

Impact of Methylparaben on *Stenotrophomonas maltophilia* Biofilm Architecture and Tolerance in Chlorinated Aquatic Environments

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INTRODUCTION & AIM

- ✓ **Parabens**, as emerging environmental contaminants, raise significant concerns due to their potential to **disrupt microbial ecology** and dynamics¹. Their widespread use and continuous discharge result in widespread distribution and accumulation in **aquatic environments**, due to incomplete removal by traditional wastewater treatment processes¹.
- ✓ **Bacterial biofilms** in these water systems are continually exposed to parabens, resulting in varied bacterial behaviors and characteristics².

This study evaluates the changes in biofilm architecture induced by chlorination and the effect of methylparaben (MP) on colony-biofilms architecture and conformation using the Mesolens microscope.

METHOD

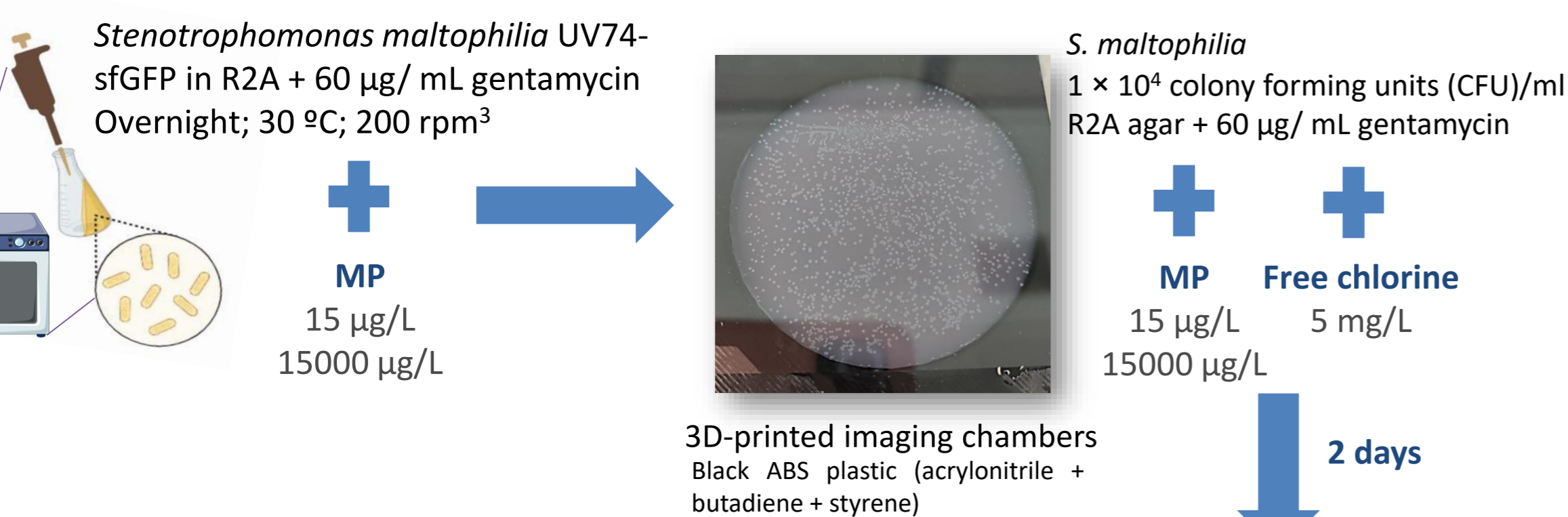


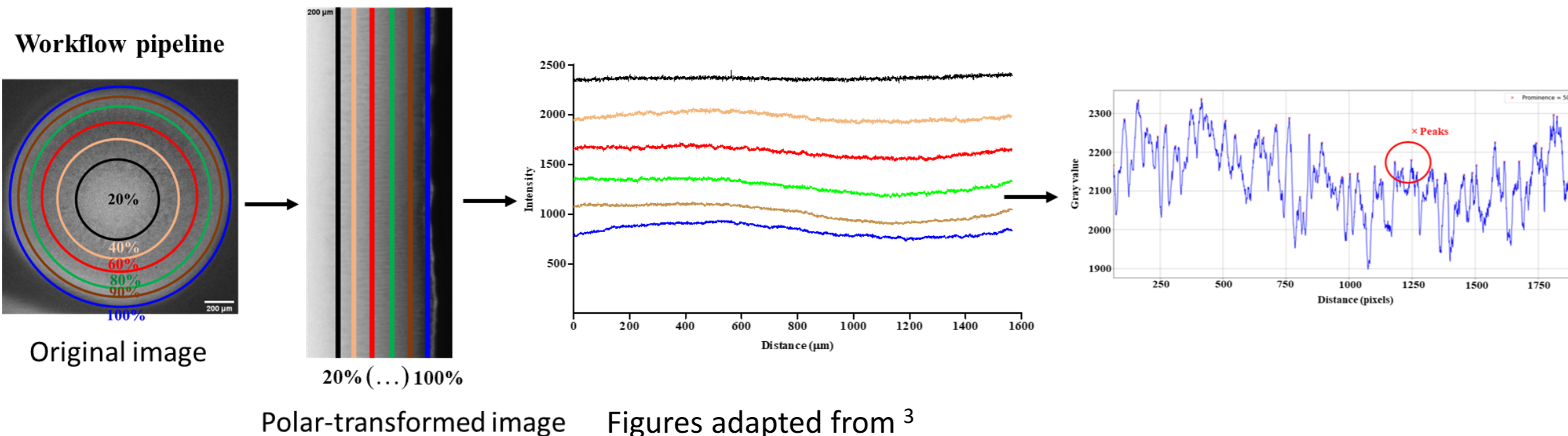
Image analysis using FIJI

- ✓ **Diameter**
- ✓ **Nº of Peaks**
Polar transformation
- ✓ **Roudness (R)**

$$R = \frac{4\pi \times \text{Area}}{\text{Perimeter}^2}$$

Imaging Mesolens widefield - Low magnification 4X

gfp 490 nm
Lipids Nile Red at 5 µg/ml - 580 nm



CONCLUSION

- ✓ Different architectural modifications in colony biofilms with exposure to MP suggested a concentration-dependent effect on biofilm structure. MP exposure led to a denser center and the formation of discernible internal structures within colonies
- ✓ Chlorine treatment significantly affected the colony biofilm architecture by changing the growth profile and roundness. The presence of both MP and chlorine exacerbated biofilm roundness perturbation, indicating an interaction between these two compounds.
- ✓ Current disinfection practices may need to be adjusted considering the presence of these environmental contaminants on drinking water distribution systems, since biofilms sense the chemical environment and adapt their architecture accordingly.

Acknowledgements

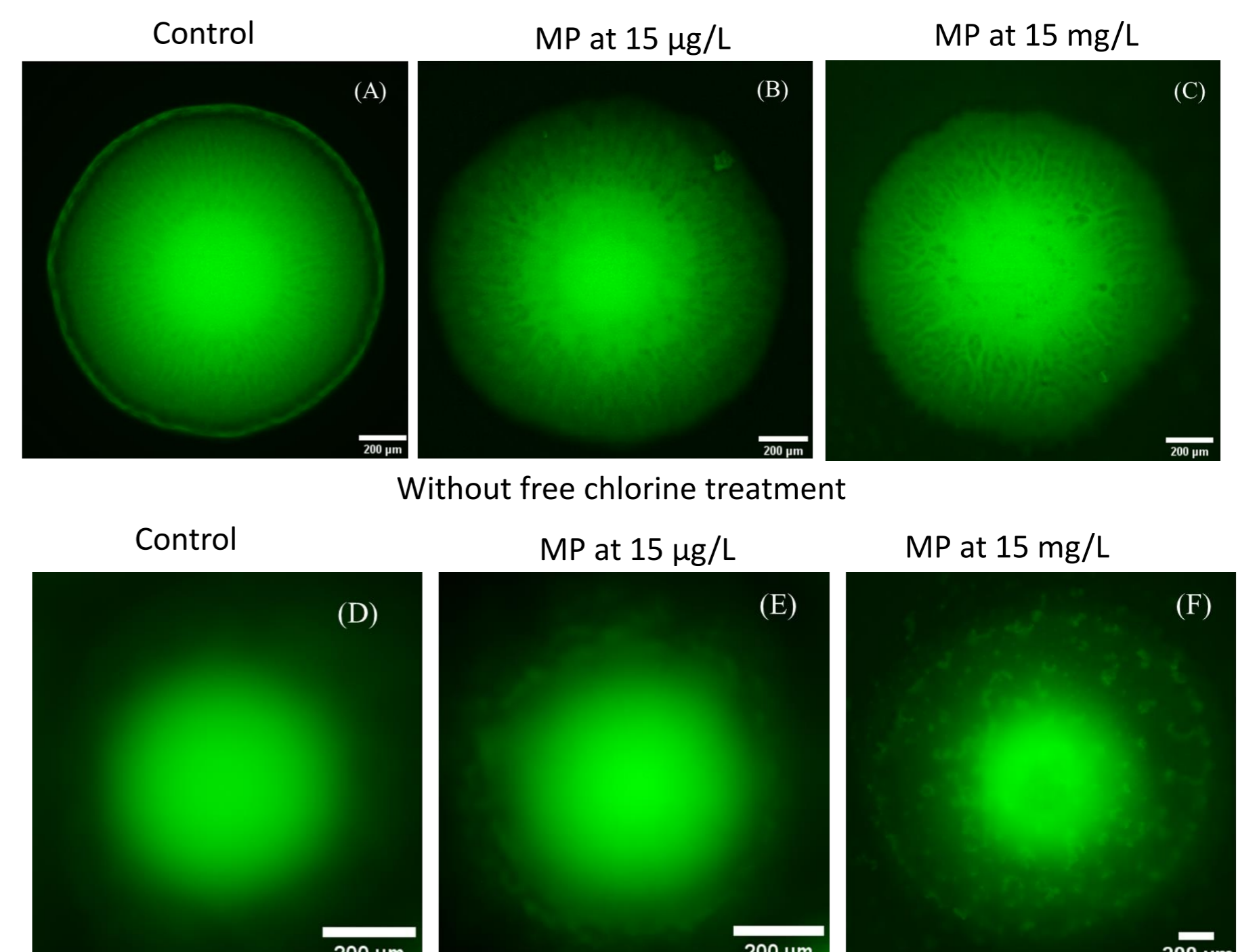
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References

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RESULTS & DISCUSSION

Impact of MP and free chlorine at environmental and in-use concentrations on colony biofilm architecture



Without free chlorine treatment
With free chlorine treatment
Figures adapted from ³

- ✓ **MP exposure** induced noticeable changes in **biofilm structure**, such as a denser center and the formation of distinct structures like channels within the colonies.
- ✓ **MP-exposed** colony biofilms exhibited more pronounced **internal structures**, evidenced by a higher number of peaks in the intensity profile.

- ✓ **Chlorine treatment** caused a decrease in the number of internal structures.

- ✓ **Chlorine disinfection** significantly reduced bacterial growth in colony biofilms, decreasing the colony diameter by more than half.

- ✓ The **roundness** of the colonies was significantly affected when chlorine and MP were simultaneously present.

