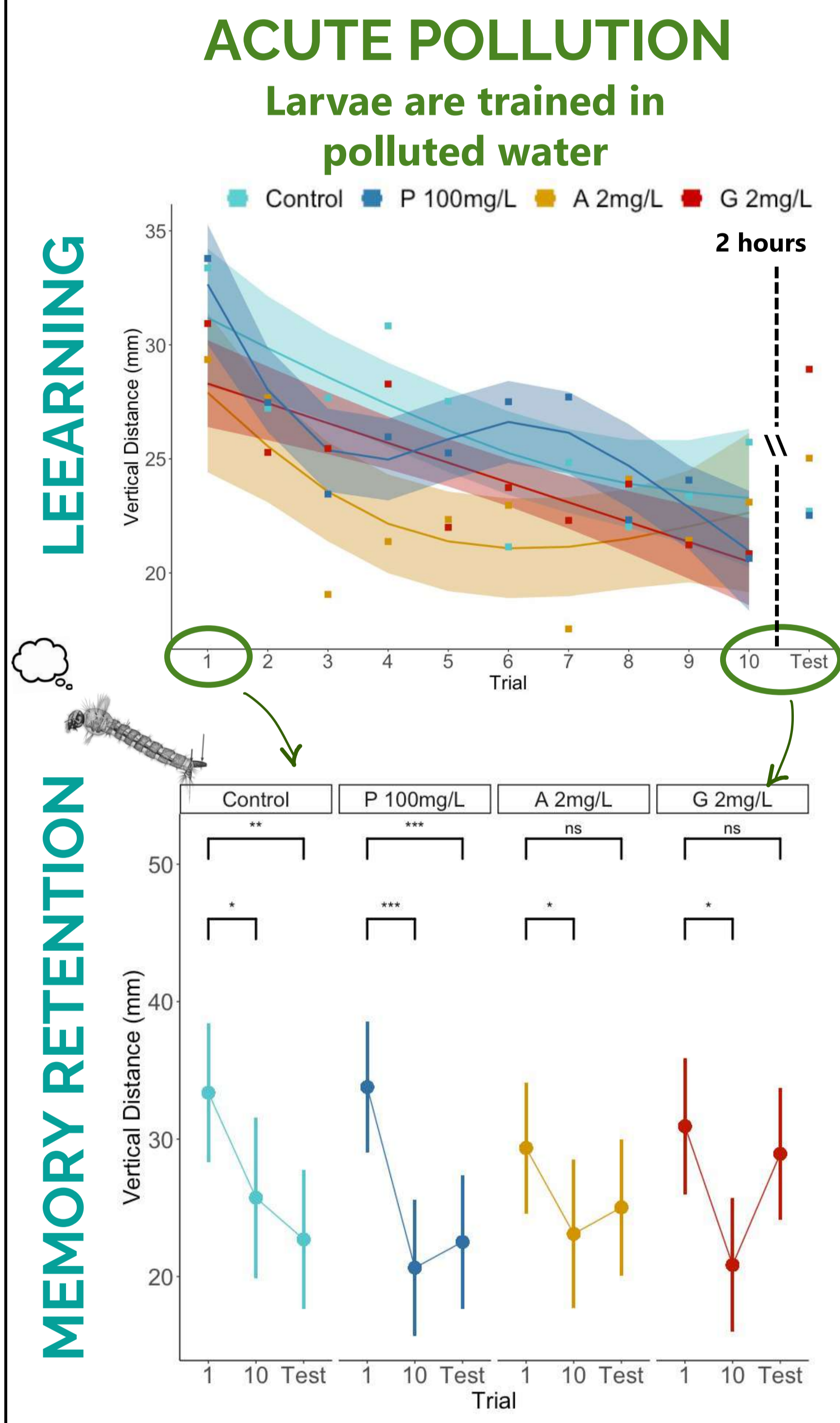


### SUMMARY

	Learning assessment	Distance travelled (m)	Average speed (mm/min)	Maximum speed (mm/min)	Time spent moving (%)	Number of diving event (%)
100 µg/L	No learning	x	x	x	x	x
200 µg/L	No learning	x	x	x	x	x
2 mg/L	No learning	x	x	x	x	x
200 µg/L	OK	x	↗	x	x	↗
500 µg/L	No learning	↗	↗	↗	↗	↗
2 mg/L	No learning	↗	↗	↗	↗	↗
1 mg/L	OK	x	x	x	x	x
10 mg/L	OK	x	x	x	x	x
100 mg/L	OK	x	x	x	x	x
0.126 µg/L	No learning	x	x	x	x	↗
2.3 µg/L	No learning	x	x	x	x	↗
6 µg/L	No learning	x	x	x	x	↗
1 mg/L	OK	x	x	x	x	x
200 µg/L	OK	x	x	x	x	x

### ACUTE POLLUTION

Larvae are trained in polluted water



## DISCUSSION

**Glyphosate** impaired learning at residual dose (<100 µg/L) and memory retention at spray dose (2 mg/L)

**Atrazine** impaired learning at residual dose (<200 µg/L), slightly altered memory retention at spray dose (2 mg/L) and highly increased individual activity

**Paracetamol** alone had no effect on larvae learning and memory abilities

In cocktail, low doses of the three chemicals (Gly. 0.126 µg/L, Atr. 2.3 µg/L, Par. 6µg/L) impaired mosquito learning abilities

The understanding of the neurotoxic impact of common chemicals is still very limited

High-throughput variables and automatic bioassays represent a sensitive and objective tool to quantify insect behaviour

The results suggest that we could use mosquito larvae as a biological indicator to evaluate the quality of aquatic environments submitted to anthropic influence

→ Consistent with literature on other organisms

→ First study showing that atrazine affects learning and memory in an insect

→ First study assessing synergistic effect on learning in an insect

Compare different mosquito species

Analyse the effect of endocrine disruptors

Compare field and laboratory reared individuals

Study mechanisms underlying learning & memory

Combine pollutants to evaluate synergistic effect