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INTRODUCTION

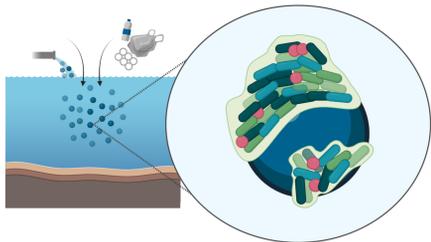


FIG 1: schematic representation of MP sources and biofilm colonisation

Up to **125 trillion** microplastics (MPs) in the ocean⁽¹⁾

Currently **5 million deaths/year** associated with bacterial antimicrobial resistance (AMR)⁽²⁾

MPs become colonised by polymicrobial biofilms called '**The Plastisphere**' (FIG.1), which can enrich AMR bacteria and are often distinct from the surrounding environment and natural debris.

Plastisphere communities may disseminate and increase survivability of attached microbes, potentially increasing human and animal exposure to AMR pathogens⁽³⁾

METHODS

Environmentally aged microplastics (polypropylene 'nurdles', polyethylene 'bio-beads' and polystyrene) and **natural or inert substrate controls** were inoculated with a natural **sewage community** (FIG.2).

Both **culture** and **molecular** methods (FIG.2) were used to calculate phenotypic resistance prevalence of faecal coliforms and a community wide measure of resistance prevalence, respectively. *Escherichia coli* phylogenetic groups were also identified using a pre-described PCR protocol (4).

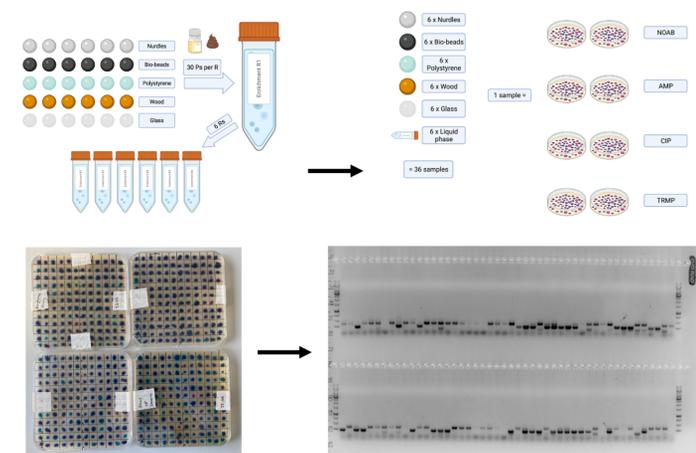


FIG 2. stages of experimental methods. Top: particle inoculation with washed sewage community. Extracted communities and liquid phase cultured on Chromocult agar supplemented with antibiotics. 16S and *int1* (widely adopted genetic marker for AMR) qPCR was also performed but not displayed. Bottom: colony PCR (4) performed on subsample to determine pathogens.

CONCLUSION

Surfaces promote the attachment of AMR organisms and pathogens, and type of surface matters when selecting for these communities.

These results may be useful in informing **environmental risk assessments** and **release limits of antimicrobials and microplastics**, in addition to highlighting improvements to **WWTP infrastructure** or **waste management** practices.

Are microplastics important platforms for the growth, enrichment and dissemination of AMR biofilms in the aquatic environment?

RESULTS

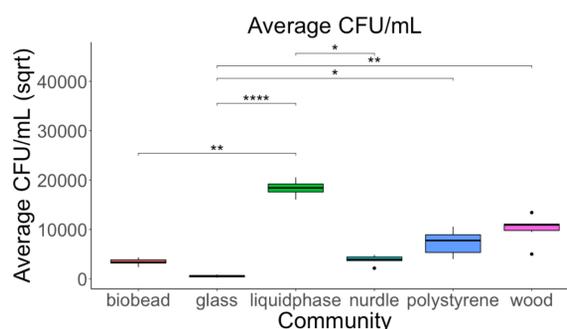


FIG 3. Average (biological replicate = 6) total CFU/mL (sqrt transformed) for particle biofilm communities and liquid phase. *: $p < 0.05$, Dunn's test (adjusted for multiple comparisons)

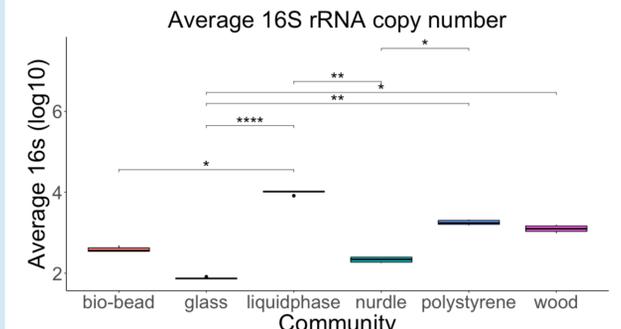


FIG 4. Average (biological replicate = 6) 16S rRNA gene copy number (log10 transformed) for particle biofilm communities and liquid phase. *: $p < 0.05$, Dunn's test (adjusted for multiple comparisons)

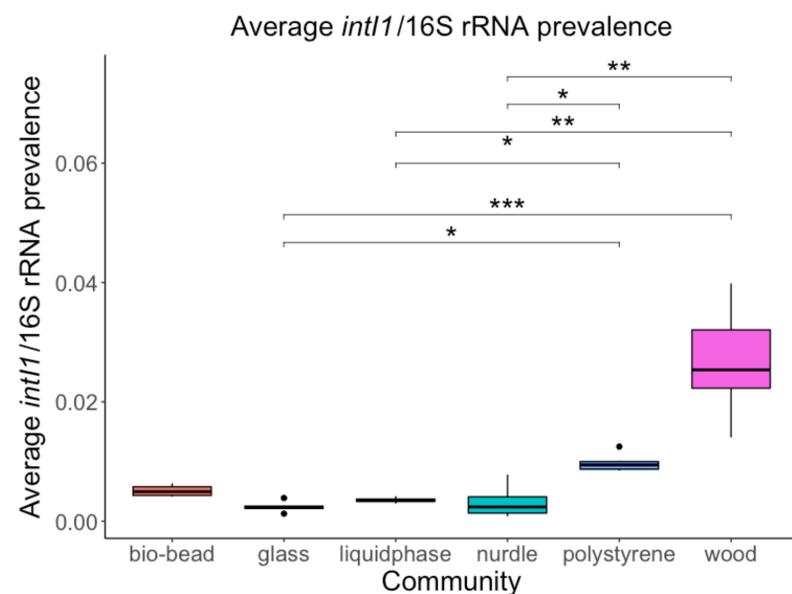


FIG 5. Average (biological replicate = 6) *int1*/16S rRNA prevalence for particle biofilm communities and liquid phase. *: $p < 0.05$, Dunn's test (adjusted for multiple comparisons)

The greatest cell densities were observed in the **liquid culture, polystyrene and wood** communities (FIG.3 and FIG. 4).

Wood and polystyrene biofilms had significantly greater *int1* prevalence than **free-living** community (FIG. 5).

Bio-bead biofilms have significantly greater pathotype prevalence than **free-living** and **wood** communities (FIG. 6).

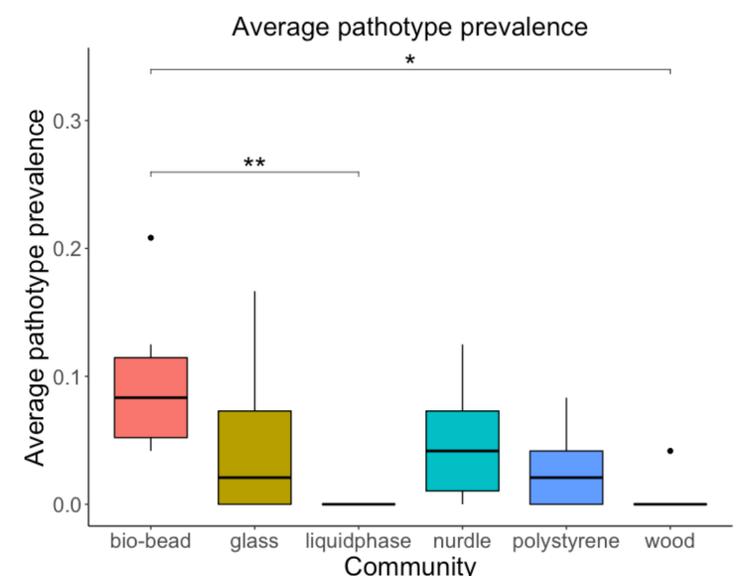


FIG 6. Average (biological replicate = 6) pathotype prevalence for particle biofilm communities and liquid phase. *: $p < 0.05$, Dunn's test (adjusted for multiple comparisons)