

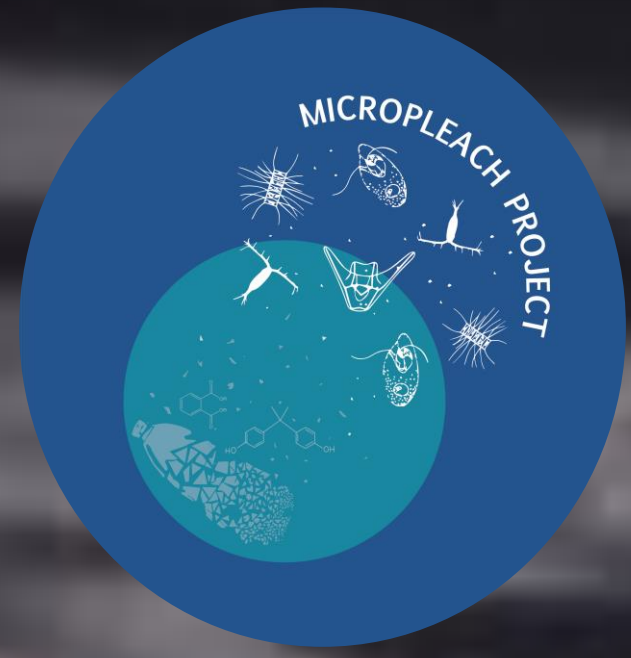
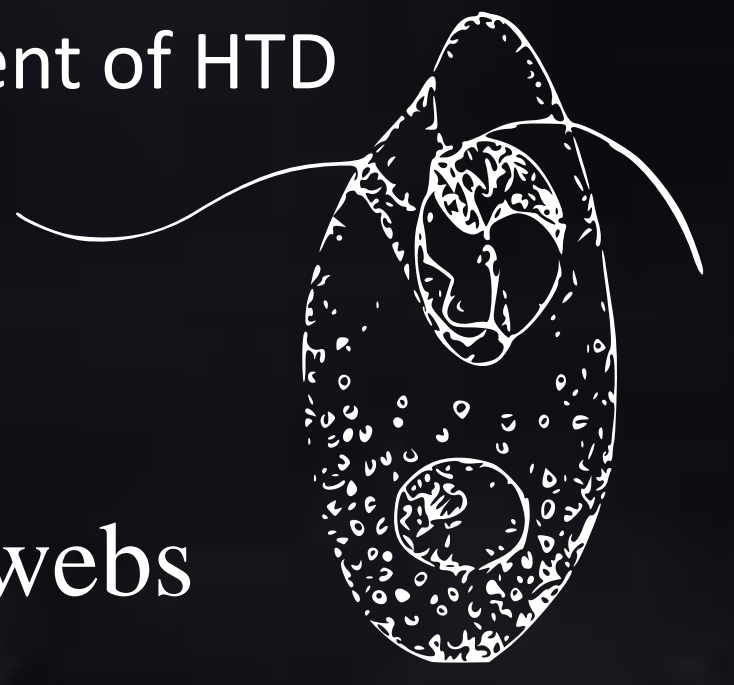
GROWTH RESPONSE OF THE MARINE HETEROTROPHIC DINOFLAGELLATE, *OXYRRHIS MARINA*, EXPOSED TO BIODEGRADABLE PLASTIC BAG LEACHATES.

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Oxyrrhis marina, a represent of HTD



BACKGROUND:

- Environmental safety of leached plastic additives is debated
- Biodegradable plastic alternatives might not be safer
- **Heterotrophic dinoflagellates (HTD)** play key roles in marine food webs
- Impact of **plastic leachates** on HTD is unknown.

OUR STUDY:

- Exposure of *Oxyrrhis marina* (HTD model) to leachates of micronized plastic bag.
- Evaluation of the impact of **leached additives** on growth and size

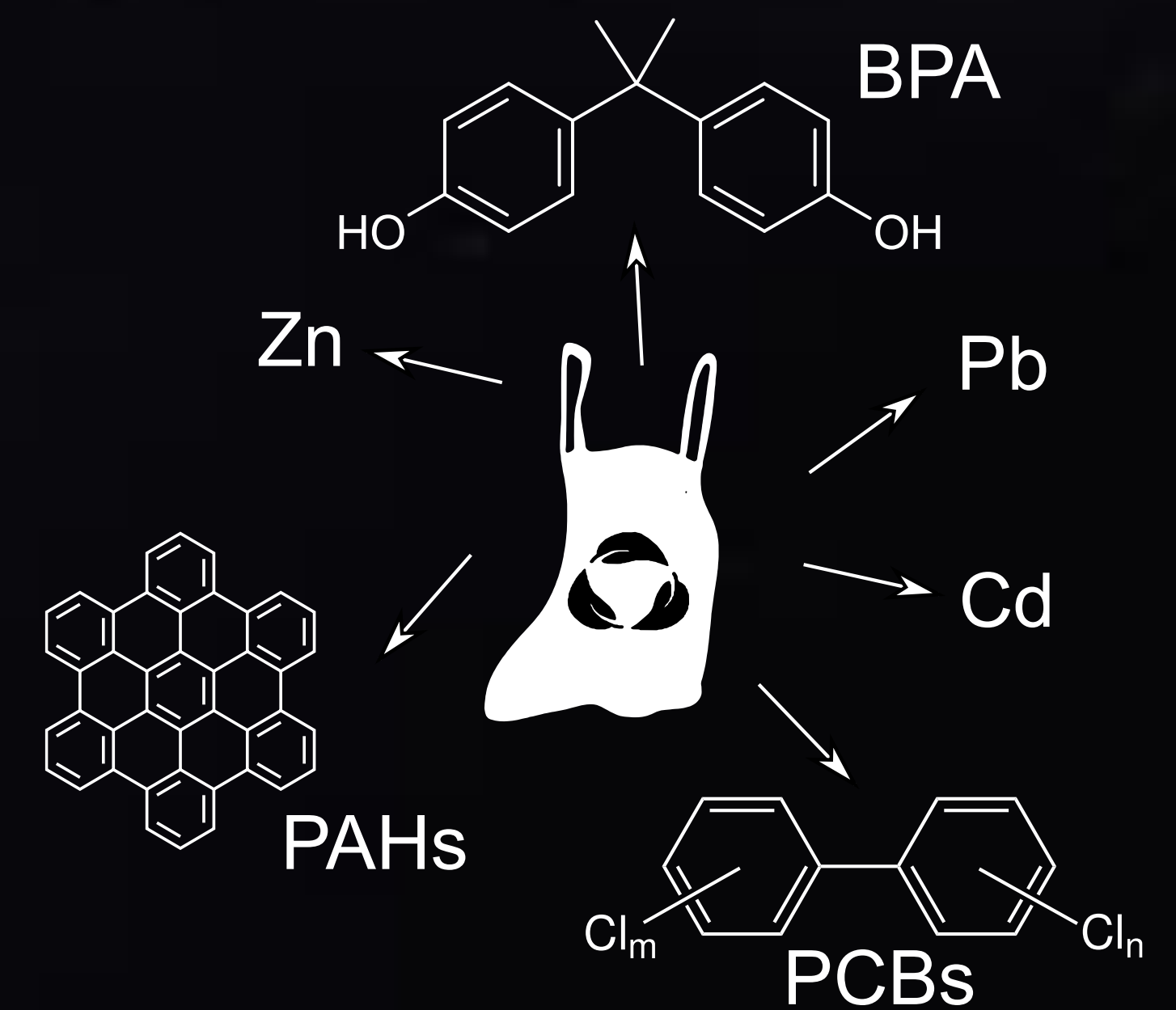
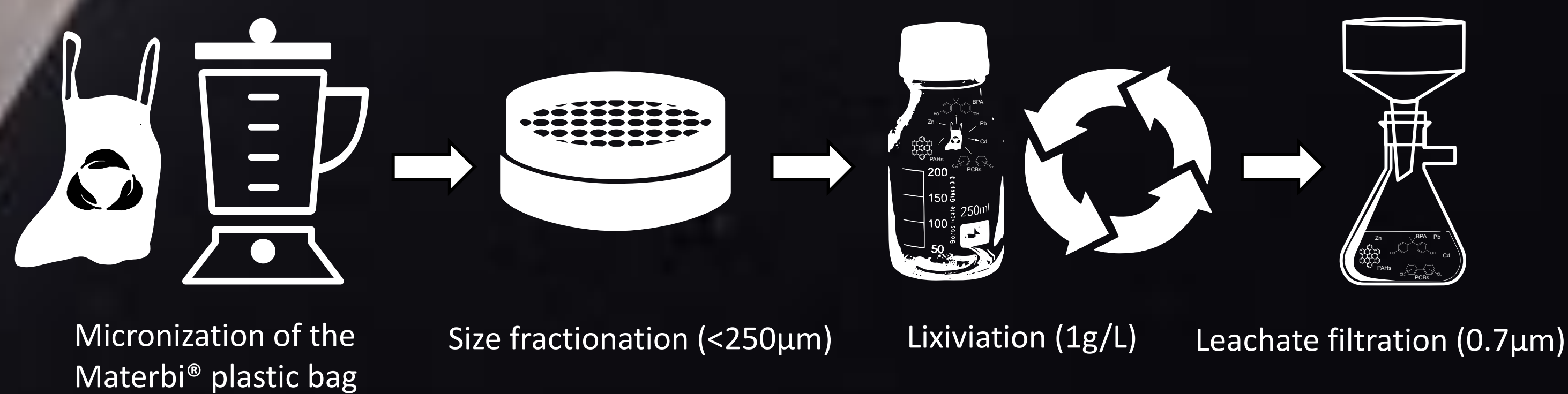


Illustration of potential leaching additives from common plastics

MATERIALS AND METHODS:

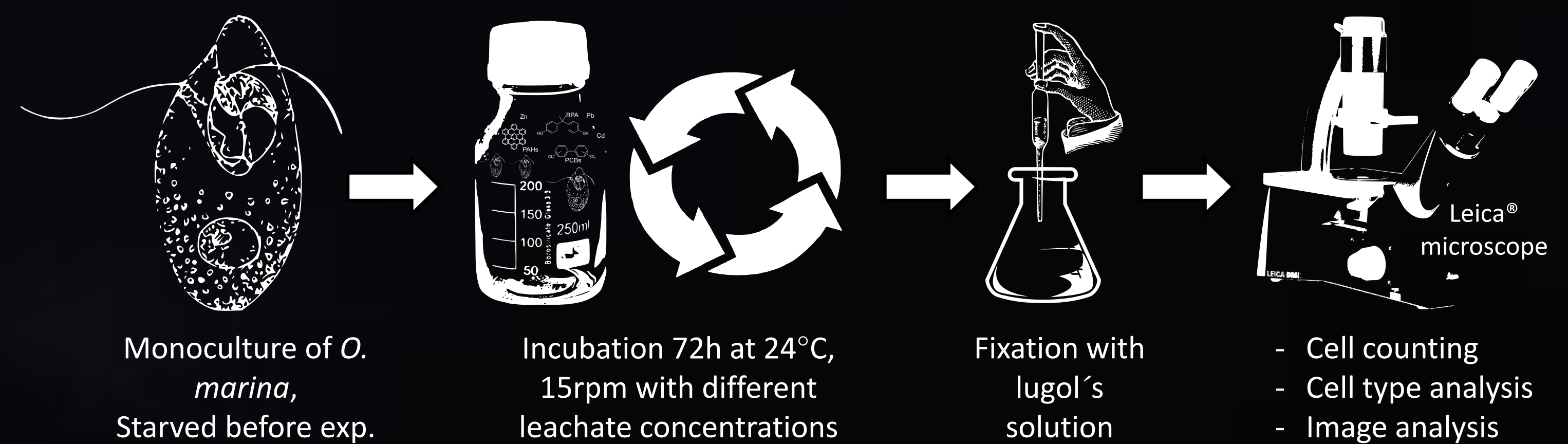


Leachate preparation (on the left):

- Only the size fraction **under 250µm** was used
- The protocol is made for improving constancy of additives extraction

Toxicity assay (on the right):

- Monoculture of *O. marina* is exposed to the leachate in glass bottles
- Cells are then fixated and analyzed microscopically



RESULTS AND DISCUSSION:

- The **growth** of *O. marina* has been **significantly increased** with the **pure leachate** (see figure 1; $p < 0.05$).
- **No change in the cellular volume** (see figure 2).

→ A **total increase** in *O. marina*'s biomass can be observed **in response** to the **leachate** of TWP.

→ From plastic leachate, cells have found **direct carbon sources** (e.g. starch or cellulose acetate) or **indirect sources** (e.g. bacteria).

→ **Dissolved organic matter** and **bacteria concentration** will be analyzed to identify the carbon source.

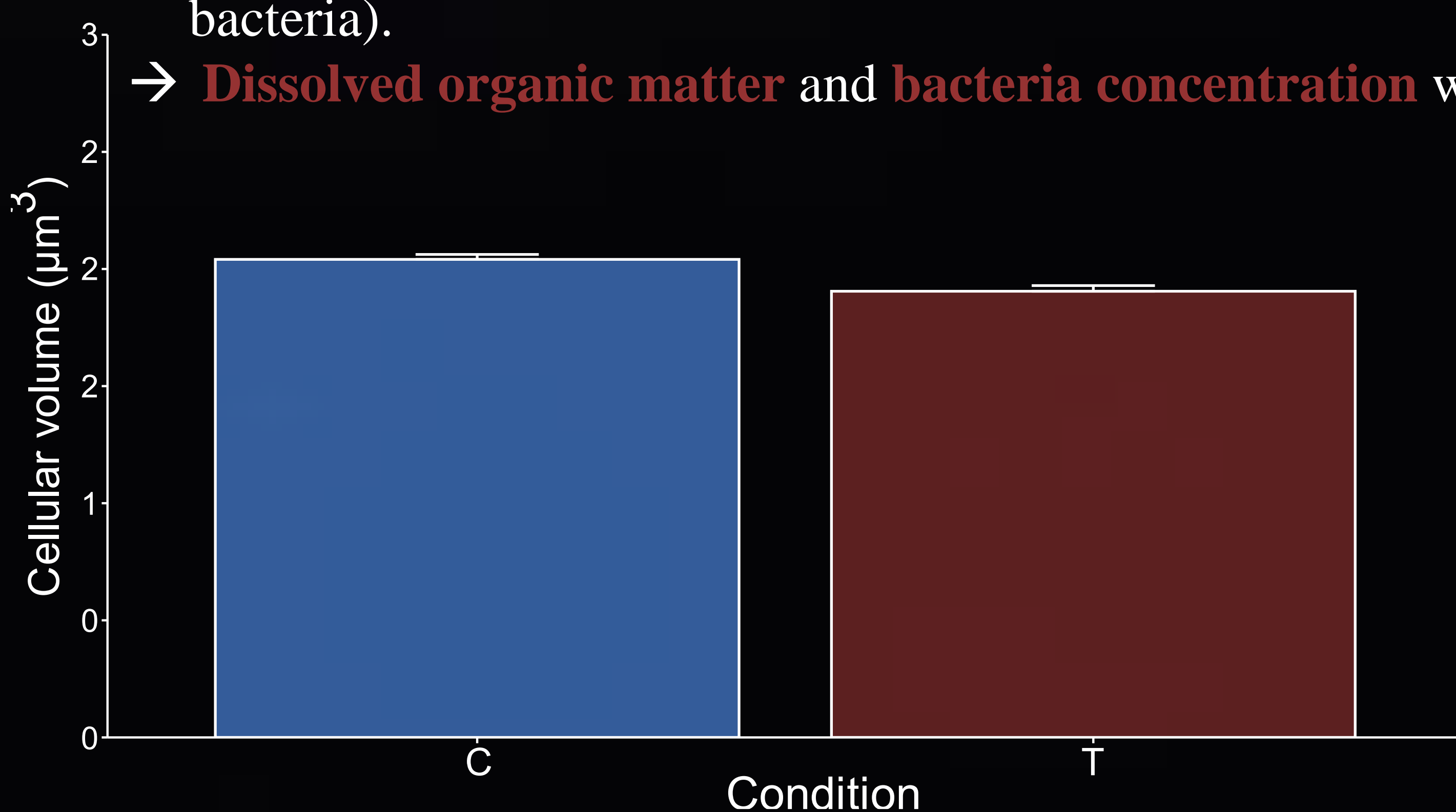


Figure 2: Mean cellular volume (µm³) of *Oxyrrhis marina* as a function of exposure conditions (absence, C, or presence of pure leachate, T. Standard errors are given at the top of each bar.

CONCLUSION:

- **No negative impact** of Materbi® plastic bag leachate was found at the concentration tested (i.e. 1g L⁻¹ of particles).
- **Increased growth** of *O. marina* due to Materbi® could induce, in the environment, a **perturbation of trophic equilibrium**.

The **toxicity** of **new alternatives** to plastics has to be **studied more thoroughly** as this study have shown that they might have **unexpected effects**, that associated with their toxicity observed in other organisms could **negatively impact aquatic ecosystems**.

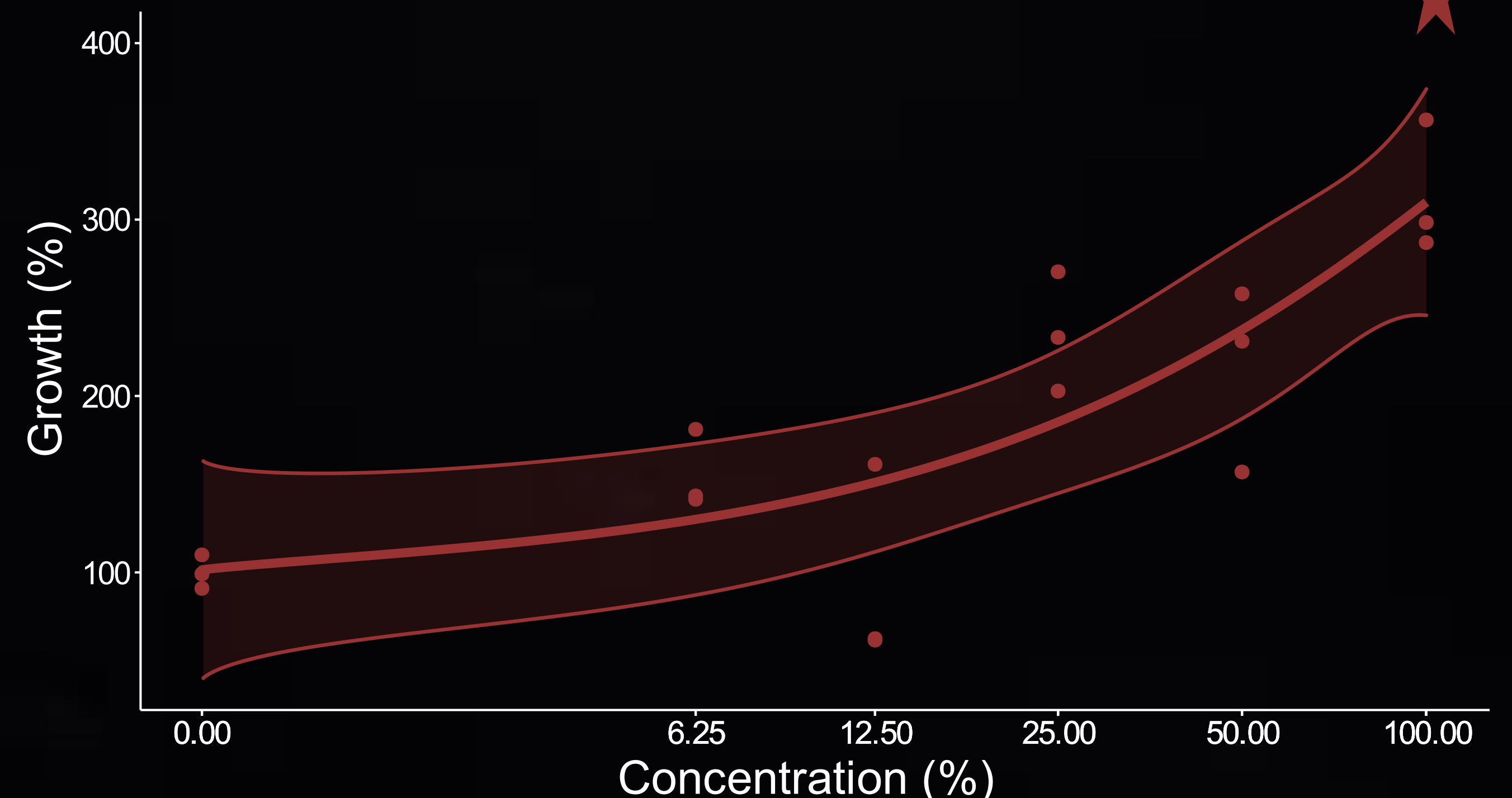


Figure 1: Growth of *Oxyrrhis marina* in function of leachate concentration. The dose-response curve has been modeled with a four-parameter log-logistic function (drc R package), the light grey area around the curve represents the 95% interval calculated with Delta's method. The P-value of the comparison of the means of each concentration is represented on the plot, statistically significant differences from the control (i.e. 0%) mean are indicated with "*" ($p < 0.05$).